Evaluation Report – Access Restrictions (WP5)

June 2006

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PART A – Report Summary

Trendsetter
Trendsetter is one of the four demonstration projects within the Civitas 1 initiative. The other projects are Vivaldi, Tellus and Miracles. The Trendsetter project aim at improving mobility, air quality and quality of life while reducing noise, pollution and traffic congestion by promoting:

- Innovative management methods
- Improved logistics for greater energy efficiency
- The use of public transport and car sharing
- Increased use of zero and low emission vehicles

The five Trendsetter cities Stockholm, Graz, Lille, Prague and Pécs implement 53 measures grouped in eight demonstration work packages; Access restrictions, Integrated pricing strategies, Public passenger transport, New forms of vehicle use, New concepts for the distribution of goods, Innovative soft measures, Integration of transport management systems and Clean public and private fleets.

WP 5 – Access Restrictions
This Work Package Evaluation Report gives an overview of the measures and the results achieved in WP 5 – Access Restrictions.

The objectives of WP 5 are:

- Demonstrate and evaluate various projects on access restrictions of inner cities aiming at promoting cleaner vehicles, thereby reducing, emissions, noise and energy consumption
- Promoting sustainable modes for mobility in central cities – aiming toward less emission, less noise, a higher quality of living and for the protection of sensitive historical parts of the city
- By introducing the access restrictions and promoting sustainable modes of transport provide best practice examples to follower cities
The six measures of WP 5 are listed and described briefly below:

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 5</th>
<th>Site</th>
</tr>
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<tbody>
<tr>
<td>Environmental zones</td>
<td>5.1 Widening of the Environmental Zone</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>5.2 Widening of Environmental Zone for vehicles &gt; 6 tons</td>
<td>Prague</td>
</tr>
<tr>
<td>Strolling zones</td>
<td>5.3 Implementation of strolling zones</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>5.4 Car-free zone, extension of strolling-zone and bicycle road network</td>
<td>Pécs</td>
</tr>
<tr>
<td></td>
<td>5.5 Preparation of a new traffic and transportation strategy</td>
<td>Pécs</td>
</tr>
<tr>
<td></td>
<td>5.6 Congestion charging</td>
<td>Stockholm</td>
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</tbody>
</table>

**Measures of WP 5**

**Widening of the Environmental Zone, Stockholm (5.1)**

In this measure the existing environmental zone in Stockholm with access restriction for heavy vehicles older than eight years could not be expanded as planned. So instead the measure put focus on improving the obedience level, which had succeeded through cooperation and improved information between the city’s Traffic administration and the supervising Police authority.

**Results of measure 5.1**

Faster renewal of the heavy goods delivery vehicle fleets.
Higher obedience level (96.2 % now follow the rules compared to 92 % in the Do Nothing scenario.)

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<tbody>
<tr>
<td>Energy use</td>
<td>- 2 TJ/year</td>
</tr>
<tr>
<td>Emissions of fossil CO2</td>
<td>- 300 tons/year</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>- 30 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 0.4 tons/year</td>
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</table>

There is only a small difference between the Do Nothing scenario of 2004 and 2004 with Trendsetter, and this is because the environmental zone has been there since 1996 and was not expanded as expected. But the Trendsetter measure increased the obedience level to 96.2 % compared with the Do Nothing scenario of 92 %.

**Widening of Environmental Zone for vehicles > 6 tons, Prague (5.2)**

A large expansion of the existing zone in Prague was implemented. The regulations are based on weight and to get access to the zone the road operators need to apply for a permit. The regulations in Prague are thus dependent on weight and on the legitimacy and importance of the transport (goods delivery, building works etc.). This successful measure has resulted in less heavy traffic, and thus less pollution and road wear and tear. The obedience level in the new part of the zone is roughly 50 %.
The results from measure 5.2 are positive with significant reductions of energy use and emissions of CO₂, NOₓ and particulate matter. This seems reasonable since there was a quite large extension of the zone.

**Results of measure 5.2**

Shift in heavy goods traffic composition.

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<tbody>
<tr>
<td>Energy use</td>
<td>- 12.2 TJ/year</td>
</tr>
<tr>
<td>Emissions of CO₂</td>
<td>- 1650 tons/year</td>
</tr>
<tr>
<td>Emissions of NOₓ</td>
<td>- 43.5 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 3 tons/year</td>
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</tbody>
</table>

Implementation of strolling zones, Graz (5.3)
The Austrian city Graz has implemented four new strolling zones as part of an “onion-skin”-model with various levels of access restriction in the inner city. The measure have boosted commerce and street life in the city centre, and resulted in less pollution and noise. The results for the environmental indicators below, brought about by the four new strolling zones in Graz, is not as big as for the environmental zone measure or the congestion charging measure. However the overall effect in Graz city centre is very positive.

**Results of measure 5.3**

Improved sustainable mobility in the city.

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<tbody>
<tr>
<td>Energy use</td>
<td>- 0.34 TJ/year</td>
</tr>
<tr>
<td>Emissions of CO₂</td>
<td>- 14 tons/year</td>
</tr>
<tr>
<td>Emissions of NOₓ</td>
<td>- 0.06 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 0.004 tons/year</td>
</tr>
</tbody>
</table>

Car-free zone, extension of strolling-zone and bicycle road network, Pécs (5.4)
In Hungarian Pécs this measure aimed at reducing pollution and noise and protecting the World Heritage site in the city centre. The car-free zone, speed limit zone and access restriction zone for heavy vehicles has been established. The extension of the bicycle road network is postponed due to financial reasons.

The measurements and analysis have been finalized during summer 2005. The results cannot be separated from other actions implemented in Pécs, namely the fuel change of the power plant. Also the modernization of the bus fleet contributes to the development of air quality to a greater extent than the measures of Trendsetter. However, the air analysis shows an improvement of the air quality in Pécs. The following deductions can be made regarding the reduction of emissions (Please observe that this is Trendsetter level results, not WP level results!):
Preparation of a new traffic and transportation strategy, Pécs (5.5)

In this measure Pécs assess the current transportation situation in the city and prepares a new traffic and transportation strategy based on the Civitas philosophy. Future development of parking facilities and public transportation is a large part. The effects of the new transportation strategy can only be measured after its implementation, which is planned for the years 2007-2013 in the framework of the National Development Plan. As an overall summary, it can be stated, that the main focus of the strategy is environment protection, i.e. to reduce the emission of greenhouse gases, in order to provide better living circumstances for our residents. The reduction of emissions is not applicable for this measure at this time.

Results of measure 5.5

The philosophy of Civitas has been integrated in actual city traffic planning. The measure has provided professional background for future transportation actions. The measure has also described the actual places where new parking houses are needed.

<table>
<thead>
<tr>
<th>Energy use</th>
<th>not applicable</th>
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</thead>
<tbody>
<tr>
<td>Emissions of fossil CO2</td>
<td>not applicable</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>not applicable</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>not applicable</td>
</tr>
</tbody>
</table>
In Stockholm a full-scale congestion charging trial will be implemented in January 2006. This measure includes pre-studies and assessments of the current traffic situation, a development of the premises for the trial such as zone limits, tariffs and time limits, a development of the operative targets for the evaluation of the trial and an implementation of an evaluation scheme. The measure has been implemented as planned, except for the delayed implementation of the congestion-charging scheme.

Congestion charging is a powerful and efficient method to restrict and direct traffic flow so that the existing road system is used in a more efficient way. Also quite low charges gives substantial effect on the traffic flow and therefore on congestion, environment and health.

<table>
<thead>
<tr>
<th>Expected results of measure 5.6</th>
</tr>
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<tbody>
<tr>
<td>Reduced traffic, especially during peak hour.</td>
</tr>
<tr>
<td>Reduced congestion.</td>
</tr>
<tr>
<td>Change to more sustainable transport modes.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Energy use</th>
<th>Reduction (no exact figure available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions of fossil CO2</td>
<td>Reduction (the effect is + in the TS five-degree-scale (- - / - / 0 / + / ++), where + indicates a positive change and thus a reduction of emission)</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>- 110 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 37 tons/year</td>
</tr>
</tbody>
</table>

It is important to know that the results from the congestion charging measure presented here is estimated results from when congestion charging is actually implemented in Stockholm. Clean vehicles will be exempt from the charge and their share is therefore expected to increase.

Outside of Trendsetter public transport is strengthened, therefore the results come from both the congestion charging scheme itself and improved public transport. Public transport use to and from the inner city is expected to increase by 7 % as a result of the introduction of the congestion charge.

The congestion charges can also contribute to an increase in the level of conformity with the environmental quality standards for air, especially regarding NOx.
Recommendations for replication and take up by other cities

In general

• Access restriction measures generally result in reduced emissions of CO2, NOx, PM and noise, reduced energy consumption, less congestion, improved sustainable mobility and more human-friendly city centres. These measures can change the character of the city to something that better fills people’s needs.

• Environmental zones and strolling zones are suitable in sensitive city areas or in areas where the local emissions are unacceptable. The positive effect in the local environment (NOx and PM) is somewhat stronger than the global effect (CO2), even if the global effect often also is positive.

• Policy work is not only important on an EC level, but also on a national, regional and local level. Policies are important because they form a base from which work can start. A strong policy can create demand for sustainable transport solutions. It is easier to achieve acceptance for demand management measures if there is a clear policy. When the main direction and goals are decided, individual measures can be accepted easier.

• Use other events, projects and valuable assets to create positive synergies with access restriction measures, for example cultural capitals and world heritage sites.

• Both regarding environmental zones, strolling zones and congestion charging a good idea is to proceed step by step. These kinds of measures have the advantage of being quite flexible and easy to upscale geographically or regarding emission limits. A step-by-step approach for strolling zones has been successfully used in Graz as well as in Copenhagen.

• To achieve acceptance and support from the general public and different actors information and actor involvement is crucial, this cannot be said too many times. Use innovative methods for this like in Graz or Pécs. A reference group can be a very good way to attain participation. Involving citizens when planning and implementing measures like this is also a positive way to practice democracy.

• New transportation patterns need to be assessed before implementing an access restriction measure. Current or expected bottlenecks should be eliminated.

• Access restriction measures also should be planned together with urban planning departments and a system approach is needed to avoid unwanted effects. It is very important to improve more sustainable transport modes when implementing strolling zones and congestion charging. Public transport and the possibility to bicycle or walk need to be strengthened. If this is not done there can be a risk for increased external establishments and a total increase of transportation work. A good example on how to do this is the implementation of strolling-zones in Graz. The commercial activity in the city centre have been boosted rather than diminished because of the strolling zones.

• It is important to consider at what development stage a city is in, as this can vary a lot. A measure that is very urgent and suitable for one city might be a total waste of time and resources in another city.

• Pécs recommend that each city should modify and update its traffic and transportation strategy after the completion of the Civitas projects. The best practices of these cities should appear in medium and long-term traffic development programmes.
• Combine carrots and sticks!
• Cooperate with different types of media to communicate information.
• Broad and strong political commitment is needed.

Environmental Zones

• Prague states that environmental zones are an efficient way to reduce the volume of especially transit goods vehicle traffic inside a limited urban area. Environmental zones can be a tool for cities to fulfil the European air quality directive.

• A Swedish experience is that cooperation between cities regarding environmental zones has many benefits. It can give more media attention and more people will listen to your message. The same or similar information material and computer programmes can be used, both an economical and practical benefit. It is also easier for road carriers that operate in several different cities if the environmental zone rules in these cities are the same.

• When planning an environmental zone, communication with road carriers and their organizations has something important to add. A good idea is to form a reference group with participants from organizations for road carriers, producers of vehicles and people from other authorities. This group should be put together in good time before the project starts. Much can be learnt from a group like this and it can also give valuable help when information shall be spread.

• The environmental zone rules are worthless if they are not followed, this is why enforcement is crucial. In Stockholm for example, this task have been successfully accomplished through cooperation between the Traffic Administration and the Police Department. Supervision can also be improved through introducing a special parking ban for vehicles that do not fulfill the environmental zone rules. Then the traffic warden will also contribute to the surveillance work. It is also necessary to consider what consequences to choose for those breaking the rules.

• It is important to investigate the legal aspect in an early stage when planning an environmental zone, on both a national level and within the EC. If there is any legal obstacle to environmental zones this should be solved first.

• When establishing environmental zones it is important to remember that fleet renewal takes time. Therefore it is important that the rules are set at an appropriate level. If the rules are set too low, the environmental zone is not putting pressure on the road carriers. And if they are set too high, that might drive transport companies out of business.

• When choosing type of environmental zone regulations, consider if the needs best can be filled with rules based on Euroclass, age or weight, and if it should be possible to achieve access permits for example on a daily basis? To have possible future EC harmonization in mind when choosing is a strong recommendation.

• Another important aspect is how to handle long-distance and international transports.
• Environmental zones is a type of measure that usually have good acceptance among citizens, while lower among transport companies. Usually, transport companies become more positive after some time of operation.

• Adjust the local infrastructure when implementing restricted zones. Drive-through corridors might be needed in certain cities depending on geography.

Strolling Zones
• Graz recommends the establishment of strolling zones as an additional possibility for sustainable urban design and also the use of the citizen advisory opinion method in other European cities.

• It is important to involve commerce in the process.

• Acceptance from commerce and citizens often increases after implementation.

• Very important to improve public transport within the zone and increase parking space around it.

• Strolling zones can be used to achieve a living city centre with prospering commerce and street life.

• Strolling zones are usually easier to implement than pedestrian zones (which totally exclude other modes than pedestrians).

• Strolling zones increase the accessibility for disabled, families and other un-protected modes.

Congestion Charging
• Congestion charging should be part of a transport package with complementing measures like improved public transport and park & ride facilities.

• Coordinate congestion charges with other environmental schemes, to gain increased efficiency. Municipal efforts to support clean vehicles can be combined with charge exceptions or reductions.

• To achieve interoperability in the future, new congestion charging systems should be designed with consideration to international standards and good practice, if such have been developed by that time. To cooperate with other cities is necessary.

• There should be enough time in the time plan so that bottlenecks can be eliminated in good time. Do not underestimate the time needed for this type of measure.

• A congestion charge scheme should be transparent and user-friendly:
  - Citizens must experience the current traffic situation and air quality as a problem in order to support implementation of congestion charges.
  - The main objectives should be reflected in the system.

• An evaluation plan should be adopted in an early stage, designed to provide accessible, comprehensive and reliable information on the efficiency of the scheme.
Recommendations to the EC

- Continue the policy work regarding sustainable transports, as this is the base for successful implementation of individual measures. Policies are important because they form a base from which work can start. A strong policy can create demand for sustainable transport solutions. It is easier to achieve acceptance for demand management measures if there is a clear policy. When the main direction and goals are decided, individual measures can be accepted easier.

- The regulations for environmental zones need to be harmonised through an EC directive. The rules should use the Euroclass standards as a basis and they should also make it possible to identify what Euroclass a vehicle has. It is good to use the Euroclass standards as a basis since they are directly related to the emissions. It should be possible for both certified vehicles and vehicles that meet the demands of the Euroclass in question on particles and emissions to be approved.

- Harmonize the rules regarding congestion charging and increase interoperability in Europe concerning electronic fee collection.

- It is important to consider at what development stage a city is in, as this can vary a lot. A measure that is very urgent and suitable for one city might be a total waste of time and resources in another city. An EC supported project like Trendsetter should have this flexibility and consideration built-in.

- It is very important to use a system approach when the EC is working in this area, and to have a comprehensive view instead of seeing transports as a separate entity.

- The EC could recommend the installation of strolling zones as an additional possibility for urban design and the use of citizen’s advisory opinions in other European cities.

- The concept of strolling zones has not been fixed in legislation: things like traffic sign, right for cyclists, speed limit need to be regulated.

- The EC should also disseminate experience and knowledge about success stories regarding access restriction measures.

- The EC should continue to support access restriction measures.
PART B – Common Trendsetter introduction

1. Introduction

1.1 Background
Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 Trendsetter – a part of the Civitas Initiative
The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
• Political commitment is a basic requirement
• Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:
• to promote and implement sustainable, clean and (energy) efficient urban transport measures
• to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
• to build up critical mass and markets for innovation

Each city implement a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

The five Trendsetter cities are briefly described in appendix 1.

1.3 Achievements within Trendsetter

Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European
dimension. Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

Improving access to public transport

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

Trip planning, traffic control and cycling

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

Access restrictions for reduced traffic

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access
restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone. Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

Marketing and mobility management
Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

Co-transportation of goods
Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

Clean vehicles and fuels
Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

Incentives and promotion of clean vehicles
Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.
1.4 Overview of achieved effects

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
</tr>
</tbody>
</table>

**Costs** are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure. **Time** – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emissions</th>
<th>Energy</th>
<th>Mobility</th>
<th>Time</th>
<th>Investment cost</th>
<th>Operational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td></td>
<td>Increased public transport security</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td></td>
<td>New services for special needs</td>
<td>–</td>
<td>–</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>Trip planning</td>
<td>Real-time information helps staff and passengers</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
<td>![ ]</td>
<td>![ ]</td>
<td>–</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td></td>
<td>Selective access restriction for heavy vehicles</td>
<td>![ ]</td>
<td>![ ]</td>
<td>–</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>alternatives</td>
<td>Mobility management</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
<tr>
<td>Improved goods</td>
<td>Consolidation of goods *</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
<td>![ ]</td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect*
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 Trendsetter cities after Civitas

The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas I cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1 Evaluation at different levels

The Trendsetter project has been evaluated in different levels; measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:

- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

2.2 Indicator based evaluation

Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dBA</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios

When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.
Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.

Methodology
The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (\(--\) 0 \(\) ++).
3. Trendsetter objectives

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

3.1 Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide examples:</td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase mobility:</td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td>Enhance Environment:</td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO₂ emissions by 5 %, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOₓ emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td>Save Energy</td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO₂, NOₓ and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfil the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.
The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period. The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.

The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
## 3.2 Demonstration objectives

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. Those not reached are commented below.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel</td>
<td>97</td>
<td>134</td>
<td>+ 37</td>
<td>Graz</td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+ 88</td>
<td>Stockholm 324 Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4 Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+ 1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+ 2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>- 57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td>300</td>
<td>3 000</td>
<td>+2 700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1 100</td>
<td>3 000</td>
<td>+1 900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>
3.3 Scientific and technical objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Each demonstration objective and the fulfilment of it is described below

**Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.**
In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm3, but biogas vehicles have consumed only 4,26 million Nm3. The rest has been used for heating and electricity production or just flared.

Before Trendsetter, the local biogas production in Lille was 0,12 Nm3 biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3,6 million Nm3 per year.
This objective is not applicable for the other three cities.

**Reduce the commercial cost of biogas fuel by 20% in demonstrating cities**
The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.

In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).
This objective is not applicable for the other three cities.
Implement a complete biogas technology chain in Stockholm and Lille, from production to end use

In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plats will be ready.

This objective is not applicable for the other three cities.

Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now.

The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.

- A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of
fossil CO2, emissions of NOx and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

– A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.

– In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the website has been successful in reaching potential buyers and to have a reliable and relevant content.

– In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

Evaluate the effectiveness and political acceptability of environmental zones

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

– An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

– The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

– Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.
− In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

**Develop integrated city mobility plans integrating environmental protection, traffic and public health policies**

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2,200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.

The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4. Overview of WP

4.1 Work package objectives

The work package objectives for WP5 – Access restrictions are:

- Demonstrate and evaluate various projects on access restrictions of inner cities aiming at promoting cleaner vehicles, thereby reducing emissions, noise and energy consumption.
- Promoting sustainable modes for mobility in central cities – aiming toward less emission, less noise, a higher quality of living and for the protection of sensitive historical parts of the city.
- By introducing the access restrictions and promoting sustainable modes of transport provide best practice examples to follower cities.

4.2 Short overview/description of measures within WP

This chapter contains a short description of all measures in work package 5. As can be seen in the table below, some of the measures can be put in two subgroups, environmental zones and strolling zones. The measures regarding a new transportation strategy and congestion charging are the two remaining measures.

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 5</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental zones</td>
<td>5.1 Widening of the Environmental Zone</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>5.2 Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
<td>Prague</td>
</tr>
<tr>
<td>Strolling zones</td>
<td>5.3 Implementation of strolling zones</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>5.4 Car-free zone, extension of strolling-zone and bicycle road network</td>
<td>Pécs</td>
</tr>
<tr>
<td></td>
<td>5.5 Preparation of a new traffic and transportation strategy</td>
<td>Pécs</td>
</tr>
<tr>
<td></td>
<td>5.6 Congestion charging</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>

Widening of the Environmental Zone, Stockholm (5.1)

Since 1996 there is an Environmental Zone for heavy vehicles and buses in the central area of Stockholm. Within the zone diesel engine driven heavy trucks and buses are prohibited to drive if they are older than 8 years. Approximately 10% of the heavy vehicles in the zone did not obey the existing rules in year 2000.
The measure is aimed at widening the environmental zone in Stockholm, to make the obedience to the rules as high as possible and to spread information to other cities. The widening of the zone had to be postponed since the building of the area in question is delayed and not finished yet. So the measure turned out to be focused on increasing the obedience, which was made through improved cooperation between the Stockholm Traffic Administration and the Police department.

The reasons for increasing the obedience level and widening the environmental zone is to create a more attractive city centre with less emissions, energy consumption and noise and increase acceptance for clean vehicles.

Responsible actor for this measure is the Stockholm Traffic Administration.

**Widening of Environmental Zone for vehicles > 6 tons, Prague (5.2)**

Prague, a city with population of 1.2 million, has recently experienced a massive rise in registered vehicles as well as increased volumes of car traffic. The number of registered vehicles almost doubled from 1990 to 2003, and traffic volumes grew by over two and a half time. Simultaneously, neighbouring countries like Germany and Austria have adopted fees for heavy goods vehicles, thus increasing the transit transport in Czech Republic. This has negative impacts on the environment due to hazardous emissions and noise but also on the traffic flow and traffic safety. Heavy goods vehicles are a big reason for this. Before Trendsetter, Prague had an access restriction zone for vehicles over 3.5 tons in the inner city centre and a larger zone around this zone with access restriction for vehicles over 6 tons. Access permits are issued per day, so traffic that do not have to go inside the zone drives around it, thereby avoiding the time loss when applying for a permit. Intending to curb negative impacts of traffic on the environment, the Environmental Zone for vehicles over 6 tons was decided to be widened. Some traffic that used to transit the zone is expected to move outside the zone to other roads that have larger capacity and are more capable of reducing the adverse effects of traffic. Additionally, implementing this measure creates pressure to make transporters gradually renew their fleet to modern, light and medium goods vehicles that produce less hazardous emissions.
emissions, less noise and less affect the other urban traffic. The measure has been implemented as planned.

Responsible actor is the Institute of Transportation Engineering of the City of Prague.

Implementation of strolling zones, Graz (5.3)
Graz has one of the largest pedestrian precincts among European cities. But the neighbouring districts are strongly affected by heavy individual motorised traffic.

Accessibility of the precincts through these surrounding areas is neither safe nor attractive, which is a problem in many cities with large pedestrian areas. The objective of this measure is to implement four strolling zones in central Graz, thereby improving the quality of living and attractiveness of the city, to promote sustainable alternatives to private cars in the city centre such as walking and biking, to provide other cities with best practice examples and to reduce emissions and noise in the city centre. The pedestrian areas will be extended with differentiated access restrictions through an “onion-skin system” of pedestrian precinct, bike access precincts, the missing link strolling zone and beyond that the city wide speed limit of 30 km/h for certain suitable areas. Car traffic will not be excluded totally from inner city traffic, but will only play a minor role in these streets with respect to number and speed.

The measure implementation has been somewhat modified. Other strolling zones were selected, but the number was maintained. Finalisation of two of the strolling zones and an extensive evaluation is planned to be finalized during 2005. The reasons for the delay are budgetary problems of the city and political changes.

Responsible actor is City of Graz.

Car-free zone, extension of strolling-zone and bicycle road network, Pécs (5.4)
The main problem to be solved by measure 5.4 is to reduce the large number of cars visiting the city centre, which results in congestion, significant air and noise pollution and damages the UNESCO protected sites.
This measure establishes a car-free zone in the centre of Pécs around the UNESCO protected monuments. This zone is accompanied by a limited access area in the buffer zone of the city-centre. The planning of the location, the argumentation with the stakeholders, the implementation and the evaluation of the action, i.e. the whole implementation cycle is included in Trendsetter. Extension of the strolling zone and planning a bicycle road in the inner city is also part of the measure, which is also expected to increase the use of “green” transportation like bicycling and strolling.

Traffic signs and tables, blocking the roads and using strict municipal police control serve the implementation of the measure. A speed limit of 30 km/h and a limitation of access for freighters over 6 tons is also introduced in the area. The actions contribute to significant decrease in private car use in the centre and by that a reduction of the number of cars accessing the centre, the emission of greenhouse gases and noise pollution.

There have been smaller deviations from the plan, like postponing some infrastructural investments. The extension of the bicycle road system has been taken out of Trendsetter. Responsible partners are the City of Pécs and Pécs Municipal Operations and Property Management Company.

Preparation of a new traffic and transportation strategy, Pécs (5.5)

Due to the unexpected growth in the number of private cars and never seen traffic congestion in the City of Pécs, the traffic and transportation strategy from the mid nineties lost its validity. At present there is not enough information on the present traffic situation in the city and there are no scenarios about the possible direction of future developments.
The measure aims to prepare a local traffic and transportation strategy in order to meet the challenges of the huge increase in traffic and to provide environmentally friendly solutions for the transportation needs of the citizens. The new strategy aims to continue the extension of strolling-zones, car-free zones, develop public transport and replace diesel oil based public transport with electricity (tram) and biogas-fuelled vehicles. It is expected that the strategy will be implemented between 2007-2013.

The strategy focuses on two aspects: access limitations in the city centre to offer better living and recreation conditions and a paradigm change in public transportation. The strategy investigates public transportation development from two perspectives: feasibility of the introduction of fixed track public transportation modes and the perspective of fuel change for the existing bus fleet.

The city of Pécs will analyze the central city areas in order to get more information on the present traffic situation in the city centre, to be able to prepare a new integrated strategy taking into consideration the philosophy of Civitas in city traffic planning and management, to gain new information on the future development of the parking facilities, i.e. the location of new parking houses, to gain new information on how to re-plan traffic in the city and to describe the future directions of PT development. The measure is being implemented as planned.

Responsible partner is City of Pécs.

Congestion charging, Stockholm (5.6)

The streets in the City of Stockholm and the main roads for entrance to the city are crowded and the congestion problems are severe during peak hours. At the same time existing predictions and plans forecast an increase of people traveling by car and a decrease of people using public transport, walking or bicycling. Decreased congestion and improved environmental conditions is necessary in order to safeguard the cultural heritage, people’s health and the attractiveness of the city.

Congestion charges on a trial basis, called The Stockholm Trial, will start in January 2006 and will continue until July 2006. The purpose of the full-scale trial is to test whether congestion charges improve traffic flow, decrease emissions and enhance urban environment. The trial also includes significant investments in public transport and park-and-ride facilities. A referendum on the permanent implementation of congestion charges will be held in conjunction with the general election in September 2006.
This measure includes pre-studies and assessments of the current traffic situation, a development of the premises for the trial such as zone limits, tariffs and time limits, a development of the operative targets for the evaluation of the trial and an implementation of an evaluation scheme. The measure has been implemented as planned, except for the delayed implementation of the congestion-charging scheme.

The overall objectives of the trial are to reduce traffic volume by 10-15 percent on the most heavily used routes during morning and afternoon hours, to improve accessibility for buses and cars in the inner city, to cut emissions of CO2, NOx and particular matter in the inner city and to make people in the inner city experience an improved environment at the street level.

Responsible actor is the City of Stockholm. Swedish Road Administration, Stockholm Transport and Stockholm Traffic Administration are also involved partners.

4.3 Problems to be solved by the measures

The spontaneous development of transport in Europe is not sustainable. To change this it is necessary to mobilize and present a carefully chosen combination of measures that cover several areas and involve various responsibilities in the cities rather than a list of isolated efforts - or in other words, to have an integrated approach. All Trendsetter Cities work in this way both within Trendsetter and elsewhere to achieve this breakthrough.

In Trendsetter this is illustrated by the promotion of innovative management methods to enhance mobility; improved logistics for greater energy efficiency; the use of public transport and car-sharing and increased use of zero and low emission vehicles.

Measures within WP 5 Access Restriction are just a part of the approach for reaching a sustainable transport system through transport demand methods (TDM). Within this WP problems regarding pollution, noise and congestion in city areas have been solved through different types of access restriction, such as environmental zones and strolling zones, but also through congestion charging and through formulating an integrated transportation strategy. The access restrictions will affect the demand for transport and steer towards sustainable transport modes, and thus less emissions, noise and congestion. The measures within this WP are divided into three subgroups:

Environmental Zones (measure 5.1, 5.2)

The overall problem to be solved by the measures within the group Environmental Zones is to widen environmental zones in city centers or to increase the obedience level of these zones. When environmental zones are established, the most polluting vehicles are
prohibited to access parts of the city and thus the pollution can be decreased. The purpose of the measures is to limit access for heavy vehicles in certain densely populated city areas. Through this, the negative impact of heavy vehicles on the traffic flow is reduced, and so are emissions and noise.

Strolling Zones (measure 5.3, 5.4)
The overall problem to be solved by the measures within the group Strolling Zones is to establish or widen strolling zones or car-free zones in city centers. In one measure extension of a bicycle road network is also included. By establishing strolling zones, car-free zones and bicycle roads more space is made available for people to walk or cycle on. Pollution and noise is decreased and the living and working environment in city area gets more pleasant and healthy.

Other types of measures (measure 5.5, 5.6)
The measures about congestion charging and a new transportation strategy deviate somewhat from the two main groups above. The congestion charging measure tries to solve the problems associated to preparing a congestion-charging scheme, so that it will improve the urban environment and reduce congestion in the future. The strategy measure tries to solve the problem of taking a comprehensive view on the transportation system of Pécs and formulating a sustainable strategy for the future.

All measures aim at contributing to the high level objectives like promoting sustainable transport with decreased emissions, noise and energy use, and increased accessibility.

Common for most of the measures in the WP are that they aim to improve the quality of living and attractiveness of the city, in other words, solve problems with congestion, air pollution, noise and energy use. The first group of measures is more focused on trying to improve the air quality in cities, thus restricting access for very polluting vehicles. The second group is more concentrated on totally restricting access for any type of vehicles in some city areas, and thus also removing the very presence of vehicles. This means that the measures in the second group try to make room for people in city centres.

The two groups are very much overlapping since both environmental zones and strolling zones are about reducing congestion and air pollution in the city centre. Many of the cities have experienced a rapid growth of the number of cars, which have led to deterioration of the air quality, thus affecting people’s health. The measures tries to solve these problems by restricting the access to the city centres for cars and/or heavy vehicles.

4.4 Interaction within WP/Civitas
This work package group has had a lot of interactions, both within the WP and with other Trendsetter projects and even projects outside Trendsetter. Technical issues, acceptance, evaluation methods etc. have been discussed on meetings, seminars, workshops and study visits. A lot of information has been exchanged and there is a sincere wish to learn from each other’s projects. Some of the activities are described below.

When starting the project a kick-of was held in Graz. This gave involved people a context of Trendsetter and Civitas, as well as contact with each other.
There has also been a WP workshop in Graz in June 2002 where discussions were held about each measure, the WP objectives, evaluation indicators and more.

In May 2003 a workshop was held in Prague where experience from the Civitas projects (Miracles, Vivaldi, Tellus and Trendsetter) where presented. Information about the European Civitas Initiative was also presented along with the latest news on congestion charging from London. Two parallel sessions where held; Access restrictions and Traffic management. After a presentation of the measures a discussion was held about problems on the way, important lessons for cities, technical issues to be solved and technical issues to focus on.

A workshop was held in Pécs in October 2003. The Trendsetter cities introduced their measures to the representatives of the Hungarian cities during the workshop, which - among others - resulted in a new impulse for preparing a new traffic and transportation strategy for Pécs, based on the experiences of the Trendsetter cities. It is recommended to each Central- and Eastern European new member state city - participating in Civitas - to organize similar events in order to realize in time the need and opportunities for updating their city transportation and traffic strategies.

In May 2004 a workshop was held in Stockholm where people from Stockholm and Prague discussed bus priority and environmental zones in two parallel sessions. After a presentation of Trendsetter projects in Stockholm (describing which projects that are carried out, how the evaluation of the projects will be performed and what parameters that are used for this) the bus priority system was presented. SPOT (adaptive traffic signals), signal technology, detection technology and results from the evaluation in Stockholm were discussed. On a study tour the bus priority system and the 11 intersections in the test-area that are controlled by SPOT-technology were visited.

Information about projects within Trendsetter was also spread at the European Conference on Mobility Management (ECOMM) 2003, and at Transportforum 2004. Transportforum is the biggest conference on transport in Sweden, and Trendsetter had a half-day session.

In January 2005 a work package meeting was held in Graz. Focus was on the status of the measures, remaining evaluation process and lessons learnt (technical, economical, synergies, political/administrative). A study visit was also arranged, where measures within WP 5 as well as other measures were studied.
PART C – Results and Analysis

5. Indicators
Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators will be presented and analysed in chapter 5.1 – 5.2.

5.1 Indicators and results
Below is a table containing the measures of work package 5 and which Trendsetter Common Core Indicators and WP Common Indicators they use in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
<th>5.1</th>
<th>5.2</th>
<th>5.3</th>
<th>5.4</th>
<th>5.5</th>
<th>5.6</th>
<th>CCCI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M4</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year and peak/0 peak</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M6</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO2</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M8</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year and peak/0 peak</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M11</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dB</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>(M12)</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips (cars and delivery vehicles)</td>
<td>Number of trips/hour (5.6) or index (5.5)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M21, M22, M25</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time (cars and delivery vehicles)</td>
<td>Qualitative scale (-- - 0 + ++) or index (5.5)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>(M23)</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service (pedestrians/cyclists)</td>
<td>Qualitative scale (-- - 0 + ++) or index (5.5)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M19</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance (Car, delivery vehicles and pedestrians/cyclists)</td>
<td>Qualitative scale (-- - 0 + ++) or index (5.5) or % (5.6)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M14</td>
</tr>
</tbody>
</table>

* Civitas Common Core Indicators

Except for the Trendsetter Common Core indicators, the evaluation area *Transport* is evaluated in most measures, with a variety of indicators. Examples of indicators within *Transport* are percentage of heavy vehicles within the environmental zone with permission, traffic (flow) within the zone and different types of modal split. Within the evaluation area *Environment*, emissions of sulphur are evaluated in two of the measures.

**Widening of the environmental zone, Stockholm (5.1)**
Stockholm has had an environmental zone since 1996. The regulations apply to vehicles that weigh more than 3.5 ton and if they are more than eight years old they are not allowed to enter the zone. The zone could not be expanded as planned within Trendsetter, which is why the focus of this measure has been to higher the obedience level. Environmental zones is a good way to improve the local urban air quality and reduce noise since it is a push towards the use of more modern and environmentally friendly heavy vehicles.
There is only a small difference between the Do Nothing scenario of 2004 and 2004 with Trendsetter, and this is because the environmental zone has been there since 1996 and was not expanded as expected. But the Trendsetter measure increased the obedience level to 96.2% compared with the Do Nothing scenario of 92%. To achieve a high obedience level is a very important aspect of environmental zones.

Vehicles that are comprised by the environmental zone regulations have gradually been phased out since 1996, and only a “normal” phase out of elder vehicles was achieved within the Trendsetter period. The Do Nothing scenario therefore shows an improvement compared to some years earlier, and this improvement is not because of Trendsetter.

Widening of the environmental zone, Prague (5.2)
The environmental zone for vehicles over 6 t in Prague was extended to almost the double size. The obedience level in the new part of the zone is roughly 50%.

Results of measure 5.1
Faster renewal of the heavy goods delivery vehicle fleets.
Higher obedience level (96.2% now follow the rules compared to 92% in the Do Nothing scenario.)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
<td>- 2 TJ/year</td>
</tr>
<tr>
<td>Emissions of fossil CO2</td>
<td>- 300 tons/year</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>- 30 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 0.4 tons/year</td>
</tr>
</tbody>
</table>

Results of measure 5.2
Shift in heavy goods traffic composition.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
<td>- 12.2 TJ/year</td>
</tr>
<tr>
<td>Emissions of fossil CO2</td>
<td>- 1650 tons/year</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>- 43.5 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 3 tons/year</td>
</tr>
</tbody>
</table>

The access restriction zone for heavy vehicles in Prague is different from the environmental zone in Stockholm. In Prague the drivers can apply for short-term or long-term permits, and they will only get it if they have an errand within the zone. In this way, very much of the transit traffic is avoided. If they enter the zone without permission, they risk getting a fine by the police. So the regulations in Prague are dependent on weight and on the legitimacy and importance of the transport (goods delivery, building works etc.). The results from measure 5.2 are positive with significant reductions of energy use and emissions of CO2, NOx and particulate matter. This seems reasonable since there was a quite large extension of the zone.
Implementation of strolling zones, Graz (5.3)
The results for the environmental indicators below, brought about by the four new strolling zones in Graz, is not as big as for the environmental zone measure or the congestion charging measure. However the overall effect in Graz city centre is very positive.

<table>
<thead>
<tr>
<th>Results of measure 5.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved sustainable mobility in the city.</td>
</tr>
<tr>
<td>Energy use</td>
</tr>
<tr>
<td>Emissions of fossil CO2</td>
</tr>
<tr>
<td>Emissions of NOx</td>
</tr>
<tr>
<td>Emissions of PM</td>
</tr>
</tbody>
</table>

Car-free zone, extension of strolling-zone and bicycle road network, Pécs (5.4)
The measurements and analysis have been finalized during summer 2005. The results cannot be separated from other actions implemented in Pécs, namely the fuel change of the power plant. Also the modernization of the bus fleet contributes to the development of air quality to a greater extent than the measures of Trendsetter. Trendsetter has its main effects on the inner city because some of the traffic is placed outside the medieval city centre. However, the air analysis proves the development of the air quality in Pécs:

<table>
<thead>
<tr>
<th></th>
<th>Average daily content in 2003</th>
<th>Average daily content in 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO2 µg/m3 / average day</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>NO2 µg/m3 / average day</td>
<td>33</td>
<td>22</td>
</tr>
<tr>
<td>NOx µg/m3 / average day</td>
<td>131.61</td>
<td>89.4</td>
</tr>
<tr>
<td>Particle / m³ daily average</td>
<td>62.6</td>
<td>44</td>
</tr>
<tr>
<td>CO mg / m³ annual daily average emission</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>
From these data, the following deductions can be made regarding the average quantity of emissions (Please observe that this is Trendsetter level results, not WP level results!):

### Results of measure 5.4 (and also from other measures)

- **80 % less traffic in certain parts of the inner city.**
- **95 % less traffic of heavy freighters in the city centre.**
- **100 % less traffic in the focal point of the inner city.**
- **Around 3 % reduction of noise together with Trendsetter measure 6.5.**

All figures reflect the decrease in the city centre affected by the measures and not the city level changes.

<table>
<thead>
<tr>
<th>Energy use</th>
<th>- 9 TJ/year (deduction from the reduction of inner city traffic, although the same cars are used, but their parking is outside the centre)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions of fossil CO2</td>
<td>- 120 tonnes/year (deduction from the reduction of inner city traffic)</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>- 20 tonnes/year in the inner city (33 % reduction in city centre NOx content of air!)</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 0.9 tonnes/year (30 % overall reduction in city centre particle content!)</td>
</tr>
</tbody>
</table>

### Preparation of a new traffic and transportation strategy, Pécs (5.5)

The effects of the new transportation strategy can only be measured after its implementation, which is planned for the years 2007-2013 in the framework of the National Development Plan. As an overall summary, it can be stated, that the main focus of the strategy is environment protection, i.e. to reduce the emission of greenhouse gases, in order to provide better living circumstances for our residents. The reduction of emissions is not applicable for this measure at this time.

### Results of measure 5.5

The philosophy of Civitas has been integrated in actual city traffic planning. The measure has provided professional background for future transportation actions. The measure has also described the actual places where new parking houses are needed.

<table>
<thead>
<tr>
<th>Energy use</th>
<th>not applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emissions of fossil CO2</td>
<td>not applicable</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>not applicable</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>not applicable</td>
</tr>
</tbody>
</table>
Congestion charging, Stockholm (5.6)

Congestion charges are a powerful and efficient method to restrict and direct traffic flow so that the existing road system is used in a more efficient way. Also quite low charges gives substantial effect on the traffic flow and therefore on congestion, environment and health.

Expected results of measure 5.6

Reduced traffic, especially during peak hour.
Reduced congestion.
Change to more sustainable transport modes.

<table>
<thead>
<tr>
<th></th>
<th>Reduction (no exact figure available)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
<td>Reduction (the effect is + in the TS five-degree-scale)</td>
</tr>
<tr>
<td>Emissions of fossil CO₂</td>
<td>Reduction</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>- 110 tons/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>- 37 tons/year</td>
</tr>
</tbody>
</table>

It is important to know that the results from the congestion charging measure presented here is estimated results from when congestion charging is actually implemented in Stockholm. Clean vehicles will be exempt from the charge and their share is therefore expected to increase.

Outside of Trendsetter public transport is strengthened, therefore the results come from both the congestion charging scheme itself and improved public transport. Public transport use to and from the inner city is expected to increase by 7 % as a result of the introduction of the congestion charge.

The congestion charges can also contribute to an increase in the level of conformity with the environmental quality standards for air, especially regarding NOx.

5.2 Analysis and comparison of results on indicator level

The measures give reduced emissions of NOx and particulate matter, at least locally, but most likely in total too. For these emissions the local effect is much more important than the total effect. The local effect can be very important in polluted inner cities, improving people’s health and the environment.

Some of the measures indicate that the CO₂ emissions have decreased. But for CO₂ the total emissions are the interesting ones, and not the local emissions. Therefore one needs to know if the stated CO₂ reduction is local or not. However, for some measures it is also most likely that the total emissions of CO₂ have decreased. All depends on whether the zones increases the total transportation work or not and what kind of driving this work consists of. In some cases this is not known since only traffic within the zone is calculated.
The Trendsetter measure in Prague implied a large extension of the previous access restriction zone, and therefore the results are bigger for this measure than for the environmental zone measure in Stockholm where no extension was made.

Some explaining comments are needed when trying to compare the two environmental zone measures. The reduced emissions of NOx and CO2 from the environmental zone measure in Stockholm are calculated in two different ways. The figures of reduced NOx emissions comes from SLB-analys, which is the operator of the local air quality management system in the City of Stockholm on behalf of the Environment and Health Administration. The reduction of NOx emissions is however so small and it is part of a general reduction trend. So the positive effect from higher obedience to the environmental zone rules is uncertain. The reduction of CO2 emissions (and energy consumption) is calculated through the following procedure: First a spot check of heavy vehicles within the zone was performed in 2003 and 2004, which gave information about the vehicles age, weight, power and type. This gave fuel consumption factors, 4.1 litres of diesel/10 km in 2003 and 4.0 in 2004. The same traffic work was assumed for 2003 and 2004. The Swedish National Road Administration has a calculation programme (Eva) that estimates the average CO2 emission from trucks to be 2.54 g/litre of diesel. So the reduction of CO2 emissions and energy consumption originate from the calculated reduction in fuel consumption from 2003 to 2004. Also the CO2 emission reduction is very small and not very reliable.

The reduced emissions of NOx and CO2 from the environmental zone measure in Prague are achieved through first making a traffic survey to find out the vehicle kilometres before and after the environmental zone extension. Then the vehicle categories were associated with scientific emission factors and from this the reduced emissions were found.

Thus the NOx and CO2 emissions are calculated in different ways in Stockholm and in Prague, and it is therefore difficult to compare them. However, environmental zones seem to be a good tool for reducing the local emissions of NOx and PM and fulfil the European air quality directive regarding these emissions.

The strolling zone measure in Graz shows a smaller reduction of emissions than the environmental zones and the congestion charging. However there is a very positive overall effect from this measure in Graz.

In Pécs, the air quality has improved from 2003 to 2005. Even if it is difficult to say exactly how much the improvement has been thanks to measure 5.4, the improvement in the inner city is remarkable on a Trendsetter level.

To sum up, access restriction measures generally reduce emissions, noise and energy use and give improved sustainable mobility and more human-friendly city centres. Access restriction measures should be seen as complements to each other, and cities should work with a package of measures.
6. Fulfilment of Objectives

6.1 Achievement of measure objectives

The objectives of measure 5.1 were to widen the environmental zone in Stockholm and improve the obedience, provide other cities with best practice strategies regarding environmental zones, decrease emissions, noise and energy consumption, and increase acceptance of clean vehicles. These objectives have been met fairly well, except for the widening of the zone, which is postponed.

The objectives of measure 5.2 in Prague were to enlarge and optimise the access restriction zones for heavy vehicles over 6 tons and thereby decrease emissions and noise in the city, reduce energy consumption due to a shift of vehicle fleets towards cleaner and more efficient vehicles, increase acceptance for clean vehicles, all to promote a more attractive city centre. The environmental zone has been widened as planned and emissions, noise and energy consumption have been reduced and the attractiveness of the city centre has increased. Restricted zones support automobile park conversion towards new technically advanced vehicles with less fuel consumption and decreased emissions. There has been a shift in fleet towards more environmentally friendly vehicles.

The objectives of measure 5.3 were to establish four strolling zones in central Graz, thereby improving the quality of living and attractiveness of the city, to promote sustainable alternatives to private cars in the city centre, such as walking and biking, to provide other cities with best practice examples from successful implementations of strolling zones in city centres and to reduce emissions and noise in the city centre. All objectives have already been successfully met, even if some things are yet to be done such as evaluation of all strolling zones, a marketing campaign and finalisation of two of the strolling zones.

The objectives of measure 5.4 were to establish a car-free zone, extend a strolling zone and plan a bicycle road in the inner city of Pécs. All this was expected to lead to decreased traffic in the city centre (and especially in the historical parts of the city), thereby reducing air pollution and noise. The objectives have been met, except for the bicycle road that is postponed and the strolling zone that is closed for cars, but the ground area is still asphalt due to financial reasons.

The objectives of measure 5.5 in Pécs were to get more information on the present traffic situation, transportation and public transportation in the city centre, to be able to prepare a new integrated strategy taking into consideration the philosophy of Civitas in city traffic planning and management, to gain new information on the future development of the parking facilities, i.e. the location of new parking houses, to gain new information on the alternatives of re-planning traffic in the city and to describe the future directions of public transportation development. So far some of the objectives have been fulfilled, but the project is still running and all objectives expect to be met.

The main objective of measure 5.6 was to prepare the congestion-charging scheme in the City of Stockholm and show the potential for it to reduce the amount of traffic on the most frequented roads during peak hours, reduce congestion and increase accessibility, provide other cities with best practice strategies, increase the use of clean vehicles,
promote the use of public transport, reduce emissions of CO2, NOx and particulate matter, reduce noise levels, save energy and make the central city more attractive. Several investigations and studies on the design of the congestion charge zone, possible technical systems, evaluation and implementation process has been performed and presented. These objectives have been met.

6.2 Achievement of WP objectives

The first WP objective is; “Demonstrate and evaluate various projects on access restrictions of inner cities aiming at promoting cleaner vehicles, thereby reducing, emissions, noise and energy consumption.”

The Environmental Zone measures (5.1 and 5.2) definitely contribute to this objective. Too old and too polluting vehicles are prohibited to access parts of the city and better-informed supervisors have increased the obedience level. Measure 5.4 is demonstrating a project including a car-free zone and other restrictions regarding heavy traffic, which promotes cleaner vehicles like bicycles and PT. Measure 5.6 prepares a project that will make it more expensive to travel by car during peak hours. It will however be free to travel with environmentally friendly vehicles. Because of this preparation work the measure aims to make the congestion charge trial better and more effective, thus contributing to the first WP objective.

The second WP objective is; “Promoting sustainable modes for mobility in central cities – aiming toward less emission, less noise, a higher quality of living and for the protection of sensitive historical parts of the city.”

Especially measure 5.4 achieves this objective since it has established a car-free zone around the historical monuments in Pécs. This zone is also complemented by a larger zone with access limitations for heavy vehicles. All this has reduced emissions and noise in the city centre significantly. The strolling-zones in Graz form a measure that promotes sustainable urban mobility modes by enlarging the space for pedestrians and bicyclists and reduce the space for cars. Also the environmental zone measures in Stockholm and Prague has contributed to this WP objective by enlarging the zone and increasing the obedience to the environmental zone rules, and thus promoting more sustainable vehicles. The same goes for measure 5.6, which has laid a good foundation for the congestion charges that will help to promote sustainable transport modes.

The third WP objective is; “By introducing the access restrictions and promoting sustainable modes of transport provide best practice examples to follower cities.”

The environmental zone measures definitely have good know-how to spread to other cities, how to choose and design the zones and how to get a high obedience level. The strolling-zone measure in Graz can demonstrate a good example on how to get support from the affected stakeholders. Both measure 5.4 and 5.5 in Pécs can serve as good models for how a city can take the challenge of a sustainable transport system seriously. With their comprehensive view on the transport system and preparing a strategy for the future, they lay a good ground for future measures and make sure their actions will work in the same direction. Measure 5.6 can contribute with valuable knowledge about how to tackle difficulties when preparing a congestion-charging scheme.
6.3 Contribution to Trendsetter objectives

The first Trendsetter High level objective is; “Provide input to European policy making and promote a sustainable transport future in Europe”

All measures in WP 5 contribute to this objective.

The second Trendsetter High level objective is; “Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets”

Both Pécs measures (strolling zones and the strategy) contribute to this objective and so does the congestion charging measure and the environmental zone measure in Prague.

The third Trendsetter High level objective is; “Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology”

The strategy measure in Pécs and the congestion charging measure in Stockholm contribute to this objective. For the other measures this objective is non applicable.

The fourth Trendsetter High level objective is; “Promote the use of public transport and other alternatives to private cars”

All measures except the two environmental zone measures in Stockholm and Prague contribute to this objective. For the environmental zone measures this objective is non applicable.

The fifth Trendsetter High level objective is; “Demonstrate new ways to improve urban goods logistics and efficiency”

This objective is non applicable for all measures of work package 5.

The sixth Trendsetter High level objective is; “Reduce noise levels in demonstrating cities”

All measures in WP 5 contribute to this objective.
<table>
<thead>
<tr>
<th>High level objectives- Reduction</th>
<th>5.1: - 300 tonnes CO2/year</th>
<th>5.2: - 1650 tonnes CO2/year</th>
<th>5.3: - 14 tonnes CO2/year</th>
<th>5.4: - 120 tonnes CO2/year*</th>
<th>5.5: not applicable</th>
<th>5.6: reduction (+ in a qualitative 5-degree scale (− − 0 + ++))</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce annual fossil CO2 emissions by 5 % in demonstrating cities, approximately 75 000 tonnes per year.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes/year</td>
<td></td>
<td>5.1: - 30 tonnes NOx/year</td>
<td>5.2: - 43.5 tonnes NOx/year</td>
<td>5.3: - 0.06 tonnes NOx/year</td>
<td>5.4: - 20 tonnes NOx/year*</td>
<td>5.5: not applicable</td>
</tr>
<tr>
<td>Reduce particulate matter by at least 1800 tonnes/year</td>
<td></td>
<td>5.1: - 0.4 tonnes PM/year</td>
<td>5.2: - 3 tonnes PM/year</td>
<td>5.3: - 0.004 tonnes PM/year</td>
<td>5.4: - 0.9 tonnes PM/year (in the inner city!)*</td>
<td>5.5: not applicable</td>
</tr>
<tr>
<td>Save over 850 TJ (= 20 300 TOE) energy per year</td>
<td></td>
<td>5.1: - 2 TJ/year</td>
<td>5.2: - 12.2 TJ/year</td>
<td>5.3: - 0.34 TJ/year</td>
<td>5.4: - 9 TJ/year*</td>
<td>5.5: not applicable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>5.6: reduction (no exact figure available)</td>
</tr>
</tbody>
</table>

- Please observe that these results originate not only from measure 5.4, but from several measures in the City of Pécs.

**Contribution to Trendsetter Demonstration objectives**

The following Trendsetter Demonstration objective is applicable for WP 5:

- 4 Environmental restriction zones (Stockholm, Prague, Graz and Pécs)

All these four environmental restriction zones, which are both environmental zones and strolling zones, have been implemented.

The measures regarding a new transportation strategy in Pécs and the congestion charging measure in Stockholm was adopted into Trendsetter in a late stage, which is why no Demonstration objective is stated for these measures.
Contribution to Trendsetter Scientific/Technical objectives

Many of the scientific/technical objectives that are listed in section 2.2 are non applicable for all measures in this WP. This is the case for the first five objectives, which are related to biogas, electric hybrid lorries and ICT solutions.

The sixth objective is; “Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.”

The strategy measure in Pécs contributes to this objective. For all other measures this objective is non applicable.

The seventh objective is; “Evaluate the effectiveness and political acceptability of environmental zones”

The two environmental zone measures in Prague and Stockholm contribute to this objective and so do the two strolling zone measures in Graz and Pécs, and also the strategy measure in Pécs. For the congestion charging measure this objective is non applicable.

The eighth objective is; “Develop integrated city mobility plans integrating environmental protection, traffic and public health policies”

The two measures in Pécs and the environmental zone measure in Prague contributes to this objective. For the rest of the measures this objective is non applicable.
7. Technology and Implementation

7.1 Overview of used technology/implementation strategy within WP

The measures in this work package are mostly “soft” measures that do not use any specific technology, in the traditional sense. Therefore it is rather the implementation strategy that is described below, except for the congestion charging measure where both the technology is described (even if it is not included in the measure), and also how the pre-studies have been performed.

Environmental zones

In the Environmental zone measure in Stockholm an interesting implementation strategy has been used. To increase the obedience of the environmental zone rules the contacts between the Stockholm Real Estate and Traffic Administration and the Police Department have been improved. Through meetings and telephone contacts the policemen have been given deeper information about the rules, which have made their supervision easier and more efficient. With a high obedience level the environmental zone will also get acceptance and respect among the public and the road carriers. Vehicles with permission to drive in the environmental zone have to have an approved sticker visible in the windsreen.

Before deciding exactly where to expand the environmental zone in Prague some careful investigations were made. Four city areas were selected for close consideration, one area to widen the current 3.5 t access restriction zone and three areas to widen the current 6 t environmental zone. Surveys on area borders established numbers and directions of haulage travel. Thereby it was possible to distinguish the number of heavy goods vehicles that only pass through without having their origin and/or destination inside the considered area. Two areas for a 6 t restriction were finally selected where the limit on heavy haulage could be expected to have satisfactory effect and where the local road network arrangement and condition was appropriate. After this, traffic signs marking the new extensions of the environmental zone were set up and enforcement was provided by police random checks. In some cities, drive-through corridors might be needed depending on geography.

Strolling zones

When implementing the strolling zones in Graz the cooperation with citizens and shop owners were prioritized. This laid a good foundation for getting support for the measure. For the first time in Graz the specific method of the “Bürgerbeteiligungsverfahren”, guided by an expert for communication, was applied when designing one of the strolling zones. This is an intensive form of citizens’ participation, the result being a so-called “Bürgergutachten” – a citizen’s advisory opinion. Information days were carried out to inform interested residents about further construction activities. Local daily newspapers issued reports about the new strolling zones in Graz. The plan is to put almost all of the recommendations from this opinion into practice. Due to budgetary limitations only the first steps are realized within Trendsetter – at the two entries the street is redesigned and additional space is claimed for pedestrians and cyclists. The method of the “Bürgergutachten” is rather expensive, but will probably be repeated in other streets or
micro regions in Graz, as it turned out to be a successful method for citizens’ participation. The evaluation results will be specially prepared for the target group of shop owners and retailers, because for this group a special communication strategy is necessary. The shop owners are very important for the long-term implementation of sustainable urban transport all over Europe. Well-tuned presentations for this target group based on evaluation results have a clear added value.

Information about the new strolling zones in Graz was spread through the monthly local magazine (BIG), which is distributed to every household in the city. On the German TRENDSETTER-Graz website an article and pictures illustrating the progress of the project were issued. An external workshop helped to raise awareness of politicians and transport planners about other access restriction solutions for Graz.

The design of differentiated access restrictions through an “onion-skin system” is also an interesting and new move. The pedestrian area will be the core of this onion, while the inner skin also will permit bicyclists. The second skin will be the new strolling zone. Beyond this is the citywide speed limit of 30 km/h for certain suitable areas. Car traffic will not be excluded totally from inner city traffic, but will only play a minor role in these streets with respect to number and speed. One success factor in Graz was high quality in the urban design.

Another characteristic for this measure was that the construction engineers worked in close cooperation with archeologists.

In measure 5.4 Pécs has used the municipality’s legal power for limiting access for private cars in the city centre. Based on the principles of democracy all stakeholders and affected citizens have been invited to plan the municipal resolution and all political parties supported the actions contributing to improvement of the environmental and living conditions in the city centre. Media played a positive role in the implementation. No technological innovations have been implemented.

**New transportation strategy**

The strategy itself does not use any kind of new technology, but it builds upon the use of all known and Civitas experienced technologies. The strategy is elaborated as a result of the Civitas experiences of Pécs. During the measure implementation residents of Pécs have been invited to see ideas and design plans for the conversion of a central parking area into a green park and give their opinion about it.

**Congestion charging**

In measure 5.6 a congestion-charging full-scale trial is prepared for the City of Stockholm. Even if the trial itself is not part of the measure it is still worth to mention the technology. The system that is going to be used in the trial builds upon DSRC Microwave technology, which is the same type as the systems used in Singapore and Melbourne, and is accordingly already tested and working.

The system consists of on board units (OBU), receivers and cameras. The receivers will be put up on frames by the side or over the roads at the entrances to the inner city. When a car with an OBU is passing through the zone boundary the OBU will communicate with the receivers. Furthermore, all vehicles are photographed automatically. If a vehicle
doesn’t have an OBU, the charge decision will rely on the photo. The advanced payment technology will not impede the throughput of traffic at the control points.

Some vehicles, like emergency vehicles, military vehicles, motorcycles, clean vehicles and taxis, are exempt from congestion charges. They are automatically identified.

There are several advantages with the system. It is technically possible to reduce or increase the charge on short notice, though legal amendments are required which can take longer time to realize. It also has lower operation costs on condition that most vehicle owners use the OBU:s. In the long run, the system with OBU:s makes it possible to get a better geographical differentiation of the charges or differentiation of charges regarding vehicle characteristics.

In this measure an evaluation scheme has also been created, describing different areas that will be evaluated outside Trendsetter. The areas are traveling patterns, car traffic, effects on public transport, pedestrian transport, bicycle transport, environmental and health effects, road safety, distribution effects, business community and regional economy, revenue and costs of congestion charges, public economy and attitudes to congestion charges. The methods vary, and are further described in the evaluation scheme. Effects of travels and traffic for 2005 (with and without congestion charges) have thus mainly been calculated with the traffic model SamPers and the in SamPers integrated network model EMME/2.

When trying to assess the congestion charges expected effects on emissions in the Stockholm area, calculations have been done based on data from an emission database. The calculations are also based on traffic data from the analysis and proposal for design of the charging system (from January 2004).

7.2 Comparisons and conclusions

This work package contains “soft” measures that do not use any technology in the traditional sense. Therefore it is rather the implementation strategy that is described here. Some comparing and concluding remarks are presented below.

- Both Stockholm and Prague have environmental zones. In Stockholm the restriction is based on age (and soon also on the Euroclass standards), while the restrictions in Prague are based on weight. If you have a too old vehicle in Stockholm you are not allowed to drive in the zone. In Prague, even if you have a vehicle over 6 tons you can drive in the zone if you get a permit first. Because of this Prague have to deal with more administration.

- The supervision is made through police random check in both Stockholm and Prague. The obedience level in Stockholm has been increased from 89.8 % in year 2000 to 96.2 % in year 2004. In Prague the obedience level is around 50 %. The environmental zone extension in Prague has led to a shift in vehicles to more modern and environmentally friendly vehicles. In Stockholm on the other hand, no shift in vehicles has been noticed during the Trendsetter period even if the obedience level has increased. This is because the environmental zone has existed in Stockholm since 1996 and a shift in vehicle fleet has already occurred.
• When implementing environmental zones a high obedience level can be reached through better cooperation with the supervising authority. If they are well aware of the regulations and how to supervise the traffic they can do a better job.

• When planning an environmental zone the transportation patterns should be assessed to obtain knowledge about how big the through traffic share is and how many vehicles that has its origin or destination within the zone.

• If strolling zones are being planned it is very important to involve citizens and shop owners in the process and carefully consider their opinions.

• Use different types of media to keep the citizens informed about the process.

• Strolling zones can successfully be part of an “onion-skin system” with different levels of access restriction.

• If congestion charging is implemented it is important that vehicles without OBU:s really are registered and have to pay, otherwise there is a risk that people will try to avoid the charges by not installing OBU:s and this consequently makes the measure more expensive to manage.
8. Economical Aspects

8.1 Per measure
In many of the measures of this WP no numerical assessment of the economical aspects have been made. Therefore a discussion in general terms regarding costs and benefits of the measures is held below.

Since the measures of WP 5 aims at reducing emissions and noise it is worth to mention the environmental quality standard, which has been implemented in many European countries as a result of an EU directive. The standards state the highest approved value for acceptable environmental quality. The most difficult standards to reach in for example Sweden are particulate matter (PM10) and nitrogen dioxide (NO2). The cost of polluted air can be assessed through for example looking at cases of illness. Such an assessment is however quite difficult to make and therefore it is also difficult to estimate the benefits from measures that are expected to decrease emissions and noise. The benefits from less congestion can be estimated from the expected time saving, and also from the decreased emissions because of less queuing. Purely economical benefits can arise from fees and taxes, as in the case of congestion charging. The costs are often cost for personnel who shall develop, implement and administrate the measure. A great deal of the cost can also be technical equipment, traffic signs and infrastructure.

Environmental zones
Because of the environmental zones some road carriers will have additional costs because they have to invest in new vehicles or cleaning equipment. These costs are difficult to estimate, and have to be compared with the environmental and health benefits (and possible time savings). The administration and supervision of the zone rules is also a cost. The benefits from an environmental zone are reduced emissions and noise and possibly also less congestion. There could also be environmental costs due to the zones, for example if vehicles needs to make a long detour to avoid the zone the CO2 emissions will be higher. On the other hand other emissions are reduced within the zone, which might be a substantial benefit for the environment and health of people in that area. As a result of extending the environmental zone in Prague the roads will not need to be repaired as often as before, which is an economical benefit.

Strolling zones
The establishment of strolling zones in Graz costs a lot, but boosts commercial activity (bars, shops etc.). A cost benefit analysis however, has not been made. Anyhow, the strolling zone implementation also gives benefits like less emissions and noise in the area, and costs for administration and construction. When infrastructure is built up there is often a so-called Public Private Partnership (PPP), where a private actor builds and operates for a number of years, and then hands over the management of the infrastructure to the public authority, who can start taking fees. This procedure is called Build Operate Transfer (BOT). The owners of the parking garages in Graz estimates to have the investment back in 15 years. After 50 years the garages will be handed over to the public authority.
Regarding the strolling-zones in Pécs the implementation cost covers mainly personnel costs required for planning the system as well as its political and civil argumentation. The investments are mainly traffic signs, tables, jet-polls and other small-scale infrastructure developments. The car-free zone in Pécs results in about 1 million EUR income loss for the municipality budget, but the improvement of the environmental conditions in the long run has a significant positive impact.

New transportation strategy

The strategy measure in Pécs is difficult to assess economically. When preparing and formulating a transportation strategy the main cost is the personnel cost for making research and assessments. The benefits from developing such a strategy are that future transportation planning will be easier and more efficient and that different measures will work in the same direction. The cost is the personnel that need to do all investigations before the strategy can be formulated. The benefits from the strategy will appear in the future, some in a very long run, and they are therefore difficult to estimate. But the strategy will surely have great benefits if it’s well done.

Congestion charging

The main costs for preparation of the congestion charge scheme are costs for carrying out pre-studies and assessments. The expected benefits from the preparatory work are a higher degree of efficiency, coordination and adaptation to local conditions.

Traffic congestion has a negative effect in life quality, trade and industry. Delays because of traffic jams in the Stockholm region are estimated to cost the society between 320 and 860 million Euros per year. Environmental effects as a result of the traffic, including health effects from air pollutions (i.e. public health insurance costs), are estimated to cost the society 320 million Euros per year in the city of Stockholm only.¹

Aggregated results from prior studies of effects on travel time for the trade and industry show that:

Service- and freight traffic can expect a profit of 20-55 million Euros per year and the costs might be 20-35 million Euros per year. The net result will be somewhere between zero up to a profit of about 20 million Euros.²

Business trips can expect a profit of around 2 million Euros per year and the cost might be around 3 million Euros per year. The net result is estimated to be a loss of around 1 million Euros.³

Several calculations regarding the trial’s economy have been carried out. The congestion charge secretariat has analyzed preliminary cost and revenue calculations. The figures show that the revenue can be estimated to around 10 million Euros per month. This is however a “gross potential” without any analysis of the non-responses.

¹ Booklet from the Congestion charge secretariat: Why is Stockholm implementing a full-scale congestion charging trial?
² Trivector Traffic AB: Vad kostar trängseln för näringslivet? (How much does congestion cost for Business?)
³ Trivector Traffic AB: Vad kostar trängseln för näringslivet? (How much does congestion cost for Business?)
The costs, including investments in public transport, park & ride facilities and transponders supplied free of charge, are calculated by the congestion charge secretariat to approximately 160 million Euros. The central administration costs are not included. The operating costs are strongly depending on the market penetration of OBU:s. The more people using the transponders, the lower the operating costs will be.

8.2 Comparison and conclusions

No thorough cost-benefit analyses have been performed for the measures. From the general reasoning above the following concluding remarks can be made:

- Benefits from measures in this work package are often reduced emissions resulting in improved health and environment. It could also be less congestion and therefore time savings or a reduced need to repair roads.

- Costs in this work package are often cost for personnel that plan, implement and administrate the measure. The infrastructural and technical investments can also be quite large, especially in a measure like congestion charging.

- The economical aspect when implementing congestion charging is dependent on how many uses the OBU:s and how many need to be charged with help from photos.

- Prague thinks that the Trendsetter measure budget has been too small compared to the normal budget.

- Congestion charges are formulated differently in different cities and countries, sometimes they are defined as a tax and in other cases as a charge. This can in turn decide where the income goes.
9. Synergies

9.1 Need for supplementary measures

A fundamental idea behind Trendsetter is to use an integrated approach for obtaining sustainable cities. Therefore, the nature of most of the measures contains a need for supplementary measures.

Environmental zones

Because of road fees in surrounding countries, the heavy vehicles traffic has increased substantially in Prague. In the near future road user charges are expected to be introduced in Czech Republic as well, which likely will reduce the heavy traffic. Environmental zones in certain city areas as well as road user charges fees will influence the transportation in Prague in a sustainable direction. Also regarding the environmental zone in Stockholm, it is very important that drive-through routes exist.

Strolling zones

In the city of Graz various actions aiming at sustainable transport has been introduced. The example of strolling zones as in this WP measure is one, but there are also others like promoting less heavy trucks in the inner city, new parking tariffs for low-polluting vehicles and the extension of the 30 km/h zone. So the installation of new strolling zones is embedded into an overall transport policy of the city of Graz. Since the first pedestrian street in Graz has existed for more than 25 years and has been extended to a large pedestrian precinct, pedestrianisation in general is ongoing and facilitates further establishment of strolling zones. A further extension is expected in the future and especially near public transport nodes.

The strolling-zone measure in Pécs can only be successful if it is accompanied by the introduction of the zone-model parking system of measure 6.5 as they build upon each other. The development of public transportation is inevitable for further results, as the municipality cannot continue the limitation of private car access without providing high-level public transport services in the centre.

By 2010, it is expected and planned that the whole city-centre of Pécs will be closed for private cars and Hungary’s largest pedestrian zone will be implemented inside the medieval city walls. This requires a complete change of the bus fleet to environmentally friendly midi buses (at this stage biogas fuelled is the most likely) and the increase of the green areas in the centre (the conversion of the largest car-park into a public park has already been started).

To use other projects or cultural assets to motivate a measure is a good strategy. For example Graz was the cultural capital during the Trendsetter project and could use this fact as a motivation for the strolling zone measure. Pécs used the World Heritage site as a motivation and driver for the strolling zones.
New transportation strategy

Regarding the strategy measure in Pécs, the financial implementation context of the strategy is not known yet, therefore numerous supplementary measures are needed. The strategy has good potential for positive synergies when making future measures work in the same direction.

Congestion charging

In connection with the congestion charging trial, the city of Stockholm and the other participants take measures to strengthen the functionality of the trial. The thought is that the congestion charges do not replace other solutions, but they are a complement that together with developed public transport and other measures can contribute to a more efficient and sustainable transport system. The trial with congestion charges contain a package of measures:

- Improved public transport. 197 new buses have been purchased for meeting the demand from former private car commuters. These buses will be a part of 14 new bus lines. Further investments are made in improvements of rail-bound traffic like new commuter trains, longer trains and a few more departures.
- Park-and-ride facilities. New park-and-ride facilities are under construction and existing park-and-ride facilities at important public transport nodes will be made more attractive by investments in security.
- Improvement of the road and street system. The traffic system is improved where needed with better accessibility for bus traffic, better signal systems etc.

9.2 Comparison and conclusions

Access restriction measures often require complementary measures. Therefore a comprehensive view is necessary when aiming at a sustainable urban transport system.

- Environmental zones, strolling zones and especially congestion charging are measures that work best if implemented in a package of measures with an overall strategy.
- Environmental zones and road user charges outside cities both affect heavy traffic and interact with each other.
- During the last years Graz has implemented several measures aiming in the direction of sustainable urban mobility, and therefore positive synergies have been reached, like increased walking mode, boosted commercial activity and a lively, human friendly city centre.
- Strolling zones create positive synergies with complementary measures like for example improved public transport and restriction of parking space.
- Congestion charging should be part of a package also including improved public transport, park & ride facilities and more.
- Use other projects or cultural assets in order to get positive synergies with measures aiming at sustainable urban transport.
10. Political and Administrative Aspects

10.1 Overview of major political and administrative aspects influencing the measures

Political and administrative aspects are very important when working with access restriction measures. The measures need to have acceptance among the citizens and the measures affect people’s daily life.

Environmental zones

The Ministry of Industry in Sweden feared that the demand for cleaning equipment on vehicles older than eight years could create problems for road carriers from other parts of Europe. The Ministry of Industry had questions like “How and where can road carriers buy and install cleaning equipment? Is it difficult to get an exemption if cleaning equipment is installed? How can a company that sells cleaning equipment get their products approved according to the Swedish environmental zone rules?” Because of these questions and similar questions, the Ministry of Industry wanted the environmental zone towns in Sweden to adapt the rules to Euroclass. In order to do this a law change was needed in some parts, from age-based rules to rules based on age combined with the Euroclass criteria. This means that if a vehicle fulfils a better Euroclass than the current rules, the vehicle gets to drive more years in the environmental zone than it normally would. For example, a vehicle, which fulfils Euro-4 when current rules only demand Euro-3, can get extra years to drive in the environmental zone. What number of years has not been decided yet. From 2006 the new rules for environmental zones will go into force.

In Prague, the general public has accepted the extended environmental zone positively. The administrative work however, has increased due to a greater need for issuing access permits for vehicles to enter the specified area for necessary supplies, construction etc.

Another positive aspect with the Trendssetter measure in Prague is that it has contributed to the democracy development in Czech Republic by taking a participatory approach and letting the citizens express their opinion and influence the project. Historically, the citizens are not used to this, why this practice is very valuable.

One possible future problem is that the political party that might come into power after the next election in Czech Republic 2006 is more negative towards European projects like Trendssetter.

Strolling zones

The city of Graz was the Cultural Capital of Europe during 2003. In order to minimise disturbances during this period the city council decided to postpone the construction work of two of the strolling zones. Then archaeological findings in a scale, which was completely unexpected, were made at the third strolling-zone site. Hence these projects were behind the expected time schedule. Construction activities of this size always need precise planning activities, but flexibility in timing has to be maintained. Before the implementation the City of Graz had to overcome discussions with Chamber of Commerce, who was rather critical to the strolling zones.
The Trendsetter participants in Graz wish that Trendsetter could have been more flexible during the process of decision about what projects may be included. There can be projects that would fit perfectly into Trendsetter, but it is still very difficult to integrate them in the programme if they have already started. In case of the strolling zones this is a specific difficulty, as they need a rather long period of preparation.

The citizen advisory opinion method is a successful method for citizen’s participation well worth the investment and it can be applied by other cities, and one of the success factors was the political will behind the projects.

When implementing strolling zones in Pécs the political and administrative aspect of the action was absolutely positive. All political parties supported the improvement of the living conditions in the city centre through access restrictions for private cars. In addition to this the occupancy rate of public transportation is also expected to rise due to these actions. The access restrictions were not introduced on the basis of the economic cost-benefit analysis of the measure, as it decreases the income of the municipality. But in the long run, the environmental impact of the actions makes up for the implementation of the actions. The politicians eventually got support from the citizens after using media to spread information about why to establish the strolling zone. Media was a very positive actor in Pécs.

New transportation strategy

The strategy in Pécs was initiated by politicians and prepared mainly by the city administration and other experts. As all political parties support environmentally friendly modal shift in city traffic, it is expected that all political parties will accept the strategy.

Congestion charging

A congestion-charging scheme has been discussed in Stockholm for a long time.

On 2 June 2003, the Stockholm City Council adopted a proposal to conduct a trial of environmental charges and tasked the City Executive Board with carrying out a procurement of technical systems and services for managing the collection of environmental charges.

The very same month, the state “Stockholm Committee” presented its Congestion Charges Report, which included a proposal for a law on environmental charges. The committee stated that environmental charges are a state tax from a legal standpoint.

The Swedish parliament (Riksdagen) enacted the Congestion Charges Act on 16 June 2004 and voted in favour of implementing a trial of congestion charges in Stockholm.

The responsibility for building the technical system was assigned to the Swedish Road Administration, while information, coordination and evaluation were entrusted to Stockholm City.

A problem in Stockholm has been the procurement laws imposed by EC directives and case law, which has slowed down the implementation process considerably. Also, the uncertainties in Swedish law, concerning the formal status of congestion charges have been a problem.
10.2 Comparison and conclusions

Broad political will and a good informative dialogue with the citizens is the general formula for successful implementation of access restriction measures.

- The implementation of measures like this often relies on political will. So if the political leadership is changed, a different agenda might be prioritized. In order to achieve a transportation strategy with good continuity the ambition should be to have a broad political support for these measures among most parties.
- Make sure the measure has good support among citizens and commercial actors.
- So to solve the problem with opposition against an access restriction measure, information, education and participation is crucial.
- Acceptance can be improved if rules in different cities are the same and based on general standards.
- Often, commercial interests are rather critical towards access restriction. Therefore it is highly important to keep these actors well informed and involve them in the planning process.
- Citizen’s participatory methods can also strengthen democracy.
- When choosing type of environmental zone regulation the administration cost has to be considered. It depends on the rules how much administrative work the zone results in.
- Legal issues should always be thoroughly investigated and solved in advance.
11. Up-scaling and Transferability

11.1 Potential for up-scaling and transferability to other cities

Environmental zones
The environmental zone in Stockholm is an excellent example that can be transferred to other cities. Sweden in general has good competence after many years experience from working with environmental zones.

Stockholm has considered introducing parking ban for vehicles that do not fulfill the environmental zone rules, but it demands a law change. If this can be done the idea is to let the traffic warden do some of the surveillance work. If the traffic warden can supervise the environmental zone there will be one more way to increase the obedience.

Another idea among the Swedish environmental zone cities is the possibility to implement environmental zones for vehicles under 3.5 tons and vehicles with other fuels than diesel. The environmental zone towns are investigating this but also in this case there is a need to change the law and no decisions are made yet.

In Prague the environmental zones can be further expanded in the future when population and traffic flow increases. The Prague method can be used also in other cities. The size and location of the implemented or extended zone should be carefully considered. Prague also recommends considering the increased access permit administration and it’s cost, when thinking about establishing or extending an environmental zone.

Strolling zones
Regarding the strolling zones in Graz an external workshop helped to raise awareness of politicians and transport planners about other access restriction solutions for Graz. The method of the “Bürgergutachten” is rather expensive, but will probably be repeated in other streets or micro regions in Graz, as it turned out to be a successful method for citizens’ participation. To use this or a similar method to anchor a measure among the general public or other stakeholders is strongly recommended. The City of Graz believes that the strolling-zones will be further extended in the future.

New transportation strategy
The strategy measure of Pécs is a highly recommendable measure for other cities.

Congestion charging
If the congestion charging trial is successful and gives the desired effects it could be made permanent in Stockholm, and in that case the scheme might be somewhat expanded and maybe apply to foreign vehicles, motorcycles and so on. However, no political decision has been taken regarding this. The trial will and have already given valuable information about how to implement congestion charging in a city, therefore this measure has good transferability to other cities that wants to implement this kind of measure.
11.2 Comparison and conclusion
The measures in this work package have good potential for up scaling and transferability to other cities.

- Environmental zones are well working measures that can be recommended to other cities that want to reduce heavy traffic, emissions of particulates, NOx and noise in city centres.

- Both environmental zones and strolling zones can successfully be implemented step-by-step and up-scaled when necessary.

- From the preparation of a congestion-charging scheme in Stockholm many lessons have been learnt and they will be communicated to other cities through a handbook.
## 12. Assessment of All Measures

Below is a list of the measures, with comments of their implementation (e.g. implemented as planned/partly implemented/not implemented) and fulfilment of measure objectives and contribution to WP objectives.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives (yes/no)</th>
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<tbody>
<tr>
<td>5.1 Widening of the Environmental Zone</td>
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<td>partly</td>
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<td>5.2 Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
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<td>yes</td>
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<tr>
<td>5.3 Implementation of strolling zones</td>
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<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>5.4 Car-free zone, extension of strolling-zone and bicycle road network</td>
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<td>partly</td>
<td>yes</td>
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<tr>
<td>5.5 Preparation of a new traffic and transportation strategy</td>
<td>as planned</td>
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<td>yes</td>
</tr>
<tr>
<td>5.6 Congestion charging</td>
<td>partly</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>
13. Barriers and Drivers of the Measure Implementation

In this chapter barriers and drivers for the measures are highlighted. They are discussed below from a technical, synergistic, political and administrative point of view.

13.1 Technical barriers and drivers

A limiting factor when extending the environmental zone in Prague is the lack of a ring road, which could take on the heavy vehicle traffic from a transit zone.

Technical development of vehicles engines and fuels can be a barrier for progressive access restriction measures. The environmental zone rules have to be set with the current possible technology in mind.

Development of technology is important when it comes to congestion charging. When the GPS technology is reliable enough for use in city centres in the future it will be possible to control and influence traffic flow in an even more sophisticated way.

13.2 Synergies barriers and drivers

To use other projects or cultural assets to motivate a measure is a good strategy. For example Graz was the cultural capital during the Trendsetter project and could use this fact as a driver for the strolling zone measure. Pécs used the World Heritage site as a motivation and driver for the strolling zones.

13.3 Political and administrative barriers and drivers

In Sweden environmental zones were implemented in Stockholm, Gothenburg and Malmö in 1996 and these cities have been great drivers. Environmental issues spread the thought and there was a need to get rid of the problem with too old heavy vehicles, driving in sensitive city environments. The specific driving forces in Stockholm were people who work at the Traffic Administration, Environment and Health Administration and open-minded politicians.

A barrier for environmental zones is often the need to change parts of the law. The acceptance among transport companies can also be low before implementation of an environmental zone, but after some time of operation the acceptance often tend to increase.

The biggest challenge when extending the environmental zone in Prague was to negotiate and get approval for the proposed environmental zone extension from the urban authorities. They feared a large increase in access permit applications, which also occurred. The increase of rightfully awarded entry permits for necessary traffic service is indeed a drawback that somewhat limits the measure. The vehicles that obtain the permit for serving the needs in the newly extended area can then access the original zone as well.

What was helpful, on the other hand, was the co-operative attitude of heavy haulage operators inside the environmental zone in respecting the regulations and trying to find
solutions in shifting towards smaller lorries. The road carriers appreciated the option to
get a permit in necessary cases.
If politicians and planners work together, things move forward. Other success factors for
the strolling zone measure in Graz were the aim to create a high quality of urban design
and the common emphasis for the projects.
The implementation of the strolling-zone measure in Pécs has been accompanied by great
political support in theory, but practically all the local politicians tried to support the
needs of the citizens who argued against the introduction of the system. Finally, the
political parties agreed to support the measure without, at least initially, the support of the
citizens. The administration prepared all necessary legislative documents to modify the
city regulation on inner city traffic, which was accepted. The local media, mainly
television, was used for arguing in favour of the measure and finally the local citizens
were also persuaded to support the actions. Media has been a very positive cooperation
partner in Pécs.
Regarding the implementation of the strategy measure, no innovative technology or new
methods was required. The municipal operations company has implemented all actions of
the city legislation. As the Pécs strategy measure covers only the preparation of the
strategy, technical, economical and political barriers are assumed to appear in later stages,
during its implementation. Only proposals that seem to be applicable politically and
technically can remain in the final version of the strategy.
The procurement laws imposed by EU directives and case law has imposed certain
challenges for the congestion charge scheme in Stockholm, since the EU law involves the
possibility for the plaintiff to evoke a standstill in contract realization, while waiting for a
final court decision. Other challenges that is now overcome, is uncertainties of the legal
status of congestion charges.
A driving force is the severe congestion and poor air quality experienced by the
inhabitants. Swedish cars are old and heavy compared to European measures, and the
harsh winter climate makes studded tyres and road gritting necessary. The result is high
levels of NO₅ and particles.

13.4 Economical barriers and drivers
A barrier for environmental zones is that road carriers often only see the increased cost
and therefore argues against implementing the measure.
One barrier when extending strolling zones in Graz was feared loss of parking space.
More room for pedestrians and cyclists means less room for motorists. Among
shopkeepers there was a fear that this could mean a loss of commerce. In Graz this was
countered by the establishment of large subsurface parking garages. Another barrier was
the lack of funding. Redesign of urban space costs money, which often is not available. In
Graz it was partly co-financed by the Kunsthaus project and the cultural capital year
2003. Still, finance is often the main barrier in times of restricted budgets. A driver for
strolling zones in Graz was actually commerce. Some shopkeepers or owner of bars
clearly perceive the advantage of urban redesign. Attractive urban space attracts much
more customers than squares crammed full with cars.
An experience from Pécs is that people who live inside the strolling zone generally like it and
people who live outside the zone dislike it. Citizens and shop owners often object access
restriction measures before implementation, but are often satisfied afterwards.
14. Lessons to Consider for Replication and Take-up by Other Cities

In general

- Access restriction measures generally result in reduced emissions of CO2, NOx, PM and noise, reduced energy consumption, less congestion, improved sustainable mobility and more human-friendly city centres. These measures can change the character of the city to something that better fills people’s needs.

- Environmental zones and strolling zones are suitable in sensitive city areas or in areas where the local emissions are unacceptable. The positive effect in the local environment (NOx and PM) is somewhat stronger than the global effect (CO2), even if the global effect often also is positive.

- It is important to consider at what development stage a city is in, as this can vary a lot. A measure that is very urgent and suitable for one city might be a total waste of time and resources in another city.

- Policy work is not only important on an EC level, but also on a national, regional and local level. Policies are important because they form a base from which work can start. A strong policy can create demand for sustainable transport solutions. It is easier to achieve acceptance for demand management measures if there is a clear policy. When the main direction and goals are decided, individual measures can be accepted easier.

- Use other events, projects and valuable assets to create positive synergies with access restriction measures, for example cultural capitals and world heritage sites.

- Both regarding environmental zones, strolling zones and congestion charging a good idea is to proceed step by step. These kinds of measures have the advantage of being quite flexible and easy to upscale geographically or regarding emission limits. A step-by-step approach for strolling zones has been successfully used in Graz as well as in Copenhagen.

- To achieve acceptance and support from the general public and different actors information and actor involvement is crucial, this cannot be said too many times. Use innovative methods for this like in Graz or Pécs. A reference group can be a very good way to attain participation. Involving citizens when planning and implementing measures like this is also a positive way to practice democracy.

- New transportation patterns need to be assessed before implementing an access restriction measure. Current or expected bottlenecks should be eliminated.

- Access restriction measures also should be planned together with urban planning departments and a system approach is needed to avoid unwanted effects. It is very important to improve more sustainable transport modes when implementing strolling zones and congestion charging. Public transport and the possibility to bicycle or walk need to be strengthened. If this is not done there can be a risk for increased external establishments and a total increase of transportation work. A good example on how to do this is the implementation of strolling-zones in Graz. The commercial activity in the city centre have been boosted rather than diminished because of the strolling zones.
• Pécs recommends, that each city should modify and update its traffic and transportation strategy after the completion of the Civitas projects. The best practices of these cities should appear – mainly in the CEE cities’ – medium and long-term traffic development programmes.

• Combine carrots and sticks!

• Cooperate with different types of media to communicate information.

• Broad and strong political commitment is needed.

Environmental Zones

• Prague states that environmental zones are an efficient way to reduce the volume of especially transit goods vehicle traffic inside a limited urban area. Environmental zones can be a tool for cities to fulfil the European air quality directive.

• A Swedish experience is that cooperation between cities regarding environmental zones has many benefits. It can give more media attention and more people will listen to your message. The same or similar information material and computer programmes can be used, both an economical and practical benefit. It is also easier for road carriers that operate in several different cities if the environmental zone rules in these cities are the same.

• When planning an environmental zone, communication with road carriers and their organizations has something important to add. A good idea is to form a reference group with participants from organizations for road carriers, producers of vehicles and people from other authorities. This group should be put together in good time before the project starts. Much can be learnt from a group like this and it can also give valuable help when information shall be spread.

• The environmental zone rules are worthless if they are not followed, this is why enforcement is crucial. In Stockholm for example, this task have been successfully accomplished through cooperation between the Traffic Administration and the Police Department. Supervision can also be improved through introducing a special parking ban for vehicles that do not fulfill the environmental zone rules. Then the traffic warden will also contribute to the surveillance work. It is also necessary to consider what consequences to choose for those breaking the rules.

• It is important to investigate the legal aspect in an early stage when planning an environmental zone, on both a national level and within the EC. If there is any legal obstacle to environmental zones this should be solved first.

• When establishing environmental zones it is important to remember that fleet renewal takes time. Therefore it is important that the rules are set at an appropriate level. If the rules are set too low, the environmental zone is not putting pressure on the road carriers. And if they are set too high, that might drive transport companies out of business.

• When choosing type of environmental zone regulations, consider if the needs best can be filled with rules based on Euroclass, age or weight, and if it should be possible to achieve access permits for example on a daily basis? To have possible future EC harmonization in mind when choosing is a strong recommendation.

• Another important aspect is how to handle long-distance and international transports.
• Environmental zones is a type of measure that usually have good acceptance among citizens, while lower among transport companies. Usually, transport companies become more positive after some time of operation.

• Adjust the local infrastructure when implementing restricted zones. Drive-through corridors might be needed in certain cities depending on geography.

Strolling Zones
• Graz recommends the establishment of strolling zones as an additional possibility for sustainable urban design and also the use of the citizen advisory opinion method in other European cities.

• It is important to involve commerce in the process.

• Acceptance from commerce often increases after implementation.

• Very important to improve public transport within the zone and increase parking space around it.

• Strolling zones can be used to achieve a living city centre with prospering commerce and street life.

• Strolling zones are usually easier to implement than pedestrian zones (which totally exclude other modes than pedestrians).

• Strolling zones increase the accessibility for disabled, families and other un-protected modes.

Congestion Charging
• Congestion charging should be part of a transport package with complementing measures like improved public transport and park & ride facilities.

• Coordinate congestion charges with other environmental schemes, to gain increased efficiency. Municipal efforts to support clean vehicles can be combined with charge exceptions or reductions.

• To achieve interoperability in the future, new congestion charging systems should be designed with consideration to international standards and good practice, if such have been developed by that time. To cooperate with other cities is necessary.

• There should be enough time in the time plan so that bottlenecks can be eliminated in good time]. Do not the time needed for this type of measure.

• A congestion charge scheme should be transparent and user-friendly:
- Citizens must experience the current traffic situation and air quality as a problem in order to support implementation of congestion charges.
- The main objectives should be reflected in the system.

• An evaluation plan should be adopted in an early stage, designed to provide accessible, comprehensive and reliable information on the efficiency of the scheme.
15. Recommendations to EC and Other Actors

- Continue the policy work regarding sustainable transports, as this is the base for successful implementation of individual measures. Policies are important because they form a base from which work can start. A strong policy can create demand for sustainable transport solutions. It is easier to achieve acceptance for demand management measures if there is a clear policy. When the main direction and goals are decided, individual measures can be accepted easier.

- The regulations for environmental zones need to be harmonised through an EC directive. The rules should use the Euroclass standards as a basis and they should also make it possible to identify what Euroclass a vehicle has. It is good to use the Euroclass standards as a basis since they are directly related to the emissions. It should be possible for both certified vehicles and vehicles that meet the demands of the Euroclass in question on particles and emissions to be approved.

- Harmonize the rules regarding environmental zones and congestion charging and increase interoperability in Europe concerning electronic fee collection.

- It is important to consider at what development stage a city is in, as this can vary a lot. A measure that is very urgent and suitable for one city might be a total waste of time and resources in another city. An EC supported project like Trendsetter should have this flexibility and consideration built-in.

- It is very important to use a system approach when the EC is working in this area, and to have a comprehensive view instead of seeing transports as a separate entity.

- The Trendsetter participants in Graz wish that projects like Trendsetter could be more flexible during the process of decision about what projects might be included. If there are projects that would perfectly fit into Trendsetter it is still very difficult to integrate them in the programme, when they already had started. In case of the strolling zones this is a specific difficulty, as they need a rather long period of preparation.

- The EC could recommend the installation of strolling zones as additional possibility for urban design and the testing of citizen’s advisory opinions in other European cities.

- The concept of a strolling zone has not been fixed in legislation: things like traffic sign, right for cyclists, speed limit need to be regulated.

- The EC should also disseminate experience and knowledge about success stories regarding access restriction measures.

- The EC should continue to support access restriction measures.
**Appendix 1 – List of Trendsetter measures**

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
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<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.1</td>
<td>Widening of the Environmental Zone</td>
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<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
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<td></td>
<td>5.6</td>
<td>Congestion charging</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Strolling zones</td>
<td></td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
<td>Graz</td>
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<td></td>
<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
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<td></td>
<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
<td>Pecs</td>
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<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
<td>6.1</td>
<td>Smart card systems and integrated ticketing</td>
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<td></td>
<td></td>
<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
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</tr>
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<td></td>
<td>Parking</td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
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<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td>Establishment of a zone-model parking in the central city area</td>
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<td>WP7 Public Passenger Transport</td>
<td>Information to passengers</td>
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<td>Increasing public transport passengers</td>
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<td>Customer friendly stops for bus and tram</td>
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<td>PT intermodality</td>
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<td>Intermodal local/regional transport interchanges</td>
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<td>Seamless linkage of modes</td>
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<td>Park and Ride facilities</td>
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<td>7.7</td>
<td>Linking different ways of public transport</td>
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<td>WP8 New Forms of Vehicle Use</td>
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<td>Increasing car occupancy</td>
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<td>Awareness rising</td>
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<td>Site level Mobility Management</td>
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<td>Urban Mobility Plan</td>
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<td>Distribution of goods - Green city logistics</td>
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<td>Logistic centre for Old Town of Stockholm</td>
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<td>Subgroups</td>
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<td>Measure</td>
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<td>WP 10 Innovative Soft Measures</td>
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<td>Innovations in bicycle transport</td>
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</tr>
<tr>
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<td></td>
<td>10.2</td>
<td>Make bicycling attractive (B&amp;R information on the Internet)</td>
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</tr>
<tr>
<td></td>
<td>Trip planning</td>
<td>10.3</td>
<td>Creation of a visitor web for optimal trip planning</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>10.5</td>
<td>Marketing/information and quality management</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>Awareness of clean transport and safety</td>
<td>10.6</td>
<td>Awareness for speed reduction and less car use</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.4</td>
<td>Taxi drivers as information multipliers for clean transport</td>
<td>Graz</td>
</tr>
<tr>
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<td>WP11 Integration of Transport Management Systems</td>
<td>Traffic information</td>
<td>11.2</td>
<td>Traffic monitoring and supervision</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.3</td>
<td>Dynamic traffic management system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.4</td>
<td>Accessible road network (street) data</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Improving PT traffic flow</td>
<td>11.5</td>
<td>More adaptive signal control in a bus priority system</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
<tr>
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<td></td>
<td>11.7</td>
<td>High level service bus routes</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.1</td>
<td>Technical basis for an efficient customer focussed operation and information</td>
<td>Graz</td>
</tr>
<tr>
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<td>WP12 Clean Public and Private fleets</td>
<td>Heavy vehicles</td>
<td>12.1</td>
<td>Clean and efficient heavy vehicles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2</td>
<td>Biogas bus fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.6</td>
<td>Waste collection with biogas-vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>12.4</td>
<td>Clean municipal fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.5</td>
<td>Clean municipal fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7</td>
<td>Bio-diesel taxi fleet and bio diesel service station</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.11</td>
<td>Making Clean Vehicles less expensive</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.13</td>
<td>Increasing clean vehicle use in private company fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.14</td>
<td>Web-portal for drivers of clean vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>12.8</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 2 – Trendsetter cities

The five Trendsetter cities are described below.

Graz

With nearly 230,000 inhabitants, Graz is the second largest city in Austria, the capital of the Styria province and the cultural, economic and university centre of the region. About 80,000 commuters travel to the city of Graz daily. On an average weekday, 47% of commuters travel by car, 19% use public transport, 20% are pedestrians and 14% cycle.

Graz has a historic centre with many pedestrian precincts and much bicycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city area (except major roads) and the first Austrian city to open a mobility centre.

The main problem Graz faces is the rise of car use due to a tendency of people moving to the city outskirts. The increasing traffic as well as the topography and climate in Graz, lead to high air pollution levels in the city. Information technology will be used to make public transport more user-friendly and the services more attractive.

The following measures have been implemented in Graz within Trendsetter

<table>
<thead>
<tr>
<th>Measure</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Strolling zones</td>
<td>Implementation of strolling zones</td>
<td>5.3</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>5.4</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Information to passengers</td>
<td>Customer friendly stops for bus and tram</td>
<td>7.6</td>
</tr>
<tr>
<td>PT Intermodality</td>
<td>Seamless linkage of modes</td>
<td>7.8</td>
<td></td>
</tr>
<tr>
<td>New Forms of Vehicles Use (WP9)</td>
<td>Car pooling</td>
<td>Increasing car occupancy</td>
<td>8.3</td>
</tr>
<tr>
<td>Awareness raising</td>
<td>Site level Mobility Management</td>
<td>8.4</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP 11)</td>
<td>Bicycle measures</td>
<td>Innovations in bicycle transport</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>Testing</td>
<td>Testing of innovations and quality management</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>Safety</td>
<td>Awareness for organised and non-polluting</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Awareness of clean transport and safety</td>
<td>Safety for passenger, freight and less car use</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>Traffic management</td>
<td>Implementation of the clean transport system</td>
<td>10.7</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Traffic information</td>
<td>Dynamic traffic management system</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Technical basis for an efficient customer focussed operation and information</td>
<td>11.1</td>
</tr>
<tr>
<td>Mean Public and Private Nests (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Clean and user friendly bio-diesel taxi fleet</td>
<td>12.3</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>Elimination of the bio-diesel collection system</td>
<td>12.8</td>
</tr>
</tbody>
</table>

The map below shows the City of Graz.
Lille

Lille Metropole in France is an urban network of 85 communes with 1.2 million inhabitants. The community is close to the Belgian border and cooperates closely with its counterparts in Belgium. It is a base for distribution and a node for major routes north-south and east-west in Europe.

Lille has built up a strong public transport network. On an average weekday, 150,000 passengers travel by bus, tram, commuter trains or metro. The following measures have been implemented in Lille within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of measures</th>
<th>Measure description</th>
<th>Measure N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated pricing strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Public Transport safety</td>
<td>Public Transport Safety</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>Public Transport intermodality</td>
<td>Intermodal local/regional transport interchanges</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Park &amp; Ride facilities</td>
<td>7.6</td>
</tr>
<tr>
<td>New forms of vehicle use (WP8)</td>
<td>Car pooling/sharing</td>
<td>Company Mobility Plan in the administration fleet</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>Awareness raising</td>
<td>Urban Mobility Plan</td>
<td>8.5</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving Public Transport traffic flow</td>
<td>High Level Service Bus Routes</td>
<td>11.7</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Biogas Bus Fleets</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Clean Municipal Fleets</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>Clean Fuel distribution</td>
<td>Analysis of the biogas experience</td>
<td>12.9</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Lille.
Pécs

The City of Pécs with 170,000 inhabitants is a middle-sized cultural, educational, commercial and health centre in Hungary, 40 km from the Croatian border. In the last decade the number of cars and the number of tourists and students have increased rapidly, creating a huge demand for parking spaces and public transport. In November 2000, the early Christian burial chambers in the city centre received UNESCO World Heritage status, providing the municipality with new tasks to protect and preserve the heritage.

The following measures have been implemented in Pécs within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Strolling zones</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Strolling zones</td>
<td>Preparation of a new traffic and transport strategy</td>
<td>5.5</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The map below shows the location of the parking-zones and the access restriction areas in Pécs.
Prague

The City of Prague is the capital of the Czech Republic and the country’s largest city with 1,300,000 inhabitants. On an average weekday, 44% of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 1.160 million passengers per year uses the public transport system in Prague.

Prague has a high concentration of both political and economic administration, industry, trade, education, research and tourism. This requires good traffic management. One of the biggest problems is the very fast increasing number of private cars. It has more than doubled since 1990. A new traffic policy promotes public transport, development of traffic infrastructure and regulation of car traffic, particularly in the city centre.

The following measures have been implemented in Prague within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure nr</th>
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<tbody>
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<td>Access Restrictions (WP5)</td>
<td>Environmental Zones</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
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<td>Public Passenger Transport (WP7)</td>
<td>PT intermodality</td>
<td>Linking different ways of public transport</td>
<td>7.7</td>
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<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.6</td>
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</tbody>
</table>

The map below shows the geographical context of measures in Prague.
Stockholm

The City of Stockholm is the capital of Sweden and the country’s largest city with 770,000 inhabitants. On an average weekday, over 600,000 passengers travel by public transport in the county of Stockholm. Of all travellers, 46% go by car, 23% use public transport, 29% are pedestrians and cyclists and 2% use other modes.

The biggest traffic problems include an increasing number of vehicles, congestion on many main roads, heavy duty traffic, limited rail track capacity and few cyclists. Moreover, there are problems with the air quality in inner city areas especially due to a high concentration of NOx and particulate matter. Noise levels are also high.

Stockholm is improving its transport system environmentally by substituting conventional vehicles with clean ones and making logistic services more effective. Better public transport and intelligent traffic information techniques are other important fields.

The following measures have been implemented in Stockholm within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure No.</th>
</tr>
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<tbody>
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<td>Widening of the Environmental Zone</td>
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<td>Integrated Pricing Strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.1</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Parking</td>
<td>Reduced parking fees to promote clean vehicles</td>
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<td>Natural logistic centre – to optimise freight deliveries at construction site</td>
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</tr>
<tr>
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<td>Increasing cycling attractiveness (BBM information on the Internet)</td>
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<tr>
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<td>Traffic information</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.5</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and efficient heavy vehicles</td>
<td>12.1</td>
</tr>
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<td>Light vehicles</td>
<td>Clean municipal fleets</td>
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<td>12.4</td>
</tr>
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<td>Clean kerosene distribution</td>
<td>Improved biogas re-fuelling infrastructure</td>
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<td>12.10</td>
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</table>

The map below shows the geographical context of measures in Stockholm.
### Appendix 3 – Wordlist

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
</tr>
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<tbody>
<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
</tr>
<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
</tr>
<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>RKF</td>
<td>Resekortsföreningen I Norden -</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
<tr>
<td>SL</td>
<td>Stockholm Transport</td>
</tr>
<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l’Intégration Réseaux et des Tarifs</td>
</tr>
<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDSETTER</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
The European project Trendsetter involves 50 individual projects, all of which aim to: improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union.
Read more about Trendsetter at www.trendsetter-europe.org.
Read more about the Civitas project at www.Civitas-initiative.org
Evaluation Report – Clean Vehicles (WP12)

June 2006
Trendsetter Report No 2005: 10
Trendsetter External Deliverable No 4.3h
Contract No: NNE-2001-00323

Contractors
1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
7. Swedish National Road Administration, Stockholm Region
8. Stockholm Real Estate and Traffic Administration
9. Public Transport Company of Graz
10. Taxi Group 878 Cityfunk Ltd
11. Styrian Transport Association, STVG Ltd
12. Erlach Consulting & Engineering
13. Province of Styria
14. Austrian Mobility Research
15. City of Pécs
16. Pecs Municipal Operations and Property Management Company
17. Syndicat Mixte des Transports
18. Statoil Detaljhandel AB
19. AGA Gas AB
20. Home 2 You AB

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## PART A – REPORT SUMMARY

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PART A – REPORT SUMMARY

PURPOSE OF THIS REPORT

This report details the implementation and the evaluation of the demonstration work undertaken in WP12 of Trendsetter, in relation to Clean Public and Private Fleets.

It presents the activities in the perspective of 3 among the 5 cities involved in Trendsetter: Stockholm, a capital city of the European Union and Lille and Graz, two regional capitals of different size.

It details the work done, the various facets related to the operational activities and the achievements.

It analyses the results, the potential impact locally, at project level and at European Union level. It also pays an important attention to the potential for replication in other sites, of same or different size.

It makes recommendations to the various types of stakeholders involved, on technical as well as on economical, political and administrative issues.

It finally gives specific input to the European Commission on important matters to be addressed at this level.

CLEAN PUBLIC AND PRIVATE FLEETS IN TRENDSETTER

Trendsetter’s overall strategy is to combine advanced mobility management schemes with clean vehicle fleets, which can achieve both short-term energy and emissions reductions and long term shifts to more public transport and effective urban goods flows. Trendsetter is a large demonstration project focusing both on heavy vehicles (buses, lorries and vans) and on private cars. The project comprises 53 demonstration projects and some associated projects in 5 cities with 20 partners. The project includes 8 work packages in two major fields: Better transport mobility management and Fleets of clean, cost-effective and energy-efficient vehicles. These two major fields each include public, commercial and private transport. Trendsetter methods build upon a mix of policy based measures and technology that combine the following work paths:

- Stimulate the use of public transport through packages of measures including new pricing strategies, bus priority systems, innovative information technologies, improved intermodal interchanges and transport demand systems
- Improve efficiency in urban freight transports through logistics and information
- Achieve a higher market penetration for clean, renewably fuelled busses, lorries, vans and cars by coordinated procurements to reduce prices, improved infrastructure and other measures.
- Promote alternatives to private cars through new services and innovative measures
- Encourage policy changes towards more sustainable urban transport systems

Clean Public and Private Fleets has therefore an important role in the implementation of specific objectives:

- Accelerate the heavy vehicles transition from a classical fossil fuel to clean fuel solution
- Accelerate the light vehicles take-up from a larger audience (PT, Municipality, private companies)
- Improve the clean fuel production and distribution
The measures in this WP are grouped after its main purpose:

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**MAIN TOPICS ADDRESSED BY WP12 - PUBLIC AND PRIVATE FLEETS**

**HEAVY VEHICLES**

4 measures address specifically this topic, which relates to buses as well as to lorries and trucks for different services, e.g. transport, waste collection, servicing of infrastructure, …:

**MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES**

The measure has had the overall purpose to demonstrate that clean heavy vehicles can replace conventional diesel vehicles in an efficient way. The demonstration has included buses and lorries.

The board of the local public transport company, SL, decided in 2003 that 125 (half) of the company’s buses running in the city centre area should be replaced by bio gas buses by the end of 2008 starting with 21 buses 2004. The procurement of the buses was completed in the beginning of 2004 and the 21 buses were delivered during the period July to September. The chosen brands were MAN and VOLVO. To secure bio gas deliveries SL has signed a long term contract with the producer of bio gas, Stockholm Water Company. SL has also invested in a filling station at the bus garage only to be used by the SL buses (not public). All stakeholders are very pleased with the new buses. Half noise level, no harmful emissions of carbon dioxide and much less harmful emissions affecting health. Economy as expected.

SL has recently decided to replace another 100 diesel buses with buses running on ethanol.

Stockholm Water Company, a company owned by the City of Stockholm, uses 10-15 heavy trucks on a daily basis in their work to invest, reinvest and maintain pipes for water and waste water. Most of the transport service is bought from private transport companies. The board of the Stockholm Water Company decided in 2002 that three of the heavy diesel lorries should be replaced by bio gas lorries during the period 2003-2004. After the procurement process was completed these vehicles have been delivered. All of the diesel lorries used by the company are planned to be replaced by bio gas lorries in 2-3 years. All stakeholders are pleased with the bio gas lorries.

Innovative aspects include the optimisation of the use of biogas locally by fuelling heavy vehicles that are used in sensitive and densely populated areas in the city centre.

**MEASURE 12.2 BIOGAS BUS FLEETS**

In 1990 Lille Metropolis decided to start an urban bus service, fuelled by natural and/or purified biogas, produced from the fermentation of sludge from a local sewage treatment plant. After an experimental project and a test period, it was decided to introduce a new fleet of such vehicles into full service. The final objective is to convert the entire fleet (400 buses) into buses running on this type of fuel.

By the end of year 2005, Lille Metropole will have:

- Purchased 128 gas/biogas buses. By Mid-2005, the total fleet should include 170 gas/biogas buses (50% of the bus fleet).
- Purchased a new CNF and biogas compression station for the buses.
- Built a new bus depots and modified certain lines (detectors, ventilation system, lighting), in order to guarantee bus operation and maintenance safety.

Infrastructure investments will be partly financed by the Trendsetter Budget (extra-cost of the busses, the depots and the line modifications due to the use of biogas).

Furthermore, a technical study will evaluate the technical and environmental aspects of the experience of a biogas busses fleet.

Innovative aspects include a clean public bus fleet using locally produced biogas fuel.
MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET

The collected used cooking oil is converted into biodiesel and provide the whole busfleet. The busfleet has also a optimum interior design, a better acoustic and visual information and ramps for handicapped persons.

Attractivity of the city will increase due to less exhausts by the biodiesel driven buses. Also, public transport become more userfriendly, especially for the disabled and other specific target groups.

The Grazer Verkehrsbetriebe are interest in technical progress for better air quality, therefore this company switched the whole busfleet to biodieseloperation.

Innovative aspects: the 100 percent switch to alternative fuel for the entire bus fleet of the city of Graz is new, as well as the innovative financing scheme (leasing model for tramways and buses, including maintenance), which allows for a quick renewal of the fleet, achieving customer friendly buses, accessible also for disabled.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES

The measure aimed to introduce clean waste collection vehicles to the entrepreneurs that are running the waste collection in Stockholm for the account of the city’s Waste Management Administration. This part of the Trendsetter project required the city contractors to operate one or two biogas-fuelled waste collection lorries each. In order to do this the contractors were offered Trendsetter co-financing for a part of the extra costs incurred investing in biogas collecting lorries, up to a total of eight vehicles in the project.

The Entrepreneurs to the Waste Management Administration should then use those vehicles in the daily operation. After the introduction of the biogas collection vehicles an evaluation would be carried out. The evaluation should include operational users as well as the citizens’ attitudes regarding biogas fuelled waste collection lorries.

For the time being eight biogas waste collection lorries has been purchased within the framework of Trendsetter. Besides that the contractors that run the waste collection lorries already had two biogas lorries through the EU-supported project of Zeus (Zero and low Emission vehicles in Urban Society) were eight European cities worked together to promote greener fuels and vehicles during 1996-2000. The experiences from Zeus were very positive.

Innovative aspects include the extended use of biogas driven waste freighters within a larger number of private waste collection companies will act as a showcase of the biogas energy loop to citizens and private companies.

The 3 cities involved in WP12 demonstrated experiences in a variety of situations and configurations.

In all cases, the experiences were positively viewed, from the point of view of all stakeholders: operators, drivers, community, etc.

Most of the difficult issues relate to infrastructure aspects and to the necessity to reach a critical mass in the operation of clean heavy vehicles fleets. In particular, fuel production and fuelling stations are major issues, whatever the clean fuel used (oil, gas, ethanol, …)

Another important aspect in the implementation of clean heavy vehicles fleets relates to the long lifetime of heavy vehicles, which may impose a slow replacement rate in many cases.
LIGHT VEHICLES

6 measures address specifically this topic, which relates to the implementation of light vehicles in the fleets of administrations and companies:

**MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)**

This measure has been about how to increase the number of clean vehicles in the municipal fleet of Stockholm. In the Municipality of Stockholm there is a political consensus that all the city administrations companies shall purchase only clean vehicles. At the moment 41% of the vehicles used by the different administrations are clean. To bring an increase about actions have been taken to remove barriers and create incentives to promote clean vehicles. A major action taken has been a common procurement, which has brought prices down. Information campaigns and seminars have been launched.

A test fleet of clean cars has been set up to make it possible for potential buyers to test different models free of charge. Actions have also been taken to increase the number of filling stations for renewable fuels (bio gas and ethanol). Lobbying has resulted in free or discounted parking and no congestion tax. Talks with the car dealers have helped to introduce more models of clean cars.

Innovative aspects include the municipality vehicle fleet as a showcase towards citizens as well as private companies.

**MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)**

Initially, in 1997, the Urban Community of LILLE decided to acquire 20 vehicles with natural gas and 10 electric vehicles per annum during three years. The decision was taken to gradually replace most of its fleet of vehicles of service using the fuels gasoline and gas oil, by vehicles with clean energy, with Natural gas and electricity.

Project TRENDSETTER made it possible to accelerate the introduction of clean vehicles into the fleet in service at Lille Métropole thanks to the significant forecast of purchase of additional clean vehicles to reach quickly and if possible 220 clean vehicles.

Gas Vehicles:

The reasons which made us prefer the GNV rather than the LPG (liquified petroleum gas) are:

- A real diversity of provisioning. The LPG is a petroleum product, fossil energy with limited stock.
- Flexibility and safety in the provisioning (not delivered by tanker)
- The vehicles equipped present a greater guarantee of safety.
- The natural gas is made up mainly of methane which can be produced by "biomethanisation" starting from stations of purification or fermentable waste, the "bio gas" true energy renewable which can supply our vehicles GNV. This project of coherent with the project "Bio Gas Bus (Trendsetter 12-2)" carried out by the Urban Community of LILLE and the Transpole company.

For the gas vehicles, a filling station was installed on the site of the hotel of community in accordance with the initial agreement with GDF. a new compression unit of will also be acquired and installed on another Community site, in order to facilitate the provisioning of the whole of the park, when volumes justify it.

Electric vehicles:

For the electric vehicles, terminals of normal refill (5 to 6 hours for a normal refill) were installed on various Community sites thus facilitating the refill of the 34 vehicles on the territory of the Urban Community.

Innovative aspects include replacing the staff vehicles by clean (gas and electrical) vehicles with the objective of a totally clean staff fleet;
MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION

It is the first time in Austria, that an entire taxi fleet of this size switches towards bio diesel. The implementation of a new bio-diesel service station for taxis in 2003 also provides an opportunity to raise the number of bio-diesel user due to the opening for the public.

In the starting phase there appeared great technical problems for the engines of the used Mercedes Taxis. They could get solved by contracting two bio diesel experts of the Department of Chemistry, at the Karl Franzens University of Graz and Institute for Internal Combustion Engines and Thermodynamics, at Technical University of Graz. Several working meetings with the two experts, chairman of the taxi company and TRENDSETTER management team led to a practicable solution.

The change-over from fossil fuel to bio-diesel use for the emergency backup generator flew smoothly.

MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE

The measure was split in two parts each representing a means of decreasing the purchase price of clean vehicles; a common procurement of vehicles and a network of companies using and promoting clean vehicles by means of a system of subsidies for a part of the additional cost of a clean vehicle.

The common procurement process was split into three phases: market study, information campaign including forming of buyers consortium and the procurement its self. This worked very well and the outcome of the whole process was considered a success.

Companies in Stockholm that have at least on clean vehicle started the Network of Clean Drivers. The network has about 40 companies as members and more than 200 clean vehicles have been sold to the network members.

Any company which buys a clean vehicle can join. The network was started by Swedish Television company and was strongly linked to the Trendsetter subsidies in this measure.

Several dissemination actions have been taken to spread knowledge about the project and the network of clean drivers i.e. press releases, newsletters to 1.300 companies, national web portal on clean vehicles. Many news articles have written in the papers about this measure during a period of six months.

Lesson learned: Subsidies are an effective way of spreading the purchase of clean vehicles to small and medium size companies with many external contacts (customers). For larger companies subsidies is not enough, other incentives such as requirements from customers, free parking, exemption from congestion fees are more important for choosing clean vehicles.

Innovative aspects include a co-ordinated nation-wide procurement of clean vehicles that significantly improves national competitiveness in the manufacturing of such vehicles and the implementation of commercially viable innovation from ongoing research on conventional vehicles

A Clean Vehicle Network called “At least one clean vehicle” was created during the project. Members are companies in Stockholm that have at least one clean vehicle in the organisation. They act as a strong body to increase the infrastructure of alternative fuels. The initiative was taken by the Swedish Television and was strongly linked to the Trendsetter subsidies in this measure. A press conference was arranged where the director of the Swedish Television as well as four other managers signed an agreement to “join the Trendsetter project” as well as the Clean Vehicle Network committing themselves to purchase at least one clean vehicle.

EARLIER MEASURE 12.12 FUSED INTO MEASURE 12.11
MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS

The objective of the measure is to influence private companies to choose clean vehicles instead of conventional vehicles fuelled by petrol or diesel. The measure is part of the mission to decrease emissions to air from the transport sector in the city of Stockholm.

A strategy was set at the start of the project. This strategy was the platform for how to reach both market and companies. Firstly, two market studies were made. These studies resulted in a market potential of clean vehicles as well as a strategy on how to communicate clean vehicles as a concept.

The project activities included a combination between Public Relations and Sales Promotion. The aim was to raise the awareness of clean vehicles in the companies and among the public. Therefore, a media perspective was applied in all activities. Journalists were always and are still invited to the events that are arranged. The journalists were supplied with research results and news in general. The following activities were carried out:

1. The setting up of a company register
2. Production of information materials
3. A campaign directed to media and companies including seminars, press releases etc
4. Enabling companies to try out a clean vehicle for free during one week
5. Information and education aimed at vehicle retailers
6. Use of subsidy for the additional cost as an incitement when buying a clean vehicle (12.11)
7. Direct contacts and advice to companies
8. Support to parallel activities in other organizations such as seminars
9. Evaluation of clean vehicle sales and share of renewable fuel sold in the region

Together with vehicle retailer and fuel distributors, a campaign has been carried out that included both PR activities such as press releases and active contacts with journalists, and sales promotion activities in the form of seminars and exhibitions of clean vehicles. The distributors and retailers contributed with financial and man-time resources. A close co-operation was achieved that simplified the promotion of the clean vehicle concept and activated the sales persons.

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MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES

The objective of the measure is to promote and make information available and easy accessible on a public web site at the national level, with English translation. The launched web site presents:

- Participants and contact details.
- Definition of clean vehicle and –fuels
- Vehicle models and retailers
- Calculations on environmental benefits of clean vehicles
- Possibility to make economical calculations
- Maps on fuelling stations with addresses and prices
- National as well as relevant international legislation on clean vehicles, including taxes, subsidies and benefits.
- Links to other related information on clean vehicles.

The web address has been marketed intensively through all available channels in the participating cities. Innovative aspects include Web information that comprises all information of the availability and conditions of clean vehicles and that has links to all relevant Web sites due to clean vehicles and fuels.
These measures are all confronted to the need of allowing the fleets to reach a critical mass to allow and justify the implementation of the corresponding infrastructure.

It is important to underline that federative actions (e.g. central purchasing) may have a very strong impact in starting the process of inserting clean vehicles in existing fleets, triggering the justification for the deployment of infrastructure in terms of clean fuel production and distribution.

The availability of clean light vehicles (e.g. in France) is definitely an issue that is depending only on the marketing and sales strategies of the vehicle manufacturers. The situation is very variable from one country to another, and this does not allow administrations or companies to implement plans with the necessary reliability on the purchasing side.

The cost of clean vehicles is also an issue, and this requires further actions, both at purchasing level to allow a critical mass of purchase to influence the vendors (cf. 12.11) and probably through direct incentives to the manufacturers. In this emerging market, the absence of 2nd hand car market is also creating an economic difficulty.

Communication to convey the right perceptions and information elements also appears to be an essential part of the take-up of use of clean light vehicles.

Altogether, it appears that the use of clean vehicles in administration and company fleets is feasible and attractive, once the adequate approach is taken to overcome the still remaining issues of availability, cost and infrastructure.
CLEAN FUEL DISTRIBUTION

3 measures address specifically this topic, which relates to the infrastructure issues, both at production and at distribution levels:

MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM

Collection of waste-cooking-oil from private households:

1) mobile collection with toxic-waste bus
2) stationary collection in the district authorities and at 2 fire brigades
3) in the summer in the context of district clearing outs. The city of Graz offers a clearing out service to the citizens to get rid of bulky waste, scrap metal etc., this is picked up by the city. Citizens can also get rid of their oil there.
4) evaluation of the awareness raising activities concerning waste cooking oil and the mobility consultation

Collection of waste cooking-oil from restaurants:

1) Development of the logistics for collecting used cooking oil from restaurants
2) Setting up the necessary agreements
3) Collection of used cooking oil from restaurants in specia buckets and free of charge

Conversion of used cooking oil to biodiesel.

Collected used cooking oil is sold to SEEG (Südsteirische Energie- und Eiweißerzeugungsgenossenschaft as valuable raw material for the production of biodiesel. SEEG

Is a concern which dissipates used cooking oil into biodiesel.

It is the first time, that a combined consultation for edible-oil collection and a realisation of a mobility service is offered. The same applies to the combined consultation for private households about mobility services and recycling.

MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE

Besides the already existing production of biogas fuel by the sewage treatment in the framework of a former Thermie project, Lille will make strong efforts during the Trendsetter project to extend the supply of biogas fuelling stations. A new big organic waste plant will be started in Nov 2004 and construction finished by 2006. This will increase the biogas production to 3.6 M Nm³ per year after Trendsetter. The quality of the produced biogas, which will at least correspond to the European standard defined for the Compressed Natural Gas, will be imposed.

Innovative aspects include the local massive production and use of biogas from waste and sewage treatment and experience evaluation

The linked projects, Organic recovery centre and bus depot construction in the same area, will be one of the biggest integrated project on alternative fuel in Europe : with the inhabitant wastes Lille metropolis will produce biogas used for public transports of those persons.
MEASURE 12.10 IMPROVED BIOGAS REFUELING INFRASTRUCTURE

Three of the five existing bio gas filling stations were built during the period 1996-1997. The other two were built in 2004 and are not open to the public. The reason why no more public stations have been built up till now is that the interest for building has been zero. The market for selling bio gas has been to small and non profitable. The insufficient infrastructure has hindered a breakthrough of bio gas vehicles. During 2004 AGA Gas expressed an interest in becoming a distributor of bio gas in the Stockholm region.

After hard and difficult negotiations between AGA and Stockholm Water Company with support of the Environment and Health Administration an agreement was settled which gave AGA the sole right to buy, sell and distribute all bio gas produced by Stockholm Water Company with the exception of a certain volume reserved for bio gas buses operated by the local public transport company, SL, and stoves for apartments. Suitable locations for four new stations has been studied and decided. Three of the four stations are just about to open. The fourth station has been ordered but has been stopped for political reasons at least for the time being.

Innovative aspects include the new biogas fuel stations which will largely increase the competitiveness for biogas as a fuel in Stockholm. It will give many private companies a possibility to choose a clean vehicle.

The new filling stations are technically different from the existing ones. What we have here is a remote-monitored system with swap-fuel units that are easy to replace

This set of measures demonstrated that alternative fuels (biogas from waste and sludge, oil, …) can be produced at similar costs to fossil fuels and be competitive in the whole value chain of operation of vehicles in fleets.

It also demonstrated that the quality produced is totally satisfactory, for the benefit of the operators.

The distribution infrastructure must be put in place to allow the proper refuelling without excessive constraints, requiring investment and changes of habits for most of the stakeholders involved.
**MAIN CONCLUSIONS**

The measures of WP12 reached their objectives (at least partially and most of the cases totally) and can be used as basis for examples and for replication to other cities.

On a general basis, the work in this workpackage supports some important general results of Trendsetter:

- Biogas value chain for heavy vehicles fleets (buses, trucks, …) is not only environmentally attractive but economically viable (e.g. Lille, Stockholm)
- Infrastructure and the corresponding constraints (long term planning, heavy investments, multiplicity of stakeholders) are a key issue for Sustainable Urban Transport Plans (SUTP’s) and can only be triggered and accompanied by “short” projects such as Trendsetter
- Sustainable urban transport requires complex decision-making and integration in the general urban management. When the decision making is adequate, efficiency is highest
- Communication, explanation, didactics, etc. are at the heart of adoption processes by users: using successful examples as such developed in Trendsetter to gain adhesion from citizens is very effective
- Soft measures are an essential accompanying element for mobility management

All sites and all measures clearly demonstrate that clean fleets can only be supported within a global approach from the local/regional/national authorities.

Such approach requires the involvement of a wide and complex variety of stakeholders from administration and from industry, and must address the whole value chain, including the essential point of logistics.

The consensus making process must exist prior to action with defined goals, argumented budgets and explicit commitments.

High-level political support is essential for decision-making, and must be accompanied by a strong communication.

The work shows that real economic impact is positive.

A global approach including operational elements (direct operating costs, infrastructure, fuels, …) and induced elements (urban benefits, environmental impact, …) is necessary to validate the economic impact of the switch to clean fleets.
The work done in the various measures highlights the importance of trials and progressive approaches in order to
give credibility to up-scaling and deployment actions.

In the decision making process, the evaluation of the critical mass to be reached for operational and economic
viability must be validated.

This allows:

- motivation of industry to address a real market
- economic threshold for viability and long term stability
- motivation of the users which receive the optimal service

Consensus building, communication and information are instrumental in reaching these goals.

The European Commission is one among the several stakeholders involved in the process towards clean public
and private fleets, as it develops many of the general policies towards environmental friendly mobility of persons
and goods.

It is therefore expected that it plays a role in supporting, incentive and co financing (through subsidies as well as
tax exemptions) various key elements:

- Infrastructure for the production and distribution of alternative fuels, a key element of the take up
- Development of clean vehicles by the manufacturers, so that they are available on the market
- The direct use of clean vehicles to accelerate the path towards a critical mass for the operations

Last but not least, the EC may have a key role in informing and validating that fleets of clean vehicles, public or
private, ARE POSSIBLE AND ECONOMICALLY INTERESTING
PART B – COMMON TRENDSETTER INTRODUCTION

1 INTRODUCTION

1.1 BACKGROUND

Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 TRENDSETTER – A PART OF THE CIVITAS INITIATIVE

The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS:

− CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
− Cities are in the heart of local public private partnerships
− Political commitment is a basic requirement
− Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:

− to promote and implement sustainable, clean and (energy) efficient urban transport measures
− to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
− to build up critical mass and markets for innovation
Each city implements a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

The five Trendsetter cities are briefly described in appendix 1.

1.3 **ACHIEVEMENTS WITHIN TRENDSETTER**

Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European dimension. Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

**Improving access to public transport**

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the
public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

**Trip planning, traffic control and cycling**

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

**Access restrictions for reduced traffic**

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone. Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

**Marketing and mobility management**

Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

**Co-transportation of goods**

Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

**Clean vehicles and fuels**

Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been
demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction..

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

Incentives and promotion of clean vehicles
Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.

1.4 OVERVIEW OF ACHIEVED EFFECTS

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
</tr>
</tbody>
</table>

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure. Time – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emissions</th>
<th>Energy</th>
<th>Mobility</th>
<th>Time</th>
<th>Investment cost</th>
<th>Operational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased public transport security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convenient and safe intermodality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer-friendly stops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New services for special needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning trips on the web</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrated public transport services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic management</td>
<td>Traffic management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling</td>
<td>Cycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selective access restriction for heavy vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Congestion charging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing attractive alternatives</td>
<td>Marketing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobility management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved goods distribution</td>
<td>Consolidation of goods *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean vehicles and fuels</td>
<td>Biofuelled vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biofuel production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect

All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be
solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 TRENDSETTER CITIES AFTER CIVITAS

The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas I cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2 OVERVIEW OF THE EVALUATION FRAMEWORK

2.1 EVALUATION AT DIFFERENT LEVELS

The Trendsetter project has been evaluated in different levels: measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:

- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

7.1 INDICATOR BASED EVALUATION

Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOₓ</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dB(A)</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios

When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.

Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.
Methodology
The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (−− − 0 + ++).
3  TRENDSETTER OBJECTIVES

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

3.1  TRENDSETTER HIGH LEVEL OBJECTIVES

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td>Reduce annual fossil CO2 emissions by 5%, approximately 75,000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1,800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td>Save over 850 TJ (20,300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO2, NOx and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfil the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.

The calculated reduction of fossil CO2 was approximately 57,000 tonnes a year. The objective of 75,000 tonnes is expected to be reached, but not within the project period.

The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.
The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
### 3.2 Demonstration Objectives

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. Those not reached are commented below.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324 Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4 Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td>300</td>
<td>3000</td>
<td>+2700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmentally restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1100</td>
<td>3000</td>
<td>+1900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>
### 3.3 Scientific and Technical Objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
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Each demonstration objective and the fulfilment of it is described below

**Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.**

In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm3, but biogas vehicles have consumed only 4,26 million Nm3. The rest has been used for heating and electricity production or just flared.

Before Trendsetter, the local biogas production in Lille was 0,12 Nm3 biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3,6 million Nm3 per year.

This objective is not applicable for the other three cities.

**Reduce the commercial cost of biogas fuel by 20% in demonstrating cities**

The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.

In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).

This objective is not applicable for the other three cities.

**Implement a complete biogas technology chain in Stockholm and Lille, from production to end use**

In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plats will be ready.

This objective is not applicable for the other three cities.
Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now. The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.

- A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of fossil CO2, emissions of NOx and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

- A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.

- In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the website has been successful in reaching potential buyers and to have a reliable and relevant content.

- In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems...
concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

Evaluate the effectiveness and political acceptability of environmental zones

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

− An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

− The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

− Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.

− In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

Develop integrated city mobility plans integrating environmental protection, traffic and public health policies

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2.200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.

The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4 OVERVIEW OF WP

The objectives for WP 12 are:

- Accelerate the heavy vehicles transition from a classical fossil fuel to clean fuel solution
- Accelerate the light vehicles take-up from a larger audience (PT, Municipality, private companies)
- Improve the clean fuel production and distribution

7.1 SHORT OVERVIEW/DESCRIPTION OF MEASURES WITHIN WP

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MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES

The measure has had the overall purpose to demonstrate that clean heavy vehicles can replace conventional diesel vehicles in an efficient way. The demonstration has included buses and lorries.

The board of the local public transport company, SL, decided in 2003 that 125 (half) of the company’s buses running in the city centre area should be replaced by bio gas buses by the end of 2008 starting with 21 buses in 2004. The procurement of the buses was completed in the beginning of 2004 and the 21 buses were delivered during the period July to September. The chosen brands were MAN and VOLVO. To secure bio gas deliveries SL has signed a long term contract with the producer of bio gas, Stockholm Water Company. SL has also invested in a filling station at the bus garage only to be used by the SL buses (not public). All stakeholders are very pleased with the new buses. Half noise level, no harmful emissions of carbon dioxide and much less harmful emissions affecting health. Economy as expected.

SL has recently decided to replace another 100 diesel buses with buses running on ethanol.

Stockholm Water Company, a company owned by the City of Stockholm, uses 10-15 heavy trucks on a daily basis in their work to invest, reinvest and maintain pipes for water and waste water. Most of the transport service is bought from private transport companies. The board of the Stockholm Water Company decided in 2002 that three of the heavy diesel lorries should be replaced by bio gas lorries during the period 2003-2004. After the procurement process was completed these vehicles have been delivered. All of the diesel lorries used by the company are planned to be replaced by bio gas lorries in 2-3 years. All stakeholders are pleased with the bio gas lorries.

Innovative aspects include the optimisation of the use of biogas locally by fuelling heavy vehicles that are used in sensitive and densely populated areas in the city centre.
MEASURE 12.2 BIOGAS BUS FLEETS
In 1990 Lille Metropolis decided to start an urban bus service, fuelled by natural and/or purified biogas, produced from the fermentation of sludge from a local sewage treatment plant. After an experimental project and a test period, it was decided to introduce a new fleet of such vehicles into full service. The final objective is to convert the entire fleet (400 buses) into buses running on this type of fuel.

By the end of year 2005, Lille Metropole will have:

- Purchased 128 gas/biogas buses. By Mid-2005, the total fleet includes 170 gas/biogas buses (50% of the bus fleet).
- Purchased a new CNF and biogas compression station for the buses.
- Built a new bus depots and modified certain lines (detectors, ventilation system, lighting), in order to guarantee bus operation and maintenance safety.

Infrastructure investments will be partly financed by the Trendsetter Budget (extra-cost of the busses, the depots and the line modifications due to the use of biogas).

Furthermore, a technical study will evaluate the technical and environmental aspects of the experience of a biogas busses fleet.

Innovative aspects include a clean public bus fleet using locally produced biogas fuel.

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET
The collected used cooking oil is converted into biodiesel and provide the whole busfleet. The busfleet has also a optimum interior design, a better acoustic and visual information and ramps for handicappeded persons.

Attractivity of the city will increase due to less exhausts by the biodiesel driven buses. Also, public transport become more userfriendly, especially for the disabled and other specific target groups.

The Grazer Verkehrbetriebe are interested in technical progress for better air quality, therefore this company switched the whole bus fleet to biodiesel operation.

Innovative aspects include the 100 percent switch to alternative fuel for the entire bus fleet of the city of Graz is new, as well as the innovative financing scheme (leasing model for tramways and buses, including maintenance), which allows for a quick renewal of the fleet, achieving customer friendly buses, accessible also for disabled.

MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)
This measure has been about how to increase the number of clean vehicles in the municipal fleet of Stockholm. In the Municipality of Stockholm there is a political consensus that all the city administrations companies shall purchase only clean vehicles. At the moment 41% of the vehicles used by the different administrations are clean.

To bring an increase about actions have been taken to remove barriers and create incentives to promote clean vehicles. A major action taken has been a common procurement, which has brought prices down. Information campaigns and seminars have been launched.

A test fleet of clean cars has been set up to make it possible for potential buyers to test different models free of charge. Actions have also been taken to increase the number of filling stations for renewable fuels (bio gas and ethanol). Lobbying has resulted in free or discounted parking and no congestion tax. Talks with the car dealers have helped to introduce more models of clean cars.

Innovative aspects include the municipality vehicle fleet as a showcase towards citizens as well as private companies.
MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)

Initially, in 1997, the Urban Community of LILLE decided to acquire 20 vehicles with natural gas and 10 electric vehicles per annum during three years. The decision was taken to gradually replace most of its fleet of vehicles of service using the fuels gasoline and gas oil, by vehicles with clean energy, with Natural gas and electricity.

Project TRENDSETTER made it possible to accelerate the introduction of clean vehicles into the fleet in service at Lille Métropole thanks to the significant forecast of purchase of additional clean vehicles to reach quickly and if possible 220 clean vehicles.

Gas Vehicles:
The reasons which made us prefer the GNV rather than the LPG (liquified petroleum gas) are:

- A real diversity of provisioning. The LPG is a petroleum product, fossil energy with limited stock.
- Flexibility and safety in the provisioning (not delivered by tanker)
- The vehicles equipped present a greater guarantee of safety.
- The natural gas is made up mainly of methane which can be produced by "biomethanisation" starting from stations of purification or fermentable waste, the "bio gas" true energy renewable which can supply our vehicles GNV. This project of coherent with the project "Bio Gas Bus (Trendsetter 12-2)" carried out by the Urban Community of LILLE and the Transpole company.

For the gas vehicles, a filling station was installed on the site of the hotel of community in accordance with the initial agreement with GDF. a new compression unit of will also be acquired and installed on another Community site, in order to facilitate the provisioning of the whole of the park, when volumes justify it.

Electric vehicles:
For the electric vehicles, terminals of normal refill (5 to 6 hours for a normal refill) were installed on various Community sites thus facilitating the refill of the 34 vehicles on the territory of the Urban Community.

Innovative aspects include replacing the staff vehicles by clean (gas and electrical) vehicles with the objective of a totally clean staff fleet;

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES

The measure aimed to introduce clean waste collection vehicles to the entrepreneurs that are running the waste collection in Stockholm for the account of the city’s Waste Management Administration. This part of the Trendsetter project required the city contractors to operate one or two biogas-fuelled waste collection lorries each. In order to do this the contractors were offered Trendsetter co-financing for a part of the extra costs incurred investing in biogas collecting lorries, up to a total of eight vehicles in the project.

The Entrepreneurs to the Waste Management Administration should then use those vehicles in the daily operation. After the introduction of the biogas collection vehicles an evaluation would be carried out. The evaluation should include operational users as well as the citizens’ attitudes regarding biogas fuelled waste collection lorries.

For the time being eight biogas waste collection lorries has been purchased within the framework of Trendsetter. Besides that the contractors that run the waste collection lorries already had two biogas lorries through the EU-supported project of Zeus (Zero and low Emission vehicles in Urban Society) were eight European cities worked together to promote greener fuels and vehicles during 1996-2000. The experiences from Zeus were very positive.

Innovative aspects include the extended use of biogas driven waste freighters within a larger number of private waste collection companies will act as a showcase of the biogas energy loop to citizens and private companies.
MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION

It has happened the first time that an entire taxi fleet of this size switches towards bio diesel. The implementation of a bio-diesel service station in 2003 provides an opportunity to raise the number of bio-diesel user due to the opening for the public.

Due to technical problems appearing at the starting phase of the project two bio diesel experts of the Department of Chemistry, at the Karl Franzens University of Graz and Institute for Internal Combustion Engines and Thermodynamics, at Technical University of Graz were contacted to get problems solved. Several working meetings with the two experts, chairman of the taxi company and TRENDSSETTER management team were carried out.

The change-over from fossil fuel to bio-diesel use for the emergency backup generator flew smoothly.

In Austria, Graz is the first city to switch to bio-diesel for a complete taxi fleet of this size. A new bio-diesel service station for taxis will be established to meet the increased demand for bio-diesel.

MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM

Collection of waste-cooking-oil:

- mobile collection with toxic-waste bus
- stationary collection in the district authorities and at 2 fire brigades
- in the summer in the context of district clearing outs. The city of Graz offers a clearing out service to the citizens to get rid of bulky waste, scrap metal etc., this is picked up by the city. Citizens can also get rid of their oil there.
- evaluation of the awareness raising activities concerning waste cooking oil and the mobility consultation

Development of the logistics for collecting used cooking oil from restaurants

Collection of used cooking oil from restaurants free of charge

Collected used cooking oil is sold to SEEG (Südsteirische Energie- und Eiweißerzeugungsgenossenschaft) as valuable raw material for the production of biodiesel. SEEG is a concern which dissipates used cooking oil into biodiesel.

Conversion of used cooking oil to biodiesel.

Biodiesel is used as renewable low emission fuel for the operation of buses in the public transport service.

It is the first time a combined consultation for edible-oil collection and a realisation of a mobility service is offered. The same applies to the combined consultation for private households about mobility services and recycling.

MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE

Besides the already existing production of biogas fuel by the sewage treatment in the framework of a former Thermie project, Lille will make strong efforts during the Trendsetter project to extend the supply of biogas fuelling stations. A new big organic waste plant will be started in Nov 2004 and construction finished by 2006. This will increase the biogas production to 3,6 M Nm³ per year after Trendsetter. The quality of the produced biogas, which will at least correspond to the European standard defined for the Compressed Natural Gas, will be imposed.

Innovative aspects include the local massive production and use of biogas from waste and sewage treatment and experience evaluation.
The linked projects, Organic recovery centre and bus depot construction in the same area, will complete one of the biggest integrated project on alternative fuel in Europe: with the waste produced by the inhabitants Lille metropolis will produce biogas used for public transports of those persons.

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

Three of the five existing bio gas filling stations were built during the period 1996-1997. The other two were built in 2004 and are not open to the public. The reason why no more public stations have been built up till now is that the interest for building has been zero. The market for selling bio gas has been to small and non profitable. The insufficient infrastructure has hindered a breakthrough of bio gas vehicles. During 2004 AGA Gas expressed an interest in becoming a distributor of bio gas in the Stockholm region.

After hard and difficult negotiations between AGA and Stockholm Water Company with support of the Environment and Health Administration an agreement was settled which gave AGA the sole right to buy, sell and distribute all bio gas produced by Stockholm Water Company with the exception of a certain volume reserved for bio gas buses operated by the local public transport company, SL, and stoves for apartments. Suitable locations for four new stations has been studied and decided. Three of the four stations are just about to open. The fourth station has been ordered but has been stopped for political reasons at least for the time being.

Innovative aspects include the new biogas fuel stations which will largely increase the competitiveness for biogas as a fuel in Stockholm. It will give many private companies a possibility to choose a clean vehicle.

The new filling stations are technically different from the existing ones. What we have here is a remote-monitored system with swap-fuel units that are easy to replace.

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

The measure was split in two parts each representing a means of decreasing the purchase price of clean vehicles; a common procurement of vehicles and a network of companies using and promoting clean vehicles by means of a system of subsidies for a part of the additional cost of a clean vehicle.

The common procurement process was split into three phases: market study, information campaign including forming of buyers consortium and the procurement itself. This worked very well and the outcome of the whole process was considered a success.

Companies in Stockholm that have at least one clean vehicle started the Network of Clean Drivers. The network has about 40 companies as members and more than 200 clean vehicles have been sold to the network members.

Any company which buys a clean vehicle can join. The network was started by Swedish Television company and was strongly linked to the Trendsetter subsidies in this measure.

Several dissemination actions have been taken to spread knowledge about the project and the network of clean drivers i.e. press releases, newsletters to 1,300 companies, national web portal on clean vehicles. Many news articles have written in the papers about this measure during a period of six months.

Lesson learned: Subsidies are an effective way of spreading the purchase of clean vehicles to small and medium size companies with many external contacts (customers). For larger companies subsidies is not enough, other incentives such as requirements from customers, free parking, exemption from congestion fees are more important for choosing clean vehicles.
Innovative aspects include a co-ordinated nation-wide procurement of clean vehicles that significantly improves national competitiveness in the manufacturing of such vehicles and the implementation of commercially viable innovation from ongoing research on conventional vehicles.

A Clean Vehicle Network called “At least one clean vehicle” was created during the project. Members are companies in Stockholm that have at least one clean vehicle in the organisation. They act as a strong body to increase the infrastructure of alternative fuels. The initiative was taken by the Swedish Television and was strongly linked to the Trendsetter subsidies in this measure. A press conference was arranged where the director of the Swedish Television as well as four other managers signed an agreement to “join the Trendsetter project” as well as the Clean Vehicle Network committing themselves to purchase at least one clean vehicle.

**EARLIER MEASURE 12.12 FUSED INTO MEASURE 12.11**
This measure will not be mentioned again in the report, as it was fused into 12.11.

**MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS**
The objective of the measure is to influence private companies to choose clean vehicles instead of conventional vehicles fuelled by petrol or diesel. The measure is part of the mission to decrease emissions to air from the transport sector in the city of Stockholm.

A strategy was set at the start of the project. This strategy was the platform for how to reach both market and companies. Firstly, two market studies were made. These studies resulted in a market potential of clean vehicles as well as a strategy on how to communicate clean vehicles as a concept.

The project activities included a combination between Public Relations and Sales Promotion. The aim was to raise the awareness of clean vehicles in the companies and among the public. Therefore, a media perspective was applied in all activities. Journalists were always and are still invited to the events that are arranged. The journalists were supplied with research results and news in general. The following activities were carried out:

- The setting up of a company register
- Production of information materials
- A campaign directed to media and companies including seminars, press releases etc
- Enabling companies to try out a clean vehicle for free during one week
- Information and education aimed at vehicle retailers
- Use of subsidy for the additional cost as an incitement when buying a clean vehicle (12.11)
- Direct contacts and advice to companies
- Support to parallel activities in other organizations such as seminars
- Evaluation of clean vehicle sales and share of renewable fuel sold in the region
Together with vehicle retailer and fuel distributors, a campaign has been carried out that included both PR activities such as press releases and active contacts with journalists, and sales promotion activities in the form of seminars and exhibitions of clean vehicles. The distributors and retailers contributed with financial and man-time resources. A close co-operation was achieved that simplified the promotion of the clean vehicle concept and activated the sales persons.

A Clean Vehicle Network called “At least one clean vehicle” was created during the project. Members are companies in Stockholm that have at least one clean vehicle in the organisation. They act as a strong body to increase the infrastructure of alternative fuels. The initiative was taken by the Swedish Television and was strongly linked to the Trendsetter subsidies in measure 12.11. A press conference was arranged where the director of the Swedish Television as well as four other managers signed an agreement to “join the Trendsetter project” as well as the Clean Vehicle Network committing them to purchase at least one clean vehicle.

**MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES**

Within the project Trendsetter 12.14 the city of Stockholm has in co-operation with the cities Göteborg and Malmö, created a national website, www.miljofordon.se. The objective is to promote and make information about clean vehicles and fuels available and easy accessible on a public web site at the national level. Some parts are translated into English.

From the start in May 2004, the number of visitors to the web site has increased steadily and it has now approximately 12 000 visits per month. A questionnaire was published on the web site during December 2004, where the visitors could enter opinions about the site and its contents and the provided information.

The result of the questionnaire showed that the web site is working well, but that there were room for improvements.

- The website is successful in reaching potential buyers of clean vehicles. Those who responded to the questionnaire were in 69% “prospective buyers”.
- The web site is successful with regard to content and fulfils the target groups’ requirements. Approximately 40% gave the highest score on the overall impression and the practical use of the web site. There did not seem to be any missing information on the site, only a few of the visitors stated that they were searching for other information than the one provided.

The web site presents information relevant for potential buyers in a way making it easier to buy and drive a clean vehicle. Main content focus on:

- Up to date information about vehicle models and retailers
- Maps on fuelling stations with addresses and prices
- Calculations on environmental benefits of clean vehicles
- Possibility to make economical calculations
- Definition of clean vehicle and –fuels
- National as well as relevant international legislation on clean vehicles, including taxes, subsidies and benefits.
- Links to other related information on clean vehicles.
- Contact details to partners behind the project

The web address has been marketed intensively through all available channels in the participating cities. Innovative aspects include Web information that comprises all information of the availability and conditions of clean vehicles and that has links to all relevant Web sites due to clean vehicles and fuels.
7.2 **Problems to be solved by the measures**

**Measure 12.1 Clean and Efficient Heavy Vehicles**

The market for heavy clean and efficient heavy vehicles has been developed very slowly so far. There is a great need to improve air quality and the noise situation in the city centre. There is also a need to lessen the dependency of fossil fuel such as diesel. Using clean heavy vehicles is a step in the right direction to solve the problem of global warming.

The objective of the measure is to increase the number of clean heavy vehicles in densely populated city centre.

**Measure 12.2 BioGas Bus Fleets**

3 main issues are addressed in this measure:
- develop the performance of the compressed gas buses
- develop the reliability of the gas fuelling (see 12-9)
- Manage the offer of gas buses from manufacturers

The objectives of the measure are to increase the ratio of clean buses in Lille
- introduce 128 new biogas buses in public transport fleet
- bring cost per km of a gas bus equivalent to a diesel bus

**Measure 12.3 Clean and User Friendly Bio-Diesel Bus Fleet**

5 main issues are addressed in this measure:
- The amount of the complete consumption of Diesel is 3,8 Mio liter a year. This creates large CO2 emissions.
- The used cooking oil of the gastronomy and the private households is ecologically harmful.
- To reach new target groups for public transport.
- Only a small part of the busses are switched to bio diesel operation.
- Graz is a model city for environment protection.

The objectives of the measure are
- To convert the entire PT bus fleet of Graz to bio-diesel.
- To thereby reduce emissions and environmental impacts from the public transport system.

**Measure 12.4 Clean Municipal Fleets (Stockholm)**

4 main issues are addressed in this measure:
- warming, acidification and eutrophication as well as health hazards in urban areas.
- Dependency of fossil fuels
- High investment costs for clean vehicles
- Slow development of the market for clean vehicles and fuels

The objective of the measure is to accelerate the take up of clean vehicles within the fleet of the city of Stockholm. Purchase of 200 clean vehicles.
MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)

Considering the emissions of gas responsible for local pollution, the Urban Community reacted by privileging, for its light vehicle fleet, the fuels gas rich in hydrogen and introduced into the cylinders of the engines in gas phase which provides a clean combustion.

The major problem to solve is to obtain a significant reduction in the particulate emissions, nitrogen oxide and carbon monoxides which contribute to the formation of oxydising fogs.

The objective of the measure is to accelerate the conversion of the Lille Metropole’s heterogeneous vehicle fleet into a clean-vehicle fleet.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES

There is a great need to improve air quality and the noise situation in the city centre. There is also a need to lessen the dependency of fossil fuel such as diesel. Using clean waste collection lorries is one step in the right direction to solve the problem of global warming.

The objective of the measure is to expand the municipality experience of clean waste collection vehicles in Stockholm city centre to private entrepreneurs of the waste collection sector.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION

The use of fossil fuel causes a lot of emissions harmful to the environment. The local government built up measures to reduce the individual traffic e.g. by limiting free parking spaces in the city. Taxis are seen as a complementary system to support public transport.

It was intended to provide a bio diesel service station just next to the headquarter of 878 City Funk Gmbh. This is very convenient for the taxi drivers, as they do not have to drive long distances to get the bio diesel. Furthermore the bio diesel service station is open for the general public as well.

The objective of the measure is to accelerate the gradual change from fossil fuel to bio-diesel in the largest taxi fleet in Graz.

MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM

The aim of „Ökodrive – From the frying pan into the tank“ has been the creation of a sustainable cycle from used frying oil as harmful waste to valuable raw material at the other hand ending up with the renewable low emission fuel biodiesel. Due to the promising results from the pilot project, as mentioned before, it has been the main objective to find a suitable way for separating used frying oil from the food chain as well as from the sewage system, by means of:

- development of a free of charge collecting system for restaurants,
- further improvement of the collecting system for private households, and
- conversion to biodiesel for the operation of buses in the public transport service, accompanied with considerable improvements in the exhaust gas situation and savings of emissions respectively.

The objective of the measure is the optimisation, improvement and extension of the system for the collection of waste cooking oil, for use as fuel for the bus and taxi fleets, in combination with mobility consultancy in private households and restaurants (similar to the well-established system of collecting and recycling waste).
**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**

The main issue of this measure is to evaluate the feasibility of mass production of biogas. How to pass from pilot plant to industrial unit. That means technical reliability, production potential, but also economic competitiveness.

The objectives of the measure are

- To strengthen the local production and distribution of biogas
- To evaluate the competitiveness and reliability of a local massive production of biogas from sewage and organic waste
- To gain a local experience in the production of biogas from organic waste

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

The main barrier for a market breakthrough for bio gas vehicles is the current insufficient infrastructure for bio gas filling stations. There is a need for at least 10 filling stations open to the public. This measure aims to solve the problem for the next few years. Additional stations will be needed later.

The objective of the measure is

- Increase the number of clean vehicles to reach a breakthrough on the market.

This will be done through:

- Improve existing biogas fuelling facilities
- Increase the number of biogas fuelling facilities from 5 to 9
- Improve the attractiveness of biogas for private companies

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

Main issues for the measure are:

- Too slow development of the market for clean vehicles and fuels.
- High purchase cost for clean vehicles.
- Dependency of fossil fuel such as petrol and diesel.
- Harmful emissions to air from carbon dioxide, nitrogen oxides and particles that contribute to global warming, acidification as well as health hazards in urban areas.

The objective of the measure is

- Increase the number of clean vehicles to reach a breakthrough on the market

This will be done through:

- Encourage the introduction of the clean vehicles among the private companies through subsidies for part of the additional cost
- Facilitate the procurement of clean vehicles
- Encourage vehicle manufacturers to produce clean vehicles
- Establish the network Clean Drivers of Stockholm
MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS

Main issues for the measure are:

- Too slow development of the market for clean vehicles and fuels.
- Low awareness of possibilities with clean vehicles.
- Dependency of fossil fuel such as petrol and diesel.
- Harmful emissions to air from carbon dioxide, nitrogen oxides and particles that contribute to global warming, acidification and eutrophication as well as health hazards in urban areas.

The objective of the measure is to raise the awareness of clean vehicles among important purchasing organisations thereby increasing the penetration of clean vehicles in private company fleets.

MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES

The measure deals with the breaking of old habits, lack of knowledge and negative attitudes based on lack of information. Once potential buyers/users interest is raised, through other means, information is easily assessed at www.miljofordon.se

The objective of the measure is to support the efforts of Stockholm in the promotion of clean vehicles as a solution for environment and energy matters in order to enlarge the clean vehicles penetration on the market.
PART C – RESULTS AND ANALYSIS

5 INDICATORS

Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators are presented and analysed in the various measures.

5.1 ANALYSIS AND COMPARISON OF RESULTS ON INDICATOR LEVEL

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES

The method used to collect relevant data has been questionnaires. The drivers and the contact person for each vehicle have been asked questions about fuel consumption, mileage, technical problems etc. Questions regarding driver perception of the vehicles were also included in the survey. From these figures, the indicators on energy and emissions were calculated using certification values or life cycle data.

The consumption of fossil energy has been reduced by 20,984,412 MJ per year. The emission of fossil CO2 has been reduced by 86%, equals 1,329 tons per year. Emissions of NOx, particles and CO has been reduced by 50%. However the emissions of HC has increased by 20 times.

The cost of maintenance has increased from 0.033 Euro per km to 0.045 Euro per km. The increase in cost depends on the fact that the bio gas engine is a otto engine which needs more service and change of spare parts than a diesel engine. The fuel consumption has gone up with 60% in comparison with the consumption of corresponding diesel vehicles. This is due to the fact that the diesel engine is more energy effective than the otto engine especially when running at low load. The consumption of motor oil has been twice as high in the bio gas vehicles compared to diesel vehicles.

The driver acceptance has been monitored and evaluated. More than 90% of them were satisfied or very satisfied with their experience from driving heavy bio gas vehicles and a majority said they would recommend others to drive bio gas heavy vehicles.

MEASURE 12.2 BIOGAS BUS FLEETS

In partnership with public transport operator (Transpole), a regular monitoring of the buses is made. The main issue of this monitoring are:

- reliability of vehicles
- cost per kilometre
- environmental impact.

This monitoring is made with transport technicians, UTAC and ADEME.

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET

Measurement methods included:

- Observation of fuel consumption and maintenance costs,
- Questionnaire about acceptance of bio-diesel usage and its impact on the image of the PT provider

During the course of the EU-project CENTAUR, there were first tests of buses running on the basis of CNG and bio-diesel. Since then, a quarter of the city buses runs on bio-diesel.
The result of Trendsetter is, that 100% of the bus fleet are switched to bio-diesel operation. Without the EU-project Trendsetter, only 50% of the bus fleet could be switched into bio-diesel operation at this time.

User-friendly buses

A survey among PT users found a high acceptance of the new user-friendly buses: 76% of the interviewees knew the new buses. 93% of the interviewees found that such buses are very important for a positive image of a PT operator (the average importance was 1.3 on a scale of 1 very important to 5 irrelevant). 22% of the interviewees said that the user-friendly buses have been a reason for them to go by PT more often. 3 of them were actually mobility impaired people.

Biodiesel

A survey among PT users found that 51% of the interviewees knew that the PT fleet was switched to bio-diesel. 92% found that this was a good initiative and 82% considered this important for a positive image of the PT operator (the average importance was 1.6 on a scale of 1 very important to 5 irrelevant).

MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)

The method used to collect relevant data has been questionnaires. The drivers and the contact person for each vehicle have been asked questions about fuel consumption, mileage, technical problems etc. Questions regarding driver perception of the vehicles were also included in the survey. From these figures the indicators on energy and emissions were calculated using certification values or life cycle data.

The total energy consumption has been reduced by 20%. The emissions of fossil CO2 has decreased from 700 ton per year to 561 tons per year. The emissions of NOx, HC and CO have been reduced as well. The average maintenance cost has been 5% higher for the clean vehicles compared to cars running on petrol mainly because the bio gas vehicles needs more service and repair. The fuelling cost has been 15% lower for the bio gas vehicles compared to petrol vehicles. The cost of ethanol (E85) has been equivalent to petrol. The fuelling cost for the electric hybrids has been 30% less than for corresponding petrol car. The clean vehicles have not consumed more motor oil than petrol vehicles. A few breakdowns have occurred. The problems have been solved and now the vehicles are running well.

The driver acceptance has been monitored and evaluated. In this survey 537 drivers were asked questions about their perception of the clean vehicles. 80% of them stated that they were very satisfied with their experiences from driving clean vehicles and 80 percent said they would recommend others to drive clean cars.

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)

Various measurements allow to follow the project as follows:
- To reduce the pollution generated by the fleet of LMCU by reducing the emissions of CO2, NOx, particles and HC.
- To reduce the noise generated by the vehicles
- To reduce the quantity of power consumption by the fleet of LMCU

This is obtained by the acquisition of clean, electric vehicles or with natural gas.

Principal indicators include:
- Comparison between the kilometric cost of cost and vehicle gas oil
- Comparison of consumption
- Number of breakdowns
- Comparison of the noise level
- Analyse oil
- Analyze exhaust fumes

**MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES**
A questionnaire has been sent out to drivers of the vehicles. Their experience of the vehicles have then been added with technical data on the vehicles. The period is the years 2002 to 2004.

**MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION**
The used method of measurement refers to the technical problems with the used bio-diesel fuel.
At the starting phase of the bio-diesel use 878 City Funk GmbH had intense feedback from the taxi service centre concerning blocked fuel filters.
Since the reason of this was found by experts and the supplier for bio-diesel was changed the taxis run quite well with the alternative fuel.
A survey was conducted among the taxi drivers with the focus on the level of satisfaction.

**Before scenario:**
The average amount of taxis running in Graz is about 575. The covered distance correspond 11.000 times the circumference of the earth. This may demonstrate the importance of taxi traffic in Graz.
Only the 220 taxis run by 878 produce a lot of CO₂ - and CO emissions.
In consideration of the increasing traffic flow during the last few years the reduction of fossil fuel use represents an important contribution to improve the air quality in Graz.

**After scenario:**
A bio-diesel station was established for the largest taxi fleet of Graz and for public users.
The emergency backup generator runs with bio-diesel.
60% of the entire taxi fleet runs with bio-diesel. Also other taxi drivers switched from fossil fuel to renewable fuel.
The number of private bio-diesel users increased to a respectable amount.

**Business as usual scenario**
The introduction of bio-diesel usage into taxi fleets could not proceed as fast and the public awareness about bio-diesel fuel would not be so high without the TRENDSETTER programme

**MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM**
Surveys (personal interviews) to evaluate the acceptance and effectiveness of the information initiative in the residential area, the use of public transport and the collection of used frying oil before and after the information day.
On the information day 41 visitors and 78 residents in their apartments were interviewed personally. Three month later 33 of the visitors and 30 of the residents were interviewed again by telephone.
Ökoservice yearly provides the Department for Environment with statistics about the amount of collected used cooking oil.
The survey among the residents of the area, in which the information initiative took place, was completed by a phone interview 3 months later to follow up on its effects. Surveys have been realised with the visitors to the information initiative as well as among residents who were approached in their apartments.

Visitors to the information day over-represent women (72%) and the age group of 37-65 year olds (83% among the visitors, whereas this amount is 55% in the households). More than 70% of the visitors use PT and the car.

The following graphs illustrated the usage of the offered consultation/information. Nearly 70% of the visitors were reading the leaflet about “Ökodrive – From the frying pan into the tank”. The most used consultancy was about collecting used frying oil/waste (60%).

There is a clear difference between the visitors of the information day and the residents who were approached in their apartments.

3 month after the information day 55% of the visitors were aware of the mobility centre Mobil Zentral, and 40% still know that “from the frying pan into the tank” means the conversion from used frying oil to biodiesel. It is striking that there is a difference between the visitors and households. The main information given in the households was the conversion from used frying oil to biodiesel. The households get the brochure “From the frying pan into the tank”. Possibly so the interviewees were not aware of other information or actions (like Mobil Zentral) on the information day.

The following graph shows the consequences of the information day separated into visitors and residents contacted in their apartments. After 3 month altogether 8% of all interviewees indicated that they started to
collect used frying oil. That shows that an information day increases the motivation to collect used cooking oil. It is striking that after 3 months the knowledge about the toxic-waste-bus from the interviewees in the households is much higher than from the people, who visited the information day. It is possible that the information given in the households was focused on collecting waste cooking oil and the toxic waste bus. Possibly people didn’t visit the information day, because they already knew about the toxic-waste bus.

Baseline for satisfaction with information available on PT in general has an average of 2 (1=very satisfied; 5=very dissatisfied). Satisfaction 3 months after the initiative increases to 1.5. Also the satisfaction with PT increases from 1.9 to 1.5.

People also indicate, that the use of biodiesel is (very) useful for the image of PT in Graz. The average is 1.4 (1=very satisfied; 5=very dissatisfied).

Concluding: With well directed information, consultation and projects the amount of collected waste frying oil, the knowledge about collecting systems and the satisfaction with information about PT can be increased.

**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**

The main indicator for this measure is the decision to start the production of biogas in high volume (construction of the plant started in November 2004 and is expected to be concluded in 2006)

The fuelling of 100 buses with biogas resulting from the installed capacity corresponds to the following savings:
- Fossil CO2 : 6 500 t
- Nox : 24 t
- PM : 700 Kg
- Fossil fuel : 2 000 t

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**
No indicators available at this stage

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**
The measures in work package 12 in demonstration city Stockholm are interlinked. Therefore, some of the results from evaluation activities in the other measures could also be used in this measure.

The evaluation has taken the before and after scenario into account. Evaluations of the indicators have been made twice. The basis for the evaluation is the questionnaire survey to the drivers in the Clean Vehicle Network. Data on fuel consumption, mileage, technical problems etc was combined with questions on driver perception of the vehicle. From these figures, the indicators on energy and emissions were calculated using certification values or life cycle data. The impact on mobility and awareness raising has also been measured through interviews and questionnaires.

Please note that the vehicles receiving subsidies (12.1, 12.4, 12.6, 12.11) are separated from the ones generated by the awareness campaign (12.13) to avoid double counting of effects.

Result from before and after;
- The share of energy from alternative fuels has increased from 0 to above 40%
- Fossil carbon dioxide emission is reduced by 430 tons and 100 g per vehicle kilometre
- The number of clean vehicles has increased in private companies and within the public. This project has affected the increase with 206 vehicles. The total increase is a result of the combination of lowered prices and subsidies
- Emission of particles and nitrogen oxides is approximately the same calculated with certified values.

A clean vehicle’s mobility is the same as for a conventional vehicle driven in Sweden and with petrol. Within mobility, infrastructure, range, operation cost, operation safety and comfort are parameters included. Operation costs includes fuel and parking.

**MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS**
The measures in work package 12 in demonstration city Stockholm are interlinked. Therefore, some of the results from evaluation activities in the other measures could also be used also in this measure; 12.13.

The evaluation has taken the before and after scenario into account. Evaluations of the indicators have been made annually. The basis for the evaluation is the sales statistics for clean vehicles in the Stockholm County. This data was collected from the car dealers through interviews rather than the national car register. The reason is that the official register does not take the alternative fuel into account in a way that is reliable for evaluations purposes. In this way, the number of ethanol, biogas, electric and hybrid vehicles sold on the Stockholm market was counted annually. From these figures, the indicators on energy and emissions were calculated using certification values or life cycle data. The impact on mobility and awareness raising has also been measured through interviews and questionnaires.

Please note that the vehicles receiving subsidies (12.1, 12.4, 12.6, 12.11) are separated from the ones generated by the awareness campaign (12.13) to avoid double counting of effects.
The deliverables from the evaluations were:

- Evaluation of the information campaign delivered as a report at the end of May 2004
- Evaluation of the total project 12.13 delivered at the end of the project time January 2005. The result is presented in the report “Successful methods to get private companies to choose clean vehicles”. This also includes the Trendsetter indicators.
- Minor evaluation activities have been made after each activity within the project. The results have been used in the tow of the major evaluations mentioned above.

The project and the campaign have been assessed quantitatively and qualitatively through media analyses, attitude surveys, questionnaires and interviews. There were two media analyses; three interviews rounds with approximately 20 participants from the target companies and three questionnaires e.g. to seminar participants were carried out during the campaign.

The sources noted below are literature used for reference. See also List of reports

- “Enkätundersökning – miljöfordon och attityder” Psykologen Göteborgs Universitet, spring 2004
- ”Miljöfaktabok för bränslen” IVL for Svenska petroleuminstitutet, Stockholm May 2001
- ”De nobbar miljöbilar”, Miljörapporten December 2003
- ”Spelet på marknaden”, Tommy Falomius and Tomas Hedberg 1998
- ”Information för marknadsföringsbeslut, 4e upplagan”, Per Lekvall and Clas Wahlbin
- ”Marknadsföring, 1a upplagan 1997”, Olof Lundqvist, Sten Albertsson and Bonnier utbildning AB
- ”Tabeller och diagram” Gunnar Hellsten, Almqvist & Wiksell förlag AB, 1991

National web site on clean vehicles: www.miljofordon.se

If the project would not taken place, the conclusions from are that without active and intense work to increase the awareness of clean vehicles and fuel, the knowledge about these would still be quite low. As early as in 1994, the clean vehicle project started in Stockholm and many activities were already started by then. The media and public would still be quite; today many believe that they will buy clean vehicles in future. So the activities in the project have resulted in improvements and higher awareness about clean vehicles and fuel. The sales figures are higher today compare to earlier, several models of vehicles are in the market and more will be joining in. Some of the vehicle companies will in near future have vehicles driven by all alternative fuel. Also the productions of the existing clean vehicles have been speeded up and prises are started to go down.

The reality is that the process of sales of clean vehicles has to mature over time. Early activities started before this project has also affected the increased sales figures and request for clean vehicles. This means that if the project didn’t take place clean vehicles would still be out on the market but not as many as today. Other activities such as co-operation with retailers, projects and activities in other cities have contributed to improve the scenario.

This project has reached good result. The direct measures are:

- The amount of clean vehicles has increased in private companies and within the public. This project has affected the increase with 2438 vehicles in different models
- The mobility is the same for a clean vehicle as for a conventional vehicle. In that calculation operation cost, operation safety, comfort, safety and the range of the refuelling is taken into account.
• The total energy consumption has decreased from 128 to 116 TJ/year. This has been reached by using clean vehicles instead of conventional vehicles without influence the mobility. The share of renewable energy consumption has increased steadily during the project years 2002, 2003 and 2004.

• The emission of fossil carbon dioxide has decreased from 186 g/vkm to 87 g/vkm. In this calculation 68% of the alternative fuel and 32% of petrol is taken into account. On the other hand if 100% would have been alternative fuel the fossil carbon dioxide been 53 g/vkm.

• This means that during the project time the total amount of fossil carbon dioxide has decreased with circa 5400 tonnes/year compared with only petrol vehicles. In this calculation the whole life cycle is taken into account. Calculated with the usage only the decrease is 7 800 tonnes/year. The difference is due to the alternative fuel has a relative effect on the environment during production and distribution of the fuel.

Thanks to the clean vehicle project a higher competence regarding clean vehicles and fuels at companies and the employees has been reached. Some conclusions and results is worth mentioning:

• The project has resulted in an increased attention in media compared to a few years ago.

• The first reason why companies purchase clean vehicles are that they want to test it because they are working actively with environmental issues, are curious or because they want to use it for marketing.

• To get the companies to chose clean vehicles there has to be more and stable economical incitement.

• There is an obvious conflict between the company and their employees when they chose their company car i.e. between the individuals’ choice and the general company decision. There is lack of policies and guidelines within the company that leads to high freedom factor when choosing the car. Because of that it is difficult to process common rules within the organisation.

**Measure 12.14 Web-portal for drivers of clean vehicles**

After running for 18 months the web site was evaluated through a questionnaire, distributed via e-mail and network e-mail lists to 500 visitors/users, the only way to get a fair assessment of the qualitative measures of interest. To complement the qualitative results, numbers of visitors have been registered and accumulated during the project.

Before the web site was launched information about clean vehicles was spread on different web sites and the reliability of the information on the sites was not evident. There were only weak links between sites that promoted clean vehicles and sites with information about fuels. Furthermore, the field of clean vehicles is constantly developing. Hence, there was a profound need for continuing gathering information and to update existing information and make it available for potential buyers/users. Earlier studies concluded that a web site with focus on clean vehicles, open to every one interested in clean vehicles (drivers, buyers, vehicle companies, fuel companies) was necessary to support the ongoing development.

In this measure it is not possible to have a before - after perspective. The projects aim was to collect, refine and complement the information earlier spread on other, different web sites and disseminate comprehensive information on clean vehicles and related issues, meeting a rising demand.

The evaluation (made in December 2004) shows that the website by the end of 2004 had 12 000 visitors per month, and the number is continually increasing.

The visitors judgement is largely positive and the users are mainly (69 per cent) buyers or potential buyers of a clean vehicle. The contents is to a very high degree corresponds to the visitors expectations on contents, it gives them all the answers they need (40 per cent gave the website highest possible marks). Another 69 per cent answered that the site is very reliable, very few suspected commercial interests behind the information.

The website/the information was easy to find on the internet or through the cities clean vehicle-projects.

The cities – Stockholm, Gothenburg and Malmoe – sees the project as very successful and have planned to make the website a permanent joint venture. Suggestions about improvements in the evaluation will be implemented in the continuing operation.
6 FULFILMENT OF OBJECTIVES

6.1 ACHIEVEMENT OF WP OBJECTIVES

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES

The objective to procure 26 clean heavy vehicles has not been fulfilled within the project time. Two vehicles short compared to the plan. In the near future more than 200 heavy clean vehicles will be in operation.

Quantified targets:
- Reduced noise from the 26 vehicles (50 %) Yes
- Avoiding CO\textsubscript{2} emissions (100 % reduction) Yes
- Reduced emissions of NO\textsubscript{x}, PM and CO. Yes

Milestones and deliverables
- M 12.1.1 Integration of the biogas powered heavy vehicles Yes
- D 12.1.1 Evaluation report of the biogas powered heavy vehicles to be incorporated with D.12.11.2 No

MEASURE 12.2 BIOGAS BUS FLEETS

All the objectives have been achieved.

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>• 128 new (bio)gas buses</td>
<td>YES</td>
</tr>
<tr>
<td>• Adaptation of the bus depots and lines to (bio)gas buses (Sept 2005)</td>
<td>YES</td>
</tr>
<tr>
<td>• A new compression station (Sept 2005)</td>
<td>YES</td>
</tr>
<tr>
<td>• Pollution reduction by 2005 for the clean vehicles fleet:</td>
<td>YES</td>
</tr>
<tr>
<td>• Fossil Co\textsubscript{2}: -41,000t per year</td>
<td></td>
</tr>
<tr>
<td>• NO\textsubscript{x}: -850t per year</td>
<td></td>
</tr>
<tr>
<td>• Particulate: -26t per year</td>
<td></td>
</tr>
<tr>
<td>• Bus noise level: -50 percent</td>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 12.2.1 65 new gas buses</td>
<td>YES</td>
</tr>
<tr>
<td>M 12.2.2 23 new gas buses</td>
<td>YES</td>
</tr>
<tr>
<td>M 12.2.3 40 new gas buses</td>
<td>YES</td>
</tr>
<tr>
<td>M 12.2.4 Adaptation of the depot and lines to gas buses</td>
<td>YES</td>
</tr>
<tr>
<td>M 12.2.5 Construction of a new depot for the buses</td>
<td>YES</td>
</tr>
<tr>
<td>M 12.2.6 New compression station</td>
<td>YES</td>
</tr>
<tr>
<td>D 12.2.1 Technical study evaluating the technical and environmental aspects of the biogas experience (subcontracting)</td>
<td>YES</td>
</tr>
</tbody>
</table>
**MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET**

The collected used cooking oil is converted into bio-diesel and provides the whole bus-fleet. The bus-fleet has also an optimum interior design, a better acoustic and visual information system and ramps for handicapped persons.

100 % of the fleet are “Low-Floor” buses.

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 percent of PT-traffic running on renewable sources of energy with low emission values</td>
<td>yes</td>
</tr>
<tr>
<td>Saving 2 300 tons of fossil fuels per year</td>
<td>yes</td>
</tr>
<tr>
<td>Implementation of the innovative financing scheme, whereby new modern vehicles can be purchased in the next few years, independently of political decisions on the availability of separate investment budgets.</td>
<td>yes</td>
</tr>
<tr>
<td>Long-term improvement of the efficiency through lower financing and regular costs</td>
<td>yes</td>
</tr>
<tr>
<td>More customer-friendly design of buses and tramways (ramps or lifts, optimum interior design, better acoustic and visual information)</td>
<td>yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12.3.1 Bio-diesel-fuel station is implemented</td>
<td>Yes</td>
</tr>
<tr>
<td>M12.3.2: 40 percent of the PT fleet switched to bio-diesel operation</td>
<td>Yes</td>
</tr>
<tr>
<td>M12.3.3: 70 percent of the PT fleet switched to bio-diesel operation</td>
<td>Yes</td>
</tr>
<tr>
<td>M12.3.4: 90 percent of the PT fleet switched to bio-diesel operation</td>
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</tr>
<tr>
<td>M12.3.5: 100 percent of the PT fleet switched to bio-diesel operation</td>
<td>Yes</td>
</tr>
<tr>
<td>D12.3.1 Evaluation report</td>
<td>No</td>
</tr>
</tbody>
</table>

**MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)**

More than 200 clean vehicles have been purchased

**Quantified targets:**

- Increase of number of clean vehicles by 200 in the city fleet.
  - Yes
- 50 percent of the vehicles are comprehensively monitored by the use of questionnaires 1-2 times per year (manually recorded data: distance travelled, fuel consumption petrol/alternative fuel, service/maintenance events).
  - Yes.
- Report on the performance of the vehicles (the drivers’ experience, fuel consumption, driving distances and service/maintenance events as well as costs).
  - Yes.
- Survey of the market for second hand clean cars.
  - Yes
- Creation of a second-hand market for clean vehicles in the Stockholm area.
  - No

100 percent of the procured vehicles are comprehensively monitored

The surveys are completed and a report on the results has been produced.

Due to the fact that the City of Stockholm decided to sell out its whole fleet and lease it back the City does not control what happens with the vehicles at the end of the leasing period Therefore it has not been possible to create a second-hand market for clean vehicles in the Stockholm area.
Milestones and deliverables

M 12.4.1 Launch of information campaign within the city.  Yes
M 12.4.2 Seminars showing clean vehicles.  Yes
M 12.4.3 Common procurement of clean vehicles.  Yes
M 12.4.4 Purchase of 200 clean vehicles.  Yes
D 12.4.1 Report on driver’s experience.  Yes
D 12.4.2 Report on strategy for second hand market for clean vehicles.  No

At the time for planning this measure (2001) all the city’s vehicles were owned by the City. However the City decided to sell out the whole vehicle fleet to a private company (LeasePlan) and lease them back. It is now impossible for the City to control what happens to the vehicles after the leasing period. Therefore no strategy for second hand market has been created.

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)
In spite of the lack of clean vehicles adapted to the Community services available from the manufacturers, the experience feedback was reached

The quantifiable targets for the measure are:

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
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</thead>
<tbody>
<tr>
<td>• 220 clean vehicles in the 500 staff vehicle fleet</td>
<td>NO</td>
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<td>(partially met: no cars available on the market)</td>
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<tr>
<td>• Study of the costs per km and the reliability of the new gas and electric vehicles.</td>
<td>YES</td>
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<tr>
<td>• Pollutant emissions monitoring with the help of the official national laboratory on behalf the Ministry of Transport and a government association for environment.</td>
<td>YES</td>
</tr>
</tbody>
</table>

Milestones and deliverables

D 12.5.1 Internal Evaluation on the clean vehicles experience,  YES
M 12.5.1 Introduction of 120 new clean vehicles for the staff fleet  NO (84 vehicles)
M 12.5.2 Procurement of a new compression unit  NO (delayed)

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES
The objective is to expand the municipality experience of clean waste collection vehicles in Stockholm city centre to private entrepreneurs of the waste collection sector. The measure objective has been fulfilled with high satisfaction from involved stakeholders.

Quantified targets

Evaluation of operational use of waste freighters  YES
Conclusions on the experience of a wider use of clean lorries for waste companies  YES
Citizen survey on attitudes to biogas lorries  YES
a survey was carried out during late spring of 2005.
Environmental effects: - noise reduction and emission savings:  YES.
MEASURES

Milestone and deliverables
M 12.6.1 End of the procurement activities for new entrepreneurs YES
M 12.6.2 Launch of new lorries in operation in certain inner city areas YES
D 12.6.1 Report on the effects of the waste lorries YES
Ongoing, will be completed in February 2005.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION
A new bio-diesel service station was established for the 878 City Funk taxi fleet and for public users.
The emergency backup generator runs quite well with bio-diesel.
After solving technical problems 5% of the fleet are currently running with bio-diesel.

The quantifiable targets for the measure are:
60 percent of the taxi fleet (currently 210 taxis) are supplied with bio-diesel No
Reduction of fossil fuel use of 1 080 tonnes per year No
As a consequence reduction of 2 900 tonnes CO2 and 3,4 tonnes CO emissions per year No
878 City Funk GmbH had to face technical problems caused by contaminated bio-diesel in the fuel filters. So
the change towards bio-diesel cars and the awareness campaigne by taxi drivers is behind time schedule.
Whereas the switch from fossil fuel to bio-diesel causes no problems for buses and trucks, it turned out, that
the adaption of passenger causes various difficulties.

Milestone and deliverables
M12.7.1 Bio-Diesel Fuel Station in operation Yes
M12.7.2 Awareness and information activities for bio diesel use partly
M12.7.3 the emergency backup generator is converted for bio diesel use Yes
M12.7.4 60 percent of taxis switched over to bio-diesel fuel No
D12.7.1 Evaluation report No
5% of the taxi fleet are currently running with bio-diesel. But as technical problems are solved the target of
60% will probably be reached within the first month of 2005.
MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM

With well directed information about the system for the collection of waste cooking oil and mobility in private households and restaurants the knowledge about collecting systems and the amount of collected waste frying oil can be increased.

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<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
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</thead>
<tbody>
<tr>
<td>Doubling of the total amount of collected oil in households.</td>
<td>No:</td>
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<tr>
<td>Reduction of the environmental impact on the sewage system and the costs for water recycling.</td>
<td>Yes, ca. 30.000,00 EURO (~80.000 kg from households)</td>
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<tr>
<td>Reduction of environmental pollution by making the collection process more organised, convenient, efficient and cheaper (in combination with the existing collecting points for other hazardous waste (old batteries, medicine, etc.).</td>
<td>Yes</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M12.8.1 Start of training</td>
<td>Yes</td>
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<td>M12.8.2 Carry out of the household action</td>
<td>Yes</td>
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<td>M12.8.3 Consultation bus adapted</td>
<td>Yes</td>
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<tr>
<td>D12.8.1 Concept for household action ready</td>
<td>Yes</td>
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<tr>
<td>D12.8.2 Evaluation</td>
<td>Yes</td>
</tr>
</tbody>
</table>

MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE

The quantifiable targets for the measure are:

Today local biogas production is 0,12 Nm³ biogas per year. At the end of the Trendsetter project time, the production will be 3,6 M Nm³ per year. Yes in 2006

Better knowledge about the function of a biogas production plant (technical and environmental aspects). Yes

A global evaluation of the biogas production by sewage and waste treatment experience (economic and environmental benefits) Yes done for ORC

Milestones and deliverables

M 12.9.1 A new big organic waste plant Yes in 2006

D 12.9.1 Global evaluation of the experience of biogas production from waste and sewage treatment Yes
MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE

The quantifiable targets for the measure are:

- 4 new biogas fuelling stations.  No
- Assessment of the volume biogas sold and experiences of delivery to fuel stations.  No
- Increased use of biogas vehicles.  No
- Increased use of biogas in dual-fuelled vehicles.  No

Three new bio gas fuelling stations have been built. The fourth station has been stopped for political reasons. It has been ordered and is under construction but might has to be moved to another location. Because of the delay in building the stations assessment of the volume bio gas sold and experiences of delivery to fuel stations has not yet started. Will start in February. Assessment of increased use of bio gas vehicles and of increased use in dual-fuelled vehicles has not yet been done but will start in February.

Milestones and deliverables

- M 12.10.1 Opening of the new biogas fuelling stations.  No
- M 12.10.2 Report on equipment for remote reading of gas pressure.  Yes
- M 12.10.3 Report on mobile built refuelling stations.  Yes
- M 12.10.4 Report on refuelling infrastructure for biogas in the region.  Yes
- D 12.10.1 Assessment results of the use of the new biogas fuelling stations.  No

This measure is much delayed due to problems finding an operator. Three new fuelling stations opened by the end of January 2005. The fourth station is under construction and was planned to open in December 2005. It has been stopped for political reas ons and it might be necessary to move the station to another location. This might lead to that this station will not get any grants from the project. Since the assessment has not yet started no results are available at this time.

MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE

A common procurement of clean vehicles has been facilitated

Efforts have been made to encourage vehicle manufacturers to produce clean vehicles make them available on the Swedish market

The objective to establish a network of clean vehicles by providing subsidies to 100 vehicles has been reached and doubled. Moreover, valuable experiences of the use of the vehicles has been collected, analysed and disseminated through press releases, newsletter and web site.

The quantifiable targets for the measure are:

- Establishment of a purchasing consortium for bio gas vehicles  yes (see comment below)
- Purchase of 100 clean light vehicles.  yes

A total of 206 clean vehicles were purchased within the Network of clean drivers
Milestones and deliverables

M 12.11.1 The first 40 clean vehicles procured by private companies   yes
M 12.11.2 The remaining 60 clean vehicles procured by private companies,   yes
D 12.11.1 Guidelines: Common nation-wide procurement of light clean vehicles,   yes
D 12.11.2 Report on the use of clean vehicles within the project period,   yes

MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS

The project objective was to increase the penetration of clean vehicles in private company fleets. It has been shown that the project goals have been fulfilled. Today, a large number of the private companies in Stockholm have clean vehicles in their fleet. From interviews and questionnaires from the evaluations and research made in the project, we estimate that approximately 50 % of all major companies have at least 1 clean vehicle in their fleet.

The awareness of clean vehicles has also been an important issue when the project started and today we estimate that every private company with an environmental manager are knowledgeable about clean vehicles. This estimate is based on large companies in Stockholm region with more than 250 employees.

It has been shown that 15% of the inhabitants in Stockholm believe that they will buy a clean vehicle in the near future and 53 % are aware of clean vehicles.

The indicators and attitudes that were measured with regard to clean vehicles in the project show the fulfillments of the goals.

The quantifiable targets for the measure are:

Number of clean vehicles sold in the region during the time of the project, at least 300.  Yes
Estimation of the volume of renewable fuel sold in the region and corresponding reduction of greenhouse gases and harmful emissions.   Yes

Approx 35 000 m3 renewable fuel sold in the region. The volume share of renewable fuel is 2.73 % calculated in energy that is 1. 73 %. The reduction of green house gases like carbon dioxide is estimated to 100 g/vkm. Other harmful emissions are more difficult to calculate depending on what fuel you compare with. Nox and particulates are decreasing.

Milestones and deliverables

M 12.13.1 Presentation of market study on clean vehicles.   Yes
M 12.13.2 Information campaign on clean vehicles and fuels towards private companies.   Yes
M 12.13.3 Establish a fleet of clean vehicles (4-6 cars) for test by private companies.   Yes
M 12.13.4 PR-campaign.   Yes
D 12.13.1 Market study on clean vehicles.   Yes
D 12.13.2 Report on successful methods to get private companies to choose clean vehicles.   Yes
D 12.13.3 Leaflet describing the test fleet of clean vehicles.   Yes
D 12.13.4 Evaluation of the PR-campaign.   Yes
MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES

The web site has clearly contributed to the reinforcement of the efforts of Stockholm, and the cooperator cities Gothenburg and Malmoe in the promotion of clean vehicles as a solution for environment and energy.

There is no specified quantifiable targets for the web site, measure 12.14.

Milestones and deliverables


6.2 **CONTRIBUTION TO TRENDSETTER OBJECTIVES**

Trendsetter's objectives are to ameliorate urban air quality and noise levels, and congestion while supporting exceptional mobility and urban quality of life. Specifically, wp12 addresses these objectives as follows:

<table>
<thead>
<tr>
<th>High level objectives</th>
<th>Measures</th>
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<tbody>
<tr>
<td></td>
<td>12.1 Clean and efficient heavy vehicles</td>
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<td>12.2 Biogas bus fleets</td>
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<td></td>
<td>12.3 Clean and user friendly bio-diesel bus fleet</td>
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<td>12.4 Clean Municipal Fleets (Stockholm)</td>
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<td></td>
<td>12.5 Clean Municipal Fleets (Lille)</td>
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<tr>
<td></td>
<td>12.6 Waste collection with biogas-vehicles</td>
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<td>12.7 Bio-diesel taxi fleet and bio-diesel service</td>
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<td>12.8 Optimisation of the bio-diesel collection</td>
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<td>12.9 Analysis of the biogas refuelling infrastructure</td>
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<td>12.10 Improved biogas refuelling infrastructure</td>
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<td></td>
<td>12.11 Increasing clean vehicle use in private</td>
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<td>12.12 Web-portal for drivers of clean vehicles</td>
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</table>

| Provide examples | Provide input to European policy making and promote a sustainable transport future in Europe | Y Y N Y Y Y N N Y Y Y Y |
| Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets. | Y Y Y Y Y N N N N N Y Y N |
| Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology. | Y Y Y N Y Y Y Y Y Y Y Y |

| Increase Mobility | Promote the use of public transport and other alternatives to private cars | N Y N N N N N N Y Y N N N N N |
| Promote the use of public transport and other alternatives to private cars | N Y N N N N N N N N N N N N N |
| Demonstrate new ways to improve urban goods logistics and efficiency. | Y N N N N N N N N N N N N N |
| Reduce noise levels in demonstrating cities | Y Y N Y Y Y Y Y Y Y Y Y Y |

| Enhance Environment (direct contribution) | Reduce annual fossil CO2 emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year. | Y Y Y Y Y Y Y Y Y Y Y Y Y |
| Reduce annual fossil CO2 emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year. | Y Y Y Y Y Y Y Y Y Y Y Y Y |
| Reduce NOx emissions by 900 tonnes/year | Y Y Y Y Y Y Y N Y Y Y Y Y |
| Reduce particulate matter by at least 1800 tonnes/year | N Y N Y Y Y Y Y Y Y Y Y Y |
| Reduce noise levels in demonstrating cities | Y Y Y Y Y N Y Y Y Y Y Y Y |

| Save Energy (direct contribution) | Save over 850 TJ (= 20 300 TOE) energy per year | Y Y Y Y Y Y Y Y Y Y Y Y Y |
## Demonstration objectives

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<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
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<td>128 biogas buses (Lille)</td>
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<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel (Graz)</td>
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<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
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<tr>
<td>320 new clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets (Stockholm and Lille)</td>
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<td>5 new biogas refuelling stations (4 Stockholm, 1 Lille)</td>
<td>Y</td>
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<td>7 biogas waste freighters (Stockholm)</td>
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<td>120 taxis converted to bio-diesel (Graz)</td>
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<td>100 clean vehicles in private company fleets (Stockholm)</td>
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<td>300 substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
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<td>26 clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
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<td><strong>Transport and mobility management</strong></td>
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<td>1 High level service bus lane (Lille)</td>
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<td>2 Bus priority signal systems (Stockholm, Prague)</td>
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<tr>
<td>4 Environmentally oriented restriction zones (Stockholm, Prague, Graz and Pecs)</td>
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<tr>
<td>3 Environmentally oriented Parking zones (Graz, Pecs, Stockholm)</td>
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<td>1 Smart Card system in full scale (Stockholm)</td>
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<td>4 Improved intermodal links (Graz, Lille)</td>
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<tr>
<td>60 High customer friendly bus and tram stops (Graz)</td>
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<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities (Lille)</td>
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<td>1 Logistic Centre including 8 clean vehicles (Euro 4 standard)</td>
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<td>2 IT based logistic management systems</td>
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<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
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</table>
Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice:

<table>
<thead>
<tr>
<th>Scientific &amp; Technical objectives</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.</td>
<td>12.1 Clean and efficient heavy vehicles</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>12.2 Biogas bus fleets</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>12.3 Clean and user friendly bio-diesel bus fleet</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>12.4 Clean Municipal Fleets (Stockholm)</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>12.5 Clean Municipal Fleets (Lille)</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>12.6 Waste collection with biogas-vehicles</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>12.7 Bio-diesel taxi fleet and bio-diesel service</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>12.8 Optimisation of the bio-diesel collection</td>
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<td>12.9 Analysis of the biogas experience</td>
</tr>
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<td>12.10 Improved biogas refuelling infrastructure</td>
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<td>12.11 Increasing clean vehicle use in private</td>
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<td></td>
<td>12.12 Web-portal for drivers of clean vehicles</td>
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</tbody>
</table>

- N: Not applicable
- Y: Applicable
The organisation of the measures to reach the specific WP objectives is

<table>
<thead>
<tr>
<th>Workpackage objectives</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accelerate the heavy vehicles transition from a classical fossil fuel to clean fuel solution</td>
<td>Y Y Y   Y Y Y Y Y Y Y</td>
</tr>
<tr>
<td>Accelerate the light vehicles take-up from a larger audience (PT, Municipality, private companies)</td>
<td>Y Y Y   Y Y Y   Y Y Y</td>
</tr>
<tr>
<td>Improve the clean fuel production and distribution</td>
<td>Y Y Y   Y Y Y   Y Y Y</td>
</tr>
</tbody>
</table>

 Measures:

- 12.1 Clean and efficient heavy vehicles
- 12.2 Biogas bus fleets
- 12.3 Clean and user friendly bio-diesel bus fleet
- 12.4 Clean Municipal Fleets (Stockholm)
- 12.5 Clean Municipal Fleets (Lille)
- 12.6 Waste collection with biogas-vehicles
- 12.7 Bio-diesel taxi fleet and bio-diesel service
- 12.8 Optimisation of the biogas experience
- 12.9 Analysis of the biogas experience
- 12.10 Improved biogas refuelling infrastructure
- 12.11 Making clean vehicles less expensive
- 12.12 Increasing clean vehicle use in private
- 12.13 Web-portal for drivers of clean vehicles
- 12.14 Web-portal for drivers of clean vehicles

7 USED TECHNOLOGY

7.1 OVERVIEW OF USED TECHNOLOGY WITHIN WP

**MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES**

All of the clean heavy vehicles bought in the framework of this project use bio gas as fuel produced at local production plants. Bio gas is by far the cleanest alternative fuel on the market and decreased noise and harmful emissions. The vehicles have been functioning well and no specific problem has occurred. Using bio gas as fuel for buses and lorries seems to be a good solution for transports in city centers.

**MEASURE 12.2 BIOGAS BUS FLEETS**

Biogas buses are available on the market as current technology.

**MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET**

Old buses:

- Exchange of fuel hoses and gaskets
- Check of all parts supplied with bio-diesel (heaters)
- Certification from the engine manufacturer
- Consent from the producer of the injection pump

All the other busses of the fleet are from a new technical generation.

- They are suitable for bio-diesel fuel / bio-diesel heating

52 of them have got air conditioning

**MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)**

The technologies used in the vehicles are based on bi-fuel (bio gas and petrol), flexi fuel (ethanol and petrol), electric and electric-hybrid. The used technologies have been functioning well. No major problems have occurred. The fuel-cell technique is not yet available commercially for cars in Sweden.

**MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)**

A) Electric vehicles

The electric vehicle brings a real change in the way of driving and its positive impact on the population is obvious. But its use imposes a rather rigorous management of the loading of the batteries. The principal observations are:

- Too weak autonomy
- Too long time of refill (6 to 7 hours)
- Low reliability of the system of additional heating
- The majority of the electric vehicles of LMCU being shared among several different drivers, we were confronted with the problem of memory effect of the batteries what caused several time the expensive replacement of the sets of batteries (5500 €) and the replacement of two engines

**B) Natural gas vehicles**

The natural gas vehicles answered well the needs for use of our park. Except some problems of development and engine tuning at the beginning)

**MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES**

The tendering process has been more expensive than for the conventional vehicles.

**Experiences from the drivers.**

The main reason for driving the vehicle are the environmental policy of the company. The policy is a result of demands from the customers and the drivers believe these demands are the reason for the investment in the vehicle. See more in attached table.

The vehicles function better than conventional ones concerning emissions and smell. Functions less well concerning reach per refueling (and need per days work) and acceleration. Different opinions are present concerning change of noise levels. 3 claims improvement, 2 claims no change and one worse performance concerning noise. The drivers consider the functions of comfort in passenger seat, drivers comfort, driving egenskaper, safety, speed and reduction of speed equally well performed as for conventional vehicles.

Too few refuelling stations but the existing ones work well.

Main sources for information are Salesmen of cars, Environment and Health Administration, Media, Internet and three of the seven do not know any sources.

The majority of the drivers think clean vehicles is a good environmental effort

6 waste collection vehicles have driven 141 328 km and consumed 91582 Nm³ biogas

In the start of the project a few trucks had to be towed back to the garage. Today the drivers know when it is time to refuel.

**MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION**

The project was delayed due to technical breakdowns arising at the starting phase. It took quite a lot of time to get to know the reason for the problem. After the two experts of the University were contacted and an in depth analysis was conducted the project got back on track. They found out, that the used bio-diesel blocked the fuel filters. This support by experts at an early stage of the project was needed to get the project successful.

The city of Graz has quite a long experience in using bio diesel in public transport. But it turned out, that the public transport sector differs far from a private taxi fleet. Whereas the public transport operator may have capacities for research, the private company has the mission statement “time is money”. If a taxi is blocked due to technical problems (filter problems) the taxi driver and the company loose money and there are no resources to solve problems that do not belong to routine.

**MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM**

In order to do the collection of used cooking oil from restaurants in an efficient and comfortable way, collection is carried out using special 20 l buckets. Full buckets are exchanged for empty ones each month. The logistics have proved to be very flexible, as the number of buckets per restaurant are adjusted to the quantity of used cooking oil per month. If required, the restaurants are provided with additional buckets. By using small collecting pails instead of big barrels, a conventional van has proved to be suitable for the
collection, particularly for restaurants that are situated in the city centre with narrow lanes and only few parking areas.

Collected cooking oil is stored in a solar heated 10,000 l tank, that is regularly emptied and the cooking oil being transported to the biodiesel plant about 50 km from Graz. The technology for the conversion of used cooking oil to biodiesel was developed by the University of Graz together with Biodiesel International (BDI) the know how leader in this field.

**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**

The biogas will be generated from urban waste in a highly efficient and technically challenging thermophilic process associated with an upgrading of the biogas in a gas scrubber.

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

The gas supplier company AGA Gas AB has provided a new, innovative, flexible and mobile fuel supply system. This is a remote-monitored system with swap-body fuel units that are easy to replace; a system of great importance in a region like Stockholm lacking a natural grid. AGA offers a 24-hours a day service level which guaranties good functioning of the filling stations at all times.

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

Introducing commercially available vehicles with renewable fuel propulsion technology i. e. ethanol, biogas, electric and electric hybrid.

Through the Network of Clean Drivers, a total of 206 clean vehicles were introduced. Most popular model was Toyota Prius (151 cars), Volvo Bi-Fuel (33 cars) and Mercedes Sprinter (5 vans). The remaining 17 vehicles were various biogas cars and vans and one electric lorry.

Before the target was set for this measure Renault indicated that their Renault Kangoo Range Extender was to be introduced to the Swedish market. The demand for this type of car was significant from Swedish buyers. Unfortunately Renault decided not to bring this model to Sweden. As a consequence the number of purchased electric hybrids is lower than planned.

Some technical problems were experienced with Volvo Bi-Fuel cars during 2003 (faulty pressure regulator), but these were solved by the manufacturer.

One electric lorry was purchased by a delivery company. This vehicle caught fire in an in-door parking facility causing major damage to the building and several other vehicles. The report from the insurance company states that

**MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FleETS**

Develop the market for commercially available vehicles with renewable fuel propulsion technology i. e. ethanol, biogas, electric and electric hybrid. Some technical problems were experienced with Volvo Bi-Fuel cars during 2003, but the manufacturer solved these. See the technical evaluation from measure 12.11

The methodologies used for market development were Public Relations, Sales Promotion and direct support and advisory services to target companies and car dealers.

**MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES**

*Not applicable for this measure.*
7.2 **Positive aspects, problems & solutions, new concepts**

The measures in the workpackage highlight many positive aspects:

- All alternative energies used have been found suitable, although Lille has evaluated electrical light vehicles less interesting than biogas fuelled ones
- Infrastructure to cope with the new energies is feasible and economically viable
- Used technologies show good acceptance
- Modifications and adaptations, when needed, could be achieved.

Some negative aspects remain, however:

- Lille reports severe problems in the availability of gas light vehicles, which underlines the issue of manufacturing and costs
- Infrastructure is still to be deployed with the adequate critical mass in many cases

7.3 **Comparison and conclusions**

Globally, there is a successful innovative use of the technologies exploited.
8 ECONOMICAL ASPECTS, COST BENEFIT

8.1 PER MEASURE

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES

The extra cost for investing in a bio gas bus or heavy vehicle like a lorry is 300,000:- - 500,000:- SEK compared to a conventional diesel-fuelled vehicle. Also the bio gas fuel is more expensive than diesel. Even the cost for maintenance seems to be somewhat higher.

From a strict commercial point of view the bio gas fuelled heavy vehicles are more expensive to operate the conventional diesel-fuelled buses. If one use the principle “Pollution pay” where the cost of pollution, noise etc is added it would be the other way around. There is a need for bio gas to be less expensive or/also to have a higher price on diesel. This might very well be the case in the near future since the price of crude oil most probably will rais. To make bio gas heavy vehicles more competitive it is also necessary for the extra investment cost to come down.

MEASURE 12.2 BIOGAS BUS FLEETS

Lille metropolis is able to prove that the cost per km of a gas bus can be equal to the cost per km of diesel bus.

The cost per km include all the investment costs and all operational costs.

To reach this objective, each constituting element of this cost had to be optimised: price of buses, price of gas, maintenance cost, price and efficiency of compression unit.

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET

The consumption of bio-diesel buses is 7 % higher but the price of this fuel is lower.

Therefore the Grazer Verkehrsbetriebe have neither benefit nor loss by using bio-diesel.

It is only an ecological aspect.

MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)

Investing in clean vehicles is more costly than buying conventional cars. The extra cost varies from model to model but it seems that electric and electric-hybrid models has the highest extra costs and that ethanol vehicles have only minor extra costs. Also the maintenance costs seem somewhat higher for clean vehicles.

This goes especially for electric and bio gas cars. As far as fuelling cost is concerned low costs go with electric and electric hybrids while bio gas and ethanol is about the same as petrol. All together it is obvious that most clean vehicles are more expensive to own and drive than conventional cars at least from a strict commercial point of view.

If the fuel would be priced according to the principle “pollution pay”, it would be the other way around. A real breakthrough on the market for clean vehicles is likely to occur in a few years when the price of fossil fuel goes up and the extra investment cost gets down.

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)

Kilometric cost of an electric vehicle Citroen Saxo: 0,29 € (compared with the same vehicle with diesel motorization:0,20 €)

There is an extra cost to use an electric vehicle, the negative point being the high price of the monthly hiring of the batteries.
The kilometric cost of cost of a gas vehicle GNV is very similar to the same vehicle using the gas, the economic assessment is completely favourable.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES

It is more expensive to operate the biogas vehicles. The cost of the biogas vehicle (~1.3 million Swedish crones) is approximately 30% higher compared to a conventional waste collection lorry (~ 1.0 million crones). To use diesel as fuel costs about half the price compared to biogas.

The oil consumption has been very high, up to 14 liter/1000 km. This was due to fault in the vehicle (vevhusventilationen). After modifications the oil consumption has been the normal one.

The total energy consumption has increased by 40% due to that the use of the otto engine when driven at low load have a significantly higher fuel consumption than a diesel engine at low load. The long periods of standing still and having short distances in-between the stops means low load on the engines.

The costs for service has risen from 0,033 Euros/km to 0,045 Euros/km. The increase is a result of the change from the diesel engine to the Otto engine. Otto engine demand more service and change of parts.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION

As long as the engines of taxis run reliably and without breakdowns, there are no economical differences between bio-diesel usage and mineral fuel.

All measures to avoid additional emissions or decrease emissions contribute to improve the environmental situation for all people living in the area of Graz. This long-term effect is more important than short term economic benefits.

MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM

“Ökodrive – From the frying pan into the tank” is a project that provides a sustainable cycle from used cooking oil as harmful waste to valuable raw material at the other hand ending up with biodiesel, used as renewable low emission fuel for the operation of buses in the public transport service.

- Right up until now more than 250 restaurants are participating in the project, saving money for disposal that usually has been about 0,30 EUR per kg
- 180,000 kilograms of used frying oil from restaurants collected in 2003, that is about 45% of the estimated total capacity of about 400,000 kilograms per year, collectable.
- 80,000 kilograms of used cooking oil from private households collected in 2003, that is about 16% of the estimated total capacity of about 0,5 Mio. Kilograms per year and an increase
- Jobs have been created for collecting the used cooking oil from restaurants
- Low financial support from the municipality for running costs, due to the contract between SEEG and Öko-Service concerning the payment for the collected frying oil
- About 30,000 EUR saved for the maintenance of the sewage system and wastewater treatment.

MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE

The biogas selling price will be kept equal to the natural gas price.

On this base it has been calculated that the methane fuel production is economically competitive as compared to other biogas valorisation (electricity, heat).
On this base LMCU and SMT have proved that the cost per km of a biogas bus is at the same level than the cost per km for diesel bus (included invest and operational costs).

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

The system delivered by the supplier company is very cost effective. Still the investment cost is high compared to other fuel stations. Until the market for bio gas vehicles has developed further, might take about 5 years, it is necessary to support the market for infrastructure. The market for bio gas and bio gas vehicles would probably “explode” if the fossil fuels were priced after the principle “pollution pay”.

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

Due to the common procurement the buyer consortium was offered higher discounts than before. The improvement was 2–3-%.

Companies with large vehicle fleets have chosen clean vehicles instead of conventional vehicles. With this measure, they have achieved a financial profit through the de-taxation of clean company cars as well as good-will and high environmental profile towards their customers. However, despite the Trendsetter subsidy of part of the additional cost there are still problems with high purchase price for bio gas and electric hybrid cars in combination with a week second hand market.

**MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS**

Companies with large vehicle fleets have chosen clean vehicles instead of conventional vehicles. With this measure, they have achieved a financial profit through the de-taxation of clean company cars as well as good will and high environmental profile towards their customers. However, there are still problems with high purchase price for biogas and electric hybrid cars in combination with a week second hand market.

**MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES**

The web site has contributed to companies decisions to choose clean vehicles instead of conventional vehicles due to reliable information on the benefits from the de-taxation of clean company cars as well as good will and high environmental profile towards their customers.
8.2 **POSITIVE ASPECTS, PROBLEMS AND SOLUTIONS**

The measures in the workpackage highlight many positive aspects:

- Economic issues are either solved or close to be solved, when approached globally taking into account investments, operational constraints as well as induced elements.
- Attractiveness of clean vehicles is higher when the economic constraints are made affordable, not necessarily suppressed.
- Communication is most important to make reality known and to avoid wrong perceptions.

Some negative aspects remain, however:

- Operational costs and investments might be a direct constraint which is difficult to overcome.
- Weak 2nd hand market for environmental friendly light vehicles makes the decisions more difficult.
- Many car producers still refuse guarantee if bio-diesel is used.
- The net of bio-diesel fuel stations is still weak.

8.3 **COMPARISON AND CONCLUSIONS**

The work shows that real economic impact is positive.

A global approach including operational elements (direct operating costs, infrastructure, fuels, …) and induced elements (urban benefits, environmental impact, …) is necessary to validate the economic impact of the switch to clean fleets.
9 SYNERGIES

9.1 NEED FOR SUPPLEMENTARY MEASURES

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES
There is a need for more filling stations for bio gas. There is also a need for a cut in price for heavy clean vehicles. Common procurements could do the job.

MEASURE 12.2 BIOGAS BUS FLEETS
No particular actions that are not implemented in Trendsetter are required to supplement Measure 12.2

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET
Awareness campaigns could promote PT in general

MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)
More filling stations for biogas and ethanol are needed and more incentives for clean vehicles.

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)
Lack of availability of vehicles requires further actions.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES
More fuelling stations for biogas is needed to access the fuel to even more biogas waste collection vehicles. There is also a need for increased production of biogas.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO-DIESEL SERVICE STATION
To improve the air quality in the area of Graz the local government has to build up additional measures. As the taxi drivers perceive themselves as an important part of public transport, they should also take part in promoting bio-diesel usage.
In this context promotion by local politicians is also essential.

MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM
- Intensive application and well directed projects about collecting waste cooking oil in households
- Shaping of opinions
- Small household-sized containers
MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE
The biogas experience in Lille, covering the whole value chain, is positive and conclusive without any additional measures.
Interconnection between biogas production and natural gas distribution is an issue to be addressed at a later stage.

MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE
There is a need for additional fuelling stations in a few years. There are also need for additional vehicle models especially for transport. Exemption from taxation will be needed for at least 5-7 years.

MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE
More fuel stations for E85 and bio gas. More vehicle models, especially large cars and vans, in combination with lower purchase prices are needed to make a market breakthrough.

MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS
More fuel stations for E85 and biogas. More vehicle models, especially large cars and vans, in combination with lower purchase prices are needed to make a market breakthrough.

MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES
Web portals are instrumental in the deployment of environmental friendly fleets.

9.2 COMPARISON AND CONCLUSIONS

Important investments in infrastructure are required, to support the transition towards clean fleets.
The analysis made within the various measures show that such investments, when studied globally, are relevant.
10  POLITICAL AND ADMINISTRATIVE ASPECTS

10.1  OVERVIEW OF MAJOR POLITICAL AND ADMINISTRATIVE ASPECTS INFLUENCING THE MEASURES

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES

The City of Stockholm has its own program for introducing clean vehicles and fuels into the market. The Trendsetter measures are part of this program. It is supervised by a political steering committee in which all political parties are represented and chaired by the Vice Mayor. There is a consensus in the committee that the City shall support the implementation of clean vehicles and fuels. Also on the national level the politicians support clean vehicles and fuels by several incentives that favour those vehicles. The new directives from EU regarding goals for introduction of alternative fuels helps.

MEASURE 12.2 BIOGAS BUS FLEETS

The new bus depot is the first in France which has received an “autorisation d’exploiter” from the “prefecture” (exploitation authorisation from the Public Authorities). This procedure includes the agreement of French administration (DRIRE,…) and “fire and safety services” (pompiers). This procedure also includes a public survey (enquete publique) that have been organised in spring 2004.

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET

Leasing buses instead of buying enabled a quicker change towards bio-diesel.

MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)

The City of Stockholm has its own program for introducing clean vehicles and fuels into the market. The Trendsetter measures are part of this program. It is supervised by a political steering committee in which all political parties are represented and chaired by the Vice Mayor. There is a consensus in the committee that the City shall support the implementation of clean vehicles and fuels. Also on the national level politicians support clean vehicles and fuels by several incentives that favour those vehicles. The new directives from EU regarding goals for introduction of alternative fuels helps the process.

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)

Availability of vehicles is an issue, once the administration tries to commit to the obligation of purchasing at least 20% of clean vehicles cannot be fulfilled as no answers are obtained to the tenders.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES

Local and national politicians support the project.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION

As Graz is situated in a basin between hills the city has been facing problems with the air quality especially in the winter period. Every measure, that contributes to better conditions is highly estimated by the citizens.
In this context the change of the taxi fleet to bio-diesel is a significant fact, that has to be forced by private public partnership.

**MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM**

Rapeseed-biodiesel and the possibilities of adding small amounts to fossile diesel have been discussed all over Austria just like in other countries. The geographical position of Graz and its susceptibility to winter inversions made it seem more sensible to cut down on air pollutants by using "biodiesel" pure in certain traffic segments.

To provide the necessary raw material and the final product Graz and its project Ökodrive have built up a direct line between those two poles. On top of it rapeseed - due to locally developed technologies - can be replaced by used vegetable oil, which is egologically even more agreeable than rapeseed.

The process of collecting, refining and using the final product has provided work for partly unemployed people, contributed to better living conditions in cleaner air and given people hope and belief in sustainable development by the practical example in daily use.

**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**

The biogas initiative implemented in Lille is a long term investment, which needed complex political consensus, supported by a strong economical analysis of the whole value chain from waste recovery to public transport operation of gas powered vehicles.

This was allowed by high level political involvement in a stable political configuration.

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

In Stockholm there is a broad political acceptance for biogas as fuel in vehicles. As a matter of fact there is a political decision that all biogas produced in Stockholm shall be upgraded and used as fuel in vehicles. Right now a study is going on to see how organic waste from restaurants and households could be collected and used for increased production of bio gas.

One problem is facing the introduction of biogas vehicles. There is a political decision not to build new fuel station of any kind inside the environmental zone. This means that all filling stations for bio gas has to be located outside that zone. This political decision might lead to that the fourth filling station in this project has to be moved. The Swedish gouvernment has decided to give subsidies to the City o Stockholm for two additional fuel stations to be built in the next three years.

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

As for the Stockholm project on clean vehicles, this is supervised by a political committee chaired by the Vice Mayor for Environment. This ensures a stable control of the local actions.

During the course of the measure, the political interest in renewable fuels has increased considerably. This has resulted in a prolongation of the national tax exemption on renewable fuels in Sweden as well as the EU directive on bio-fuels. These clear messages from the politicians have been very valuable when communicating clean vehicles to potential purchasers.

**MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS**

As for the Stockholm project on clean vehicles, a political committee chaired by the Vice Mayor for Environment supervises this. This ensures a stable control of the local actions.
During the course of the measure, the political interest in renewable fuels has increased considerably. This has resulted in a prolongation of the national tax exemption on renewable fuels in Sweden as well as the EU directive on bio-fuels. These clear messages from the politicians have been very valuable when communicating clean vehicles to potential purchasers.

**MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES**

This measure is not requiring complex decision making, provided that the communication procedures and standards applicable locally are respected.

**10.2 POSITIVE ASPECTS, PROBLEMS AND SOLUTIONS**

All sites and all measures clearly demonstrate that clean fleets can only be supported within a global approach from the local/regional/national authorities.

Such approach requires the involvement of a wide and complex variety of stakeholders from administration and from industry, and must address the whole value chain, including the essential point of logistics.

The consensus making process must exist prior to action with defined goals, argumented budgets and explicit commitments.

High-level political support is essential for decision making, and must be accompanied by a strong communication.
11 UP-SCALING AND TRANSFERABILITY

11.1 POTENTIAL FOR UP-SCALING AND TRANSFERABILITY TO OTHER CITIES

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES
The local public transport company, SL, has decided to procure 100 bio gas buses to the year 2008. The company has also decided to buy 100 ethanol buses during the same time. In total SL operates more than 1.700 buses and the companies ultimate goal is that all buses should be clean. A common co-ordinated procurement of ethanol buses is planned in order to get prices down. Several actors around the world are likely to take part in this procurement process.

MEASURE 12.2 BIOGAS BUS FLEETS
The SMT already decided to continue the renew of the entire fleet of buses with gas vehicles. The decision was also take to built a 3rd depot dedicated to gas buses. This one will be in service in September 2006 and will also include an important compression unit. On the base of this successful story, Lille Metropolis also works on the development of garbage trucks running with gas.

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET
All measures which have been implemented can easily be transferred to other companies working in similar areas. Within Europe, the transferability to similar type of companies can also be achieved very easily.

MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)
Upscaling and transferability depends highly in the availability of vehicles. Experience from other measures, e.g.12.11 can facilitate the implementation.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES
It is possible that in the future all 85 waste collecting vehicles in the city would be biogas. This would lead to xx CO2 savings, yy NOX savings and zz PM savings. The figures will be presented in February 2005.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION
The transferability of this project to other cities can be achieved easily and Graz may contribute experience in how to adapt car engines for bio-diesel fuel. The approach of information and awareness-raising measures can also be disposed for other issues.
MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM
There are still some high potential restaurants left, that are not participating in the project so far, due to profitable contracts for the disposal of their waste cooking oil. They will have to be convinced of the benefits of Ökodrive.

MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE
The plant built in Lille Metropolis is already the biggest in Europe.

MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE
AGA Gas has plans for building another 15-20 fuelling stations for bio gas in the middle part of Sweden. In the south and west part of Sweden two other companies has built more than 20 stations and more are planned. Also in the eastern part of the country there is a company setting up new filling stations. All together there are about 40 filling stations for CBG/CNG in Sweden. In the northern part of Sweden there are no filling stations for bio gas at the moment but there are plans for building stations even there.

MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE
An up-scaling of the common procurement to a European level might be a useful way of getting more different models on the market and probably chances to lower prices further.
Up-scaling the concept of Network of Clean Drivers to a national scale is already underway in Sweden. Since many of the member companies are international (Hertz, Hewlett Packard, Scandic Hilton Hotel, Ericsson etc) an up-scaling to European level would certainly be feasible. In fact, this idea was launched by the environmental director of Scandic Hilton Hotel at the Clean Vehicles and Fuels European Symposium and Exhibition in Stockholm in June 2004. The outcome of such a European Network could be a strong pressure group that could convince the vehicle manufacturers and fuel companies that there is indeed a strong demand for clean vehicles on the European market.

MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS
Up-scale projects of this kind that is national and local projects to European size. This could be done by including the manufacturers from the vehicle industry, participating in large European exhibitions as well as networking within Europe. The benefit would be to point out the European market potential for clean vehicle models.

MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES
A lot of information on clean vehicles, facts about fuels etc are common for all European member countries, but national web sites are necessary. A possible upscaling of this measure would be the development towards a European “Clean Vehicles and Fuels Information Agency”, responsible for common information, editing, news from and about different ongoing projects, illustrations etc, with the mission to serve the national clean vehicles web sites with most of the information they need.
11.2 COMPARISON AND CONCLUSION

The work done in the various measures highlights the importance of trials and progressive approaches in order to give credibility to up-scaling and deployment actions.

In the decision making process, the evaluation of the critical mass to be reached for operational and economic viability must be validated.

This allows:

- motivation of industry to address a real market
- economic threshold for viability and long term stability
- motivation of the users which receive the optimal service

Consensus building, communication and information are instrumental in reaching these goals.
12 ASSESSMENT OF ALL MEASURES

For each heading (Implementation, Fulfilment of measure objectives and Contribution to WP objectives) and measure in the table below, please choose one of the options in the parenthesis.

<table>
<thead>
<tr>
<th>Measure Description</th>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives (yes/no)</th>
</tr>
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<tr>
<td>12.1 Clean and efficient heavy vehicles</td>
<td>Partly</td>
<td>Partly</td>
<td>1, (3)</td>
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<td>12.2 Biogas bus fleets</td>
<td>As planned</td>
<td>Yes</td>
<td>1, (3)</td>
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<td>12.3 Clean and user friendly bio-diesel bus fleet</td>
<td>As planned</td>
<td>Yes</td>
<td>1, (3)</td>
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<td>12.4 Clean Municipal Fleets (Stockholm)</td>
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<td>Partly</td>
<td>2, (3)</td>
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<tr>
<td>12.5 Clean Municipal Fleets (Lille)</td>
<td>As planned</td>
<td>Partly</td>
<td>2</td>
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<tr>
<td>12.6 Waste collection with biogas-vehicles</td>
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<td>Yes</td>
<td>1</td>
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<tr>
<td>12.7 Bio-diesel taxi fleet and bio diesel service station</td>
<td>Partly</td>
<td>Partly</td>
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<td>12.8 Optimisation of the bio-diesel collection system</td>
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<td>12.9 Analysis of the biogas experience</td>
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<td>12.10 Improved biogas refuelling infrastructure</td>
<td>Partly</td>
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<td>3</td>
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<td>12.11 Making clean vehicles less expensive</td>
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<td>12.13 Increasing clean vehicle use in private company fleets</td>
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<td>12.14 Web-portal for drivers of clean vehicles</td>
<td>As planned</td>
<td>Yes</td>
<td>2, (3)</td>
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Contribution to WP objectives (between brackets means as an induced or secondary achievement)

1. Accelerate the heavy vehicles transition from a classical fossil fuel to clean fuel solution
2. Accelerate the light vehicles take-up from a larger audience (PT, Municipality, private companies)
3. Improve the clean fuel production and distribution
PART D – CONCLUSIONS AND RECOMMENDATIONS

13 BARRIERS AND DRIVERS OF THE MEASURE IMPLEMENTATION

13.1 GENERAL DESCRIPTION OF BARRIERS AND DRIVERS FOR EACH MEASURE

MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES

Barriers:
- There are no heavy lorries and trucks driven on ethanol available on the Swedish market.
- There is only one producer of ethanol buses in the market at the present time.
- The extra investment cost for clean heavy vehicles and higher costs for maintenance are reasons for that the market does not expand as fast as desired.
- The price of the clean fuel is too high relatively to diesel.
- The production of bio gas for vehicles is too limited to allow a large scale introduction of clean heavy vehicles at the moment.
- Insufficient infrastructure of filling stations

Drivers:
- Requirements from public and private buyers of transport services for clean vehicles.
- Political decisions favouring clean transports.
- Increased awareness of greenhouse effect.
- Need to lessen dependency on imported oil.
- Need to develop a clean fuel industry within the country.

MEASURE 12.2 BIOGAS BUS FLEETS

Barriers:
- Full control of the complete biogas value chain

Drivers:
- Availability of good quality vehicles
- High potential positive impact on environment.
- Economic viability of the biogas value chain: the cost of operation of a biogas bus fleet is similar or lower than the cost of operation of a similar fleet using fossil fuel.

MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET

As experience was available from CENTAUR, where the GVB tested CNG and biofuel, the measures implemented in CIVITAS did not face any problems. E.g. it was known, that with converting old buses for the usage of bio-diesel, it is necessary to exchange the filter immediately. Repeated filter changes are
necessary frequently in the beginning, as bio-diesel dissolves particles, that are residuals from the fossil fuel. Now there is no need for this frequent service anymore and maintenance costs don't differ from fossil diesel busses.

Politics as well as GVB go for environment - this fostered the 100% conversion of the bus-fleet

**MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)**

Barriers:
- Lack of suitable clean vehicle models e.g. vans and large family vehicles
- Lack of clean vehicles with automatic gearbox
- Insufficient infrastructure for clean fuels
- Lack of awareness by the public
- Still low interest at the dealer companies to launch clean vehicles
- Extra costs for clean vehicles

Drivers:
- Reduced tax of benefit on private use of company cars
- Free and discounted parking for clean vehicles
- No congestion tax for clean vehicles
- Increased awareness of greenhouse effect and dependency of oil
- Environmental requirements in procurement of transport services

**MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)**

Barriers:
- Availability of vehicles on the market

Drivers:
- High acceptance of clean vehicles
- Economic viability of gas vehicles

**MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES**

One barrier is the insecurity of the biogas supply. For the entrepreneurs this is a big concern. Occasionally the drivers have to go to many different fuelling stations in order to fill up the tank. During the years that the project has been running some positive decisions have been taken by companies to produce and distribute more biogas.

**MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION**

It is crucial to implement a driving force in the taxi company, which is ambitious about the project.
One of the key barriers concerns the organisational structure of 878 City Funk GmbH. A lot of small enterprises are joined under the umbrella of 878. As there were problems at the beginning of the project, it is still hard to convince all of these enterprises of the innovative approach of the project.

**MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM**

Because of the long experience, no problems existed with the collection of waste cooking oil. The role of the Grazer Umweltamt as the municipal partner consists of developing and financing sustainable initiatives, bringing together the right partners and providing the right platform for communication and public relation. By then direct financial input should be replaced by strategic overhead and promotion to guarantee the durability and final success of the process. In concrete terms Graz and its project Ökodrive has provided the necessary collection logistics and finally proves the benefits of biodiesel in daily use. In the future, the commercial success and its ecological impact should make further financial support unnecessary. Öko-Service has developed the logistics for the collection of used frying oil from restaurants on behalf of the Grazer Umweltamt. Collection is carried out by Öko-Service staff, who are long-term unemployed people, being especially trained in order to get jobs in the field of environmental protection. Collection is free of charge for the restaurants. Additionally the participation in the project involves a positive image and should motivate the guests to do it the same way at home. Used frying oil is supplied by contract as valuable raw material for the production of biodiesel, the technology behind having been developed in Graz. GVB – Graz Public Transport Services launched the pilot project on running buses with biofuel using frying oil, collected and correspondingly converted to biodiesel and finally proves the benefits of biodiesel in daily use.

**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**

**Barriers:**
- High investment costs
- Full control of the complete biogas value chain

**Drivers:**
- High potential positive impact on environment
- Economic viability of the biogas value chain: the cost of operation of a biogas bus fleet is similar or lower than the cost of operation of a similar fleet using fossil fuel

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

**Barriers:**
- The investment cost for building a bio gas filling station is high
- It takes time to expand the market for biogas and most operators lose money in a short run perspective.
- Biogas vehicles are more expensive to buy and own than conventional ones
- Political decision not to build fuel stations inside the environmental zone.
- The production cost of bio gas is high which makes it hard to compete with other fossil fuels

**Drivers:**
- Bio gas vehicles have favourable parking conditions
• Bio gas vehicles do not pay congestion fees
• People who drives bio gas vehicles and pay taxes for benefit get a tax discount
• Bio gas vehicles are well functioning
• Bio gas is less costly compared to petrol

MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE

Barriers:
• Delivery problems (technical problems with new technologies like bi-fuel systems and electric hybrid systems)
• Lack of suitable clean vehicle models e.g. vans and large family vehicles as well as vehicles with automatic gearbox
• Week second hand market creating an uncertainty in depreciation of the vehicles
• Insufficient infrastructure of refuelling stations
• Takes time to reach out to potential buyers and affect the awareness and perceptions

Drivers:
• New attractive high-tech clean vehicle models available on the market
• Reduced tax on private use of company cars and possible local incentives as free parking
• Increased awareness of greenhouse effect and dependency on oil
• Environmental requirements in public procurements of transport services

MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS

Barriers:
• Lack of refuelling stations for clean fuels
• Lack of suitable vehicle models
• High purchase costs and a week second hand market
• Prejudice against alternative fuels among salespeople and the public
• Lack of real long-term political commitments on tax reduction and infrastructure investments.

Drivers:
• New attractive high-tech clean vehicle models available on the market
• Reduced tax on private use of company cars and possible local incentives as free parking
• Increased awareness of greenhouse effect and dependency on oil
• Environmental requirements in public procurements of transport services

An obstacle is that the public sector cannot act as a vendor of vehicles and alternative fuels. This is what we need the private sector for. Although a local authority can sell the clean vehicles as a concept and act as a driver for a market breakthrough, it is still the salespeople that have to do the job.
**MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES**

**Barriers:**
- Lack of refuelling stations for clean fuels
- Extensive work to keep information about vehicle models and fuelling facilities updated since prices and models change. Lately development, i.e., increase in fuelling facilities, is so fast that we have a (positive) problem to keep pace with updating the information
- In the long run it might be a problem for three cities to run and finance a site mainly providing national information. Still it is relevant when compared with other possible actions the cities can take to increase use and market share for clean vehicles and fuels

**Drivers:**
- Relevant and reliable information is important in buying decision, and providing this information is an effective way for the cities to influence both potential buyers and today's drivers of clean vehicles.
- Ensuring relevant high quality clean vehicle information, and regular news, is also a good basis for media coverage and for building of media relations helping to create a positive image of clean vehicles. Easy accessible surveys is also a way to help to ensure that information in media is more correct.
- Target group surveys indicates that the fact that three cities produces the web-site gives credibility and reliability to the information provided.

No national actor have so far been willing to provide this information

**13.2 TECHNICAL BARRIERS AND DRIVERS**

**Barriers**
- Perceived issues are difficult to combat, e.g., Maintenance will always be more expensive, life time will be shorter, …

**Drivers**
- No major technical or technological problem that could not be solved

**13.3 SYNERGIES BARRIERS AND DRIVERS**

**Barriers**
- Need to reach the critical mass in terms of supply of energy and infrastructure

**Drivers**
- A global approach and the right communication allow things to move in the right direction

**13.4 POLITICAL AND ADMINISTRATIVE BARRIERS AND DRIVERS**

**Barriers**
- Need for consensus among complex assemblies of stakeholders

**Drivers**
- Opportunities from consensus and global approach, with high level involvement
13.5 ECONOMICAL BARRIERS AND DRIVERS

Barriers

- Long term investments and replacement of vehicles and infrastructure with long life time can be an economic issue

Drivers

- Environmental friendly fleets are economically viable
14 Lessons to Consider for Replication and Take-up by Other Cities

14.1 Lessons to be Considered for Each Measure

Measure 12.1 Clean and Efficient Heavy Vehicles

The transport sector and especially the heavy vehicles causes many emissions which are harmful to man and nature. One way to reduce the negative effects of transports is to substitute fossil fuels by alternative fuels and preferably renewable ones. The cleanest of all fuels available today is bio gas. Also bio ethanol is a very clean fuel. This measure has the objective to demonstrate that it is possible to run heavy vehicles on alternative fuels. The lesson learned is that there are no technical problems running heavy vehicles on alternative fuels. There are good and suitable vehicles available on the market, somewhat limited today though. The costs for buying and operating a clean heavy vehicle are today higher than for a conventional diesel vehicle. There is a local, national and international political support for introducing clean heavy vehicles.

Producing bio gas and use it as fuel for vehicles not only lessens harmful emissions but also solves a garbage problem locally. The material remaining after digestion can often also be used as a biofertilizer, which is good for nature.

For reasons mentioned above we highly recommend other cities to implement clean heavy vehicles and use locally produced bio gas as fuel if available. Otherwise bioethanol or natural gas could be used. The main success factor is of course that bio gas is available in the cities.

Measure 12.2 Biogas Bus Fleets

The experience of Lille in the operation of a biogas bus fleet is certainly pioneering this area and setting the trends for future clean and sustainable public transport.

It shows that, with the adequate political engagement, a substantial improvement in the environmental impact of the public transport operation can be made.

This requires however a complete strategy including the infrastructure.

It also shows that an evaluation, including of the economic aspects, which is only based on a sub-critical sample of the bus fleet cannot be sufficient to approach the problem of converting a complete regional fleet. Lille metropolis demonstrated the technical, environmental and economical feasibility of such conversion in a large scale.

The conversion to biogas bus fleets depends on the control of the complete value chain from gas production, to distribution and exploitation of the fleet.

Transferability depends on the capability to keep long terms investments under control.

Measure 12.3 Clean and User Friendly Bio-Diesel Bus Fleet

All measures which have been implemented can easily be transferred to other companies working in similar areas.

Within Europe, the transferability to similar type of companies can also be achieved very easily.

The mobility disabled are not in favour of automatic lifts to help them enter the buses, as 1) these systems don't work reliably in winter and 2) they have to leave the sidewalk to enter the lifts from the road level. They prefer systems, where the drivers help them with ramps, in case the low- floor buses are still too high.
MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)

The transport sector causes many emissions that are harmful to man and nature. One way to reduce the negative impacts from transport is to use renewable fuels instead of fossil fuels. There is a great potential to substitute a lot of oil by doing this. There are technologies on the market for clean vehicles that function very well and even if the costs of operating them still are somewhat higher than for conventional ones the time is now to work for a market breakthrough for clean vehicles. It is important that the implementation work is supported by politicians on both local and national level. It is also of great importance that the awareness of the public increases and that the car dealers start doing their job. A demand for more models must be created and the price must go down. This is the main lesson learned. We recommend all cities to demand clean vehicles for transport.

MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)

The lessons to be learnt from the measure are that if one wants to promote the clean vehicles with energy, it would be useful to communicate the considerable advantages of these vehicles on the environment and to insist to the various manufacturers so that they expand the range of clean vehicles are packed of advantage. The promises are there, but reality is very different.

MEASURE 12.6 WASTE COLLECTION WITH BIOGAS-VEHICLES

The supply of biogas is very important. Also the distribution is of highest importance. A third important thing is that there need to be someone that are willing to pay the extra costs that it takes to operate the biogas vehicles. The project has been successful and other cities could do it as well if they feel a need to reduce the amount of noise and pollutant emissions in the city.

MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION

One of the major outputs concerns the difference between a public fleet and a private fleet. A private fleet is maybe more ambitious in implementing new innovative systems. Nevertheless a private fleet is more influenced on the market (slogan: “time is money”) than a public fleet. If the new system sticks it is hard to get back on the track as reliability gets lost.

Another lesson to consider is about the participation and supporting role of experts. It was proven within this project, that a supervision of an expert group is essential for the whole project. So if problems arise do not hesitate to get support of an expert group.

MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM

- Used frying oil is difficult to get disposed of and must not re-enter the food chain (feed, margarine).
- The elimination of used frying oil from the waste treatment process decreases the costs for maintenance and also has the welcome effect of increasing the available treatment capacity of the municipal purification plant.
- In this way, used frying oil becomes a valuable raw material for the production of bio-diesel as a renewable resource.
- Bio-diesel emissions are clearly lower than those of conventional diesel fuels.
- Therefore, the use of biodiesel in Fel! Ogiltig hyperlänkreferens. is a significant contribution to the improvement of the air quality.
• The collection and conversion of used frying oil also creates valuable jobs.

**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**

The existence of the economically viable biogas production unit with this large scale is a strong argument to show the feasibility and viability of such initiative.

The elements of the project are available in the deliverable D12.9.1, which is available as a reference document and provides contacts for further exchanges.

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**

• Setting up filling stations in areas where there is no natural gas grid present is hard and more expensive.
• Setting up a sufficient number of filling stations is necessary to create a market for bio gas vehicles
• Setting up a filling station without subsidies is hard today
• Do not expect profit in the short run
• Put the stations at existing fuel stations
• Put signs on the roads so people can easily find them

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

By forming a strong buyer consortium with potential to buy a great number of clean vehicles it is possible to improve levels of discounts considerably. It also is a way to persuade car manufacturers and dealers to put new models on the market (examples are Ford FFV, Volvo FFV and Saab FFV).

Incentives for clean vehicles helps to create the market. Free parking or reduced parking fees has proved to be effective as well as reduced taxes for both clean vehicles and fuels.

Establishing a network of active users of clean vehicles has several benefits. This creates a pressure force outside of the official bodies normally driving the environmental development. Private companies using clean vehicles in daily service act as “ambassadors” and pave the way for new users. Large internation and environmentally oriented companies should be encouraged to network around the issue of clean transport and responsible enterprising. This creates added value to their marketing and puts pressure on other companies to do likewise.

Providing subsidies to cover part of the additional cost for a clean vehicle is an effective way of disseminating the concept of clean vehicles. A press release on the Trendsetter subsidy open to companies in Stockholm created some 15 news articles during a period of six months, a very successful result according to the PR experts. Hundreds of phone calls was also generated, giving the sudden opportunity to provide tailor made advice on clean vehicles to potential buyers.

The companies joining the network were obliged to assess their use of the vehicles through data collection and questionnaires. This is an excellent way of monitoring the large scale practical use of new technology. This can also be used for publicity purposes. Newspapers are generally very interested in surveys and new research results.

Small companies were generally easier to reach than large fleet owners. This is due to the fact that the economic benefit of the subsidy is more important for small companies than for large fleet owners like taxi that can normally achieve fairly low prices when buying large quantities. The lesson is twofold: 1. An economic subsidy is an effective way to spread the use of clean vehicles to many different users with many contact surfaces 2. Large transport companies is difficult to reach with subsidies alone, other incentives like environmental requirements in public procurement, are necessary.
MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS

A success factor is the analysis of the strategy on how to approach companies and to perform attitude surveys. Also how to use sources for the evaluation such as reference literature, interviews and to make use of the results within the Trendsetter project and similar projects on the national arena.

What are the main lessons learnt (technical, economical, political/administrative and synergies)?

- Media is one primary source of information and awareness rising with regard to clean vehicles. As a result of the measure, the media coverage has increased as well as the awareness among journalists. Using a professional PR consultant is worthwhile.

- Internet is another prime source. The web portal developed (12.14) has proven very useful.

- Economy and environment were perceived as the most important factors in choosing an environmentally adapted car (others were safety, technology, and status).

- Those who were the recipients of Trendsetter subsidies, now demand more filling stations.

- To hold or participate in seminars is an excellent method to inform companies, although expensive to arrange. Involvement with other actor’s seminars and ad hoc contingencies alongside a fixed plan of activities is less expensive.

- Companies in the private sector are a potential target group as well as the general public. The general public is the parallel group.

- Retailers for vehicles cars and alternative fuels, and leasing and finance companies are important partners.

- The test drivers’ overall impression of a clean vehicle was that “clean vehicles work”.

- Having long-term strategies for incentives to make clean vehicles become an economical option for purchasers and the expansion of the infrastructure of alternative fuels. Also to have strategies to influence the vehicle industry to consider bringing more models of clean vehicles to the market.

- The method of communicating the concept of clean vehicles to companies is different compare to communicating the same to the public. Business to business is built on direct relationships and takes much longer time.

- The first clean vehicle to the company is often purchased by curiosity or by the environmental manager. To increase the vehicle fleet, companies require other arguments such as financial rather than environmental. Emphasis is to be making on lifecycle rather than purchasing costs. Knowledge about vehicle models and infrastructure of fuels are arguments that are listened to.

- Knowledge about the company, if it is a sales oriented organisation, what type of company cars the personnel use etc is important when using direct contact approach.

Do you consider the described measure to be take-up measure for other cities? Why or why not?

Yes! It is not only to be regarded as a considered measure, but as a necessary one. Clean vehicles and fuels are part of our future to make an environmentally sound life on earth. This measure is not to be implemented in parts of Europe only. The infrastructure and number of models need to be expanded out and improved so that it will be as financially beneficial as the industry is today with conventional vehicles and fuels.

What are the success factors and worst practice?

This project is applicable in all EC cities The success factors are co-operation and collaboration. All stakeholders are required to create a breakthrough. Stakeholders such as authorities, official bodies, ministries, energy enterprises, fuel distributors, vehicle industry, private sectors with small and large companies, suppliers and customer’s customers, non-profit organisations etc. Non-existing co-operation and a traditional viewpoint with regard to vehicle fuels are a risk.

To summarise, it can be said that methods and factors that work for a project of this type are: good preparation, communication strategies, spending time on initial research, having ad-hoc contingencies, investing in media canvassing and personal contacts, distributing outline facts and arranging meetings such
as direct meetings and seminars, lobbying to all stakeholders that are involved for a long-term perspective and having economically beneficial incentives.

**MEASURE 12.14 WEB-PORTAL FOR DRIVERS OF CLEAN VEHICLES**

There is a natural competition between producers and distributors of fuels dealers of clean vehicles on the market. A neutral disseminator - a city, municipality or public authority – is necessary to gather all actors in one portal, for the benefit of all.

Media is one primary source of information and awareness rising with regard to clean vehicles. As a result of other 12-measures, the media coverage has increased as well as the awareness among journalists. Once the awareness has raised, the need for a high-quality information portal is imminent. These are essential steps towards the fulfilment of the Trendsetter aims.

**14.2 TECHNICAL ISSUES**

All measures solved real as well as perceived technical issues, e.g. maintenance, value chain, …

**14.3 SYNERGIES**

All measures demonstrated success, even if sometimes the timeframe of the Trendsetter project did not allow to fully reach the expected goals.

This was obtained through extensive preparation of the decision-making process and through piloting the future operations. Such process is essential to allow decisions to be taken for the full scale implementations.

**14.4 POLITICAL AND ADMINISTRATIVE ISSUES**

It is fundamental to bring together the appropriate stakeholders involved in the global process, beyond the sole operational structure.

The decision making process also requires high level involvement and intensive communication.

**14.5 ECONOMICAL ISSUES**

Main economic issues relate to the complexity of the economic evaluation at global level end not only at operational level.

This includes also important infrastructural investments for the long run, with high costs, long decision making and involving a complex diversity of stakeholders.
15 **RECOMMENDATIONS TO EC AND OTHER ACTORS**

On a general basis, some essential recommendations stem out of the work done in this workpackage:

- We recommend national authorities to use subsidies to co-finance the building of infrastructure for alternative fuels
- We recommend national authorities to use subsidies to encourage common co-ordinated procurements of clean heavy vehicles
- We recommend national governments to create tax legislation that favours clean vehicles
- Support building of more production capacity in Europe (biogas, biodiesel)
- Implement national definitions on clean vehicles
- Governments should have a clear strategy for a large-scale introduction of clean vehicles.

15.1 **SPECIFIC RECOMMENDATIONS FROM THE MEASURES**

**MEASURE 12.1 CLEAN AND EFFICIENT HEAVY VEHICLES**

- We recommend actions to encourage public organisation and private companies to use environmental requirements in procurement of transport services
- We recommend EC and national authorities to use subsidies to co-finance the building of infrastructure for alternative fuels
- We recommend EC and national authorities to use subsidies to encourage common co-ordinated procurements of clean heavy vehicles
- We recommend EC and national authorities to create tax legislation that favours clean vehicles

**MEASURE 12.2 BIOGAS BUS FleETS**

The biogas bus fleets are one among the various elements of a complete and complex value chain, which Trendsetter demonstrated to be feasible and economically viable, although requiring important investments and long term commitment.

It is important that such commitments are kept and supported in the long term.

**MEASURE 12.3 CLEAN AND USER FRIENDLY BIO-DIESEL BUS FLEET**

Companies, which are over passing a certain size, should be forced to switch the whole bus-fleet to biodiesel operation and also to consider the use of used cooking oil. This would result in a wide spread and a great environmental benefit. Moreover, success stories such as measure 12.3 have to be distributed to “follower” cities, so that they are encouraged to copy this action.

A European guideline should guarantee for a longer time period, that fuel produced from renewable resources has to be exempt from taxes in such a way, that it is more economical to use than fossil fuel.

The experience from Graz: 100% Biodiesel in the whole busfleet (and now also taxis) with used cooking oil bases biodiesel is unique and could be spread to all European cities. Often this is hindered by extra
guarantees asked for by bus and car manufacturers. Usually operating with a 30% biodiesel mix is already deemed difficult, Graz proves the contrary.

**MEASURE 12.4 CLEAN MUNICIPAL FLEETS (STOCKHOLM)**
- We recommend actions to encourage public organisations and private companies to use environmental requirements in procurement of transport services.
- We recommend EC and national authorities to use subsidies to co-finance the building of infrastructure for alternative fuels.
- We recommend EC and national authorities to use subsidies to encourage common co-ordinated procurements of clean vehicles.
- We recommend EC and national governments to create tax legislation that promotes clean vehicles.

**MEASURE 12.5 CLEAN MUNICIPAL FLEETS (LILLE)**
Availability of vehicles is an issue, and pressure shall be put on manufacturers to correct the situation, through the clear commitment to purchase of substantial volumes.

**MEASURE 12.7 BIO-DIESEL TAXI FLEET AND BIO DIESEL SERVICE STATION**
Frame work conditions for the introduction of renewable energy sources have to be reconsidered and improved. Although more and more people are getting known of bio diesel, knowledge still lakes in terms of acceptance and advantages. But thanks to EU-projects like TRENDSETTER people are getting aware of the benefits of bio diesel and other renewable energy sources. Specific regulations should guarantee a lower price for bio-diesel fuel

**MEASURE 12.8 OPTIMISATION OF THE BIO-DIESEL COLLECTION SYSTEM**
From the experience of Ökodrive the model can be applied universally. The key point is, that the structure of the project has to be established in the same way as it is in Graz.

Used frying oil represents a problem not only in Graz. Many European cities have been convinced by the success and have already asked for detailed information about this sustainable project and intend to adopt this system.

**MEASURE 12.9 ANALYSIS OF THE BIOGAS EXPERIENCE**
The various elements of the complete and complex value chain from Biogas production from organic and sludge waste to the operation of a complete biogas bus fleet were demonstrated to be feasible and economically viable, although requiring important investments and long term commitment.

It is important that such commitments are kept and supported in the long term.

**MEASURE 12.10 IMPROVED BIOGAS REFUELLING INFRASTRUCTURE**
- Support by subsidies or else the building of infrastructure for bio gas
- Create incentives to those who invest in bio gas vehicles
• Give support to European consortium planning co-ordinated procurements of bio-gas vehicles
• Support building of more production capacity in Europe
• Support development of new cost effective methods to produce and upgrade bio gas as fuel in vehicles.

**MEASURE 12.11 MAKING CLEAN VEHICLES LESS EXPENSIVE**

• Agree on a common definition of clean vehicles for Europe or at least for each country.
• Governments should have a clear strategy for a large-scale introduction of clean vehicles.
• Encourage the use of common procurement as an effective tool to bring new clean vehicles on the market to acceptable prices.
• Give governments legal possibilities to provide long term regulations and incentives for clean vehicles.
• Take action to stimulate the building of infrastructure (fuelling stations) for clean vehicles.
• Encourage the formation of networks and buyers consortia on a European scale that can show the manufacturers that there is indeed a demand for clean vehicles on the European market.
• Use subsidies to spread the concept of clean vehicles to many users and to assess the success of their use.
• Encourage public organisations to use environmental requirements in transport procurements. An outstanding example is the County of Stockholm (responsible for regional public transport and health care) that requires all suppliers to use 25% renewable fuel by 2006.

**MEASURE 12.13 INCREASING CLEAN VEHICLE USE IN PRIVATE COMPANY FLEETS**

If resulted wanted quickly, financial support and cooperation is important as well as having media nearby to write about what is happening. Start with one brand not all in once. This have been a very efficient ingredient working with the ethanol vehicles in Stockholm region as well as the methane gas vehicles in Gothenburg region.

Have a long-term perspective, the co-operation with all stakeholders, extension of borders, the provision of financial support and the continuance of support for this type of project. Also, to work in conjunction with the vehicle industry so that they implement clean fuel engines in all their models to enable a European and worldwide market for cleans vehicles.

The authorities are crucial when it comes to benefits and taxes. Other incentives are also important. Build out the fuel stations of alternative fuel. Don’t chose only one alternative fuel but several. Set up demonstration and dissemination projects even though it not the latest news. Don’t forget the industrial partners!
15.2 General Recommendations from the Workpackage

The European Commission is one among the several stakeholders involved in the process towards clean public and private fleets, as it develops many of the general policies towards environmental friendly mobility of persons and goods.

It is therefore expected that it plays a role in supporting, incentive and co financing (through subsidies as well as tax exemptions) various key elements:

- Infrastructure for the production and distribution of alternative fuels, a key element of the take up
- Development of clean vehicles by the manufacturers, so that they are available on the market
- The direct use of clean vehicles to accelerate the path towards a critical mass for the operations

Last but not least, the EC may have a key role in informing and validating that fleets of clean vehicles, public or private, ARE POSSIBLE AND ECONOMICALLY INTERESTING
APPENDIX 1 – LIST OF TRENDSSETTER MEASURES

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
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</thead>
<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.1</td>
<td>Widening of the Environmental Zone</td>
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<td></td>
<td></td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
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<td>5.6</td>
<td>Congestion charging</td>
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<td></td>
<td>Strolling zones</td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
<td>Graz</td>
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<td></td>
<td></td>
<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
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<td></td>
<td></td>
<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
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<td>Smart Card Systems</td>
<td>6.1</td>
<td>Smart card systems and integrated ticketing</td>
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<td>Smart card systems and integrated ticketing</td>
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<td></td>
<td>Parking</td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
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<td>6.4</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td>Establishment of a zone-model parking in the central city area</td>
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<td>Increasing public transport passengers</td>
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<td>Public transport safety</td>
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<td>PT intermodality</td>
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<td>Intermodal local/regional transport interchanges</td>
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<td>Seamless linkage of modes</td>
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<td>Park and Ride facilities</td>
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<td>Linking different ways of public transport</td>
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<td>Car pooling/sharing</td>
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<td></td>
<td>Material logistic centre – to optimise freight deliveries at construction site</td>
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<td>Marketing/information and quality management</td>
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<td>Awareness for speed reduction and less car use</td>
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<td>Taxi drivers as information multipliers for clean transport</td>
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<td>11.2</td>
<td>Traffic monitoring and supervision</td>
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<td>11.3</td>
<td>Dynamic traffic management system</td>
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<td>Improving PT traffic flow</td>
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<td>11.4</td>
<td>Accessible road network (street) data</td>
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<td>Light vehicles</td>
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<td>12.7</td>
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<td>Web-portal for drivers of clean vehicles</td>
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<td>12.9</td>
<td>Analysis of the biogas experience</td>
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<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
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</table>
APPENDIX 2 – TRENDSETTER CITIES

Four cities among the 5 of Trendsetter effectively participate to WP7. Stockholm and Prague, 2 capital cities of the European Union and Lille and Graz, two regional capitals of different size. They show each a particular context, allowing the necessary diversity of application environments to allow conclusive experiments and replication strategies.

STOCKHOLM CONTEXT

AB Storstockholms Lokaltrafik (SL) is the Public Transport Authority in Stockholm. SL has the task to offer public transport services to people living and working in the County of Stockholm. SL is responsible for the extent, planning and development of public transport as well as for the administration of transport facilities, determination of the output of transport and pricing in accordance with the owners’ decisions. During an average weekday, over 600 000 passengers’ travel by using buses, trams, suburban trains, commuter trains and the underground.

SL is owned by the County of Stockholm, which is the body responsible for the common concerns of the population with respect to medical care and public transport within the County.

Transport operations is conducted entirely with the aid of appointed traffic contractors.

PARTNERS IN STOCKHOLM

There are seven partners within Trendsetter Stockholm:

- City of Stockholm, Environment and Health Administration (MF)
- Stockholm Transport (SL)
- Swedish National Road Administration, Stockholm Region (SNRA)
- Stockholm Real Estate and Traffic Administration (GFK)
- Statoil Detaljhandel AB (Statiol)
- AGA Gas AB (AGA)
- Home 2 You AB (H2U)

DEMONSTRATION MEASURES

The partners in Stockholm will implement twenty different measures within Trendsetter

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Project owner</th>
<th>Other partners</th>
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<tr>
<td>WP9 New Concepts for the Distribution of Goods</td>
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<tr>
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<td>Bicycle measures</td>
<td>10.2 Make bicycling attractive (EBAR information on the Internet)</td>
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<td>11.2 Traffic monitoring and supervision</td>
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<td>Light vehicles</td>
<td>12.6 Waste collection with biogas-vehicles</td>
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<td></td>
<td>Clean municipal fleets</td>
<td>12.9 Clean Municipal fleets</td>
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<td>Waste collection with biogas-vehicles</td>
<td>12.10 Waste collection with biogas-vehicles</td>
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<td>Clean fuel distribution</td>
<td>12.10 Improved biogas refuelling infrastructure</td>
<td>MF</td>
<td>AGA and Statiol</td>
</tr>
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</table>

Picture 1 Organisation in City of Stockholm. Measure 12.12 is fused with 12.11
GEOGRAPHICAL CONTEXT

Map with an overview of all Stockholm’s measures

As shown in the picture above, the measures in Stockholm are demonstrated on different spatial scale. Some are demonstrated on regional level, some on municipal level and other on smaller parts within the city.

LILLE CONTEXT

The public transport activities in Lille Metropolis are placed in a specific legal context:

- the law on the air of December 1996 which recognizes to anyone the right to breathe an air which does not harm its health.

- The Urban Mobility Plan (PDU) adopted by LMCU in June 1999 which aims to limit pollution of the cities by supporting the development of the alternative modes.
In addition to the development of the collective transport system, the PDU recommends to improve the railway offer between Lille and the large cities and encourages the creation of multimodal interchanges for urban transport.

In order to obtain a coherent, balanced and readable urban environment, all the actions carried out in the city must contribute to the improvement of the connections in collective transport and to the opening on the Lille metropolis which is in the heart of a network connecting six European capitals (Brussels, Bonn, the Hague, London, Luxembourg and Paris).

**PARTNERS IN LILLE**

There are two partners within Trendsetter Lille, as described in the accepted Inception Report:

- Lille Metropole (LMCU)
- Syndicat Mixte des Transports (SMT)

Other partners involved in Trendsetter under the coordination of Lille are very numerous: organizing authorities of transport (Lille metropolis Urban Community + Nord/Pas-de-Calais Area + Department of North), transport operators (the SNCF, RFF, Transpole), towns, energy agency (Ademe), …
DEMONSTRATION MEASURES

The partners in Lille will implement ten different measures within Trendsetter, described in detail in the Inception Report and in subsequent documents:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of measures</th>
<th>Measure Nº</th>
<th>Measure description</th>
<th>Measure leader</th>
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<tr>
<td>WP7 Public Passenger Transport</td>
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<td>Public Transport Safety</td>
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<td>Intermodal local/regional transport interchanges</td>
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<td>Company Mobility Plan in the administration fleet</td>
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<td>Awareness raising</td>
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<td>Urban Mobility Plan</td>
<td>LMCU</td>
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<td>Improving PT traffic flow</td>
<td>11.7</td>
<td>High Level Service Bus Routes</td>
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<td>WP12 Clean Public and Private Fleets</td>
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<td>12.2</td>
<td>Biogas Bus Fleets</td>
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<td>Light vehicles</td>
<td>12.5</td>
<td>Clean Municipal Fleets</td>
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<td>Clean Fuel distribution</td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>LMCU</td>
<td>SMT</td>
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</table>

The working organisation involves two partners:

LMCU (Lille Métropole Communauté Urbaine), the Lille Metropolis Authority, and SMT (Syndicat Mixe des Transports), the local Transport Authority. Which brings together LMCU and the Département of Nord.

**Lille operational organisation**

![Lille operational organisation diagram](image-url)

Picture 1 Organisation in City of Lille.
GEOGRAPHICAL CONTEXT

Marquette
Biogas from sludge (12 9)

Armentières
Intermodal Interchange (7.3)

Sequedin
Dondel (for Biogas buses) (13 7)

Sequedin (ORC)
Biogas from organic waste (13.0)

Don Sainghin
Intermodal Interchange (7.3)
SYNERGIES BETWEEN MEASURES

The measures in Lille Metropolis are included in a 20 year+ plan for the optimisation of the Public Transport environment, supported by local, regional and national Authorities.

There will be therefore high synergy effects when implementing sets of measures. The synergy effects will be taken into account when evaluating the measures.

It is also important to note that many indicators are global, and the individual contribution of each measure cannot be detailed.

GRAZ CONTEXT

PARTNERS IN GRAZ

There are eight partners within Trendsetter Graz:

- City of Graz (Graz)
- Spedition- und Internationale Transport GmbH (ITG)
- Public Transport Company of Graz (GVB)
- Taxi Group 878 Cityfunk Ltd (Taxi878)
- Styrian Transport Association, STVG Ltd (STVG)
- Erlach Consulting & Engineering (ECE)
- Province of Styria (LAND)
- Austrian Mobility Research (FGM-AMOR)

DEMO MEASURES

The partners in Graz will implement seventeen different measures within Trendsetter.

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<tr>
<th>Work Package</th>
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<th>Measure</th>
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<td>5.3 Implementation of strolling zones</td>
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<td>Information to passengers</td>
<td>7.5 Customer friendly stops for bus and tram</td>
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<td>8.3 Promoting car pooling</td>
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<td>8.4 Site level Mobility Management</td>
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<td>Traffic information</td>
<td>10.3 Marketing Information and Quality management</td>
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<td>Awareness of clean transport and trip planning</td>
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<td>11.3 Dynamic traffic management system</td>
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<td>Light vehicles</td>
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<td></td>
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</tbody>
</table>
**PRAGUE CONTEXT**

Large locality in the city centre with narrow streets and a great number of medical centres and facilities (hospitals, clinics) with no public transport services available.

Actors : DP Praha,a.s. (Prague Public Transit Co. Inc.), Transport Department of Prague City Council (DOP MHMP), Police of the Czech Republic, Metaprojekt, ROPID (Regional Organizer of Prague Integrated Transport), City Police, Municipal District Authority of Prague 2, General Teaching Hospital, Technical Road Administration (TSK), ELTODO

Integration : the new city-bus line integrated into Prague Integrated Transport (PID) system, including tariff measures

**PARTNERS IN PRAGUE**

There is one partner within Trendsetter Prague:
- City of Prague

**DEMONSTRATION MEASURES**

The partner in Prague will implement three different measures within Trendsetter

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure Description</th>
<th>Project owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
<td>Prague</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>PT intermodality</td>
<td>7.7</td>
<td>Linking different ways of public transport</td>
<td>Prague</td>
</tr>
<tr>
<td>WP11 Integration of Transport Management Systems</td>
<td>Improving PT traffic flow</td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
</tbody>
</table>

**GEOGRAPHICAL CONTEXT**
## APPENDIX 3 – WORDLIST

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
</tr>
<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
</tr>
<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>RKF</td>
<td>Resekortsföreningen I Norden -</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
<tr>
<td>SL</td>
<td>Stockholm Transport</td>
</tr>
<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l’Intégration Réseaux et des Tarifs</td>
</tr>
<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDSETTER</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
The European project Trendsetter involves 50 individual projects, all of which aim to; improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union. Read more about Trendsetter at www.trendsetter-europe.org.

Read more about the Civitas project at www.civitas-initiative.org

June 2006

Trendsetter Report No 2005:8

Trendsetter External Deliverable No 4.3f
Contract No: NNE-2001-00323

Contractors
1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
7. Swedish Road Administration, Stockholm Region
8. Stockholm Real Estate and Traffic Administration
9. Public Transport Company of Graz
10. Taxi Group 878 Cityfunk Ltd
11. Styrian Transport Association, STVG Ltd
12. Erlach Consulting & Engineering
13. Province of Styria
14. Austrian Mobility Research
15. City of Pécs
16. Pecs Municipal Operations and Property Management Company
17. Syndicat Mixte des Transports
18. Statoil Detaljhandel AB
19. AGA Gas AB
20. Home 2 You AB

Project Coordination
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Project website
www.trendsetter-europe.org
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<thead>
<tr>
<th>Role</th>
<th>Name</th>
<th>Email</th>
<th>Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP-Leader</td>
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<td>+43 316 81 04 51-26</td>
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</tbody>
</table>
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PART A – Report Summary

Measures

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<th>Measures within WP 10</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle measures</td>
<td>10.1 Innovations in bicycle transport</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.2 Make bicycling attractive (B&amp;R information on the Internet)</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Trip planning</td>
<td>10.3 Creation of a visitor web for optimal trip planning</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Awareness of clean transport and safety</td>
<td>10.4 Taxi drivers as information multipliers for clean transport</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.5 Marketing/information and quality management</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.6 Awareness for speed reduction and less car use</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.7 Integrated Mobility Centre</td>
<td>Graz</td>
</tr>
</tbody>
</table>

Objectives

- Achieve a reduction in solo car use and an increase of the sustainable modes with high quality information pre trip and on trip, awareness raising campaigns for less car use and speed reduction under involvement of opinion multipliers and the use of the web
- Increase of use of sustainable modes by disabled & elderly as well as by young people
- Demonstrate the cost-effectiveness of such measures

Lessons to consider

- In addition to the normal safety training by the police (in the protected traffic garden), the real life bike training in the streets enhances optimally the biking skills of children.
- The integration of topics related to the advantages of bio diesel into the communication training of taxi drivers can be easily transferred to other cities, a practical approach (e.g. training on the job) is preferable.
- It is good to elaborate a master plan and political commitment in the form of a QM-plan, so that the theory is not subject to neglect during daily hassle and work.

Barriers and Drivers of the Measure Implementation

- The organisation of the moving together of very different institution for the new Mobility Center was extremely difficult. Different agreements were made between hierarchy levels. Good communication between all hierarchy levels is essential and can avoid many conflicts.
- Continuous political support was essential and one of the drivers of the move. The cooperation of the various involver organisations sitting together in the advisory board was also crucial.
• The car lobby is quite strong in Graz. Therefore, any measure limiting car usage requires strong political commitment, statements and convincing actions as well as courage.

• Various stakeholders with different focus, economically, private versus commercial etc. are delaying procedures.

Recommendations to EC
• Put more effort to awareness campaigns – software. Do not just subsidise basic hardware, but try to raise awareness among people. Always force both strands: hardware and software.

• EC should support local authorities to install door to door information in their city or region.
1. Introduction

1.1 Background
Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 Trendsetter – a part of the Civitas Initiative
The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;
- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
− Political commitment is a basic requirement
− Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:
− to promote and implement sustainable, clean and (energy) efficient urban transport measures
− to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
− to build up critical mass and markets for innovation

Each city implement a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

The five Trendsetter cities are briefly described in appendix 1.

1.3 Achievements within Trendsetter
Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European
Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

**Improving access to public transport**

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

**Trip planning, traffic control and cycling**

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

**Access restrictions for reduced traffic**

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access
restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone. Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

Marketing and mobility management
Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

Co-transportation of goods
Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

Clean vehicles and fuels
Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

Incentives and promotion of clean vehicles
Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.
1.4 Overview of achieved effects

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
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</table>

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure.

Time – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emissions</th>
<th>Energy</th>
<th>Mobility</th>
<th>Time</th>
<th>Investment cost</th>
<th>Operational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>Increased public transport security</td>
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<td>-</td>
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<tr>
<td></td>
<td>Convenient and safe intermodality</td>
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<tr>
<td></td>
<td>Customer-friendly stops</td>
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<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
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<td>-</td>
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<td>-</td>
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<td>New services for special needs</td>
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<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
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<td>Planning trips on the web</td>
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<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
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<td>Consolidation of goods *</td>
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<td>-</td>
<td>-</td>
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<td>-</td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 Trendsetter cities after Civitas
The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas 1 cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1 Evaluation at different levels

The Trendsetter project has been evaluated in different levels; measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:

- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

2.2 Indicator based evaluation

Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dBA</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

**Do-nothing scenarios**

When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.

Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants
spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.

**Methodology**

The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (--- - 0 + ++).
3. Trendsetter objectives

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

3.1 Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide examples:</td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase mobility:</td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td>Enhance Environment:</td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO2 emissions by 5%, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td>Save Energy</td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO2, NOx and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfil the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.
The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period. The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.

The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
### 3.2 Demonstration objectives
The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. Those not reached are commented below.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324 Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4 Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td>300</td>
<td>3 000</td>
<td>+2 700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1 100</td>
<td>3 000</td>
<td>+1 900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>
3.3 Scientific and technical objectives
Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Each demonstration objective and the fulfillment of it is described below

**Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.**

In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm3, but biogas vehicles have consumed only 4,26 million Nm3. The rest has been used for heating and electricity production or just flared.

Before Trendsetter, the local biogas production in Lille was 0,12 Nm3 biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3,6 million Nm3 per year.

This objective is not applicable for the other three cities.

**Reduce the commercial cost of biogas fuel by 20% in demonstrating cities**

The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.

In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).

This objective is not applicable for the other three cities.
Implement a complete biogas technology chain in Stockholm and Lille, from production to end use

In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plats will be ready.

This objective is not applicable for the other three cities.

Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now.

The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.
− A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of fossil CO₂, emissions of NOₓ and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

− A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.

− In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the website has been successful in reaching potential buyers and to have a reliable and relevant content.

− In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

**Evaluate the effectiveness and political acceptability of environmental zones**

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

− An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

− The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

− Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.
– In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

Develop integrated city mobility plans integrating environmental protection, traffic and public health policies

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2,200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.

The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4. Overview of WP

The work package objectives of WP 10 – Innovative soft measures are:

- Achieve a reduction in solo car use and an increase of the sustainable modes with high quality information pre trip and on trip, awareness raising campaigns for less car use and speed reduction under involvement of opinion multipliers and the use of the web
- Increase of use of sustainable modes by disabled & elderly as well as by young people
- Demonstrate the cost-effectiveness of such measures

4.1 Short overview/description of measures within WP

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 10</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bicycle measures</td>
<td>10.1 Innovations in bicycle transport</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.2 Make bicycling attractive (B&amp;R information on the Internet)</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Trip planning</td>
<td>10.3 Creation of a visitor web for optimal trip planning</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Awareness of clean transport and safety</td>
<td>10.4 Taxi drivers as information multipliers for clean transport</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.5 Marketing/information and quality management</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.6 Awareness for speed reduction and less car use</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>10.7 Integrated Mobility Centre</td>
<td>Graz</td>
</tr>
</tbody>
</table>

Innovations in bicycle transport (10.1)

The modal share of the bike had increased in Graz since 1980, but the increase has slowed down. Graz would like to surpass the city of Salzburg, which is currently the Austrian city with the highest share of bike with about 17%, whereas in Graz there are only 14.2% (1998). 10.1. consists of various subtasks:

Quality Management Process

A bike policy audit was realised, starting with the analysis of the status quo. It laid down priorities and measures to be implemented within TRENDSETTER. Participants: bike lobby, politician (city councillor for transport), related city departments, external consultant as moderator.

Information

A bike map containing bike routes, repair facilities and bike shops was provided in print version and via the internet. Access is via the home page of the city.

A new information brochure "20 reasons to take the bike" was produced for the start of the bike season 2005.
**Bike and Ride (B&R) / more bike racks**

All new PT stops and streets all over the city got equipped with B&R facilities. The basic equipment is bike racks, where bikes can be locked to. At the new end stops, roofed facilities are provided.

**Improvement of bike network by abolishing bottlenecks**

New bike paths and crossings over the railway with underpasses were built or planned.

**Bike training in real traffic**

The bike training for pupils of the age group of 10 was extended and offered to all schools in Graz.

The overall objectives were:

- Improved level of bicycle policy in Graz
- Growth of the modal share of bicycles
- Reducing fuel consumption and environmental impact
- Set up a quality plan, pointing out the weakest parts in the bicycle system
- Build new shelters, lockers & underpasses
- Provide pretrip info

**Make bicycling attractive (B&R information on the Internet) and Creation of a visitor web (10.2 and 10.3)**

Measure 10.2. and 10.3 are part of the creation of an intermodal traveller planner for greater Stockholm area and promote bicycle as a good alternative or a supplement to other transport means and a to support the concept of the sustainable society.

The www.trafiken.nu is the main web site for actual traffic, transport and traveller information in greater Stockholm area. All information is presented in the web-site www.trafiken.nu, which supports not only bicycling but also public transport and private travelling and where the traveller can make a smart journey.

**Make bicycling more attractive (10.2)**

It is focused on making bicycling visible on the web-site www.trafiken.nu and has been in conjunction with the work to create bicycling tracks & digitising the different cycle tracks (regional as well as local).

It is the first step to an integrated intermodal travel planner and contains regional bike tracks with a coverage of several municipalities. It gives the name of each track and start and stop of them. It also indicate level of safety. The web-application also have links to each of the municipality own bike tracks with all types of bike tracks – regional as well as local or residential.

The objective of the task is to facilitate for the citizens travelling to work by bike to work instead by car or to choose the best/fastest or cheapest mode of transportation. Options are indicated by different colours.
Creation of a visitor web for optimal trip planning (10.3)
The web site is the result of a co-operation between the main stakeholders, Public Transport in Stockholm, Swedish Road Administration and the city of Stockholm. The web site includes the following information:

- The current situation on all modes of transport. This means the situation on the state and municipality main roads for private and commercial traffic. It gives information of levels of mobility and as well the road condition (icy-rainy etc).
- A traveller planner for travelling from A to B with inclusion of traffic information.
- Besides reports on road maintenance and major incidents, public transport disturbances as well as information about public transport schedules and fares and about available parking possibilities and fees are included.

Further the web site will:
- facilitate “smart choice” concerning mode of transport
- encourage people to consider alternative modes of transportation for their daily travel needs
- provide a real-time picture of the traffic situation in greater Stockholm area

Taxi drivers as information multipliers for clean transport (10.4)
The aim of „Ökodrive – From the frying pan into the tank“ has been the creation of a sustainable cycle from used frying oil as harmful waste to valuable raw material at the other hand ending up with the renewable low emission fuel bio diesel.

Taxi drivers are educated and trained to be information carriers: Using the possibility to talk to the taxi passenger they will multiply Clean urban transport information as “lay disseminators“. The objective is that this will encourage mode shift and also increase the collection of waste cooking oil – thereby reducing fuel consumption and environmental impact.

Marketing/information and quality management (10.5)
Through quality management system for public transport as well as innovative communication, marketing and information measures about sustainable transport modes, modal shift from single car use will be encouraged. Thereby energy consumption and environmental impact will be reduced. 10.5. consists of various subtasks:

Quality management:
The PT association for the region of Styria (”Verbund“) realised quality controls with so-called „mystery shoppers“, who assess busses, stops, and the keeping of the time schedule by applying a catalogue of quality criteria. In case of deviations the Verbund gets in touch with the respective transport operator.

Innovative Marketing:
Among those measures are actions such as „Auf geht’s“ (musicians in the buses, trams and railway), the mobile birthday party of the 10-year-jubilee of the Verbund, or advertising of a special PT ticket for leisure trips.
Door-to-door information:
So far, an electronic system allows getting pre-trip information about connections from stop to stop. In February 2005, door-to-door information will be possible, so customers don't even need to know the closest stop anymore.

Awareness for speed reduction and less car use (10.6)
The city of Graz aims at a higher traffic safety for people using non-motorised modes of transport. The strategy focuses on the speed reduction of passenger cars, as they are the main risk for pedestrians and bikers.

A second focus of the awareness raising activities of the city of Graz lies on the reduction of car use in favour of more sustainable modes.

The measure consisted of various tasks:

Speed 30:
Graz had introduced 30km/h speed limit for all streets in Graz apart from streets with the right of way, where cars are still allowed to go 50 km/h. Within TRENDSETTER, previous streets with the right of way were checked again and became part of the 30 km/h speed limit street network.

Car free day:
The concept of the car free day was changed: from closing down bigger parts of the inner city streets it was reduced to temporary closures of sections of streets in 2004.

Feedback on speed:
Speed Control devices were spread all around the city, which inform drivers how fast they go without taking legal action against them in case they are too fast.

Integrated Mobility Centre (10.7)
Mobil Zentral provided integrated information service, but was separate from services provided by GVB and Post-bus-lines, that only provided information on their proper network. GVB and Post also sold special tickets that could not be sold at Mobil Zentral.

Therefore a one-stop-shop, the integrated mobility centre, was opened to create bigger synergies. Further objectives were:

- Increase public transport customer satisfaction
- High quality information pre trip and on trip
- Superior customer service to all potential public transport users
- Improving accessibility to and lowering the threshold for using public transport
- Improving accessibility to and lowering the threshold for using other innovative mobility services like car sharing
- Raise the awareness and the knowledge of citizens about (intermodal) mobility options

4.2 Problems to be solved by the measure

- Lack of pre trip information for bikers (10.1, 10.2)
- Lack of shelters and bike lockers at PT stops (10.1)
• bike routes are not optimally connected to form a bike network (10.1, 10.2,)
• unknown weak points in the bike transport system (10.1)
• Although the bio diesel cycle is a success story a lot of people are not aware of this great project. So the project aims to increase awareness of bio diesel production cycle in Graz through the training of taxi drivers, who are operating as information multipliers. (10.4)
• Prevent that the tendency of slight increase in PT usage of last year stops (10.5, 10.1 B&R))
• Make PT up to date, a positive experience (10.5)
• No access yet to get full-chain information from home to destination (only personal via mobility centre) (10.1, 10.2, 10.3, 10.5)
• Uncontrolled quality of transport operators which are spread all over the province of Styria; Create transparency of quality criteria (10.5)
• Speeding cars create a risk for pedestrians & bikers (10.6)
• The car still has a rather positive image compared to other modes (10.6)
• Suboptimal information; overloaded and separate services (10.6)
• Location/Access: former location of the separate information centres not very well known, marketed through separate channels and inaccessible for disabled persons (10.7)
• Lack of synergies between services of Mobil Zentral, GVB and Post-bus-lines and poor knowledge about them (10.7)
• Better access to public transport (lowering the threshold) (10.7)

4.3 Interaction within WP/Civitas
There have been several exchange meetings within TRENDSETTER or CIVITAS:
• one work shop with other CIVITAS projects to cross check the implementation of similar measures and discuss some preliminary results
• one TRENDSETTER workshop with WP leaders to discuss some preliminary results and gain insights for conclusions
• one WP 10 workshops with measure leaders to discuss first conclusions
• one discussion round within the TRENDSETTER steering committee to discuss final results, conclusions and recommendations
PART C – Results and Analysis

5. Indicators
Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators will be presented and analysed in 4.1–4.2.

5.1 Indicators and results
Below is a table containing the measures and which Trendsetter Common Indicators (in Italics) and WP common Indicators they use in the evaluation.

**Indicators:**

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
<th>10.1</th>
<th>10.2</th>
<th>10.3</th>
<th>10.4</th>
<th>10.5</th>
<th>10.6</th>
<th>Meteor</th>
</tr>
</thead>
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<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Environment</td>
<td>Reduce emissions of fossil CO2</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Reduce emissions of NOx</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Reduce emissions of PM</td>
<td>Tons/year</td>
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<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Noise level</td>
<td>db(A)</td>
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<tr>
<td>Mobility</td>
<td>No. of trips</td>
<td>No or Qualitative 5-degree scale</td>
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<td>X</td>
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<td></td>
<td></td>
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<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Minutes or qualitative 5-degree scale</td>
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<td>X</td>
<td>X</td>
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<td></td>
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<tr>
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<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
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<td>X</td>
<td>X</td>
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<tr>
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<td>Qualitative 5-degree scale</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Energy</td>
<td>Fuel consumption (reduced fuel caused by bike related measures)</td>
<td>Km/litres</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Society</td>
<td>Awareness level</td>
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<tr>
<td>Society</td>
<td>Degree of meeting the self set criteria by PT association</td>
<td>Depends on system</td>
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<tr>
<td>Society</td>
<td>Page imprint on web site</td>
<td>Page imprints</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Usage of PT (Development of number of customers in comparison to previous years)</td>
<td>Number of PT customers</td>
<td>X</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Number of participants (no of taxi drivers, no of containers, % of containers by different target groups, litres collected, no of brochures diss by taxi drivers)</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Modal split (bike related measures taken, incl.B&amp;R, CFD)</td>
<td>% of mode</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Usage of infrastructure</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Vkm (reduced vkm caused by bike related measures)</td>
<td>Km</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Average vehicle speed</td>
<td>Km/h</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Results:

Innovations in bicycle transport (10.1)

QM process-Results
The following measures were defined and implemented:
- regular bike forum
- jour fixe for coordination between city and province of Styria
- Definition of budget for improvement of bike network
- further education of city employees
- construction site management, which includes the prevention of impairments for bikers
- new infrastructure or similar: Bike Masterplan
- improving safety
- communication / awareness raising
- involvement of companies evaluation

B&R
The occupancy of the new B&R facilities varies between 33% and 75%, independently, whether they have a roof or not. The most frequented facilities are in Andritz, St. Peter and Liebenau (all 3 of them being end-stops of PT).

A survey among PT users at an end-stop, which is actually equipped with a B&R facility, showed that only 45% of the interviewees knew B&R facilities. After having received explanations about the function of B&R to the interviewees, only 35% indicated, that with these facilities would make PT more attractive for them, and the same amount said that B&R is important for a positive image of the PT operator.

Asking only the B&R users, another survey showed that for 70% PT has become more attractive - 9 people of the 33 interviewees even indicated a behaviour change from using the car before the new B&R facility in Andritz was built ("How did you travel (to work/school etc) before the B&R facility had been built?")! 88% indicate, that they think that B&R is important for a positive image of the PT operator.

Satisfaction with the B&R facility in Andritz is comparably low: 2.81 on a scale from 1 very satisfied to 5 very dissatisfied.

Bike training
Before 2001, each year about 10 school classes of 4-5 schools received the bike training in Graz. Since 2002 an important financer withdrew, but TRENDSETTER helped to still offer the training to 15 classes of 8 schools (2002) and 7 schools (2003). In 2004, bike training could be offered to all primary schools in Graz (around 40 schools with about 80 classes) with additional support from other sources. In 2003, FGM-AMOR won the Shimano award for the idea and realisation of the bike training.

The teachers and directors of different schools assessed the bike training in the real traffic environment as very good with an average mark of 1.2 (on a scale of 1 excellent to 5 very poor).
Several skills are to be improved by a bike training. The following graph shows, that on all relevant skills, the bike training in the real traffic situation is assessed better than the bike training in the protected area:

Counts at underpaths
The counts at the underpath at Mitterstraße before its reconstruction showed about 260 bikes daily.

Make bicycling attractive (B&R information on the Internet) (10.2)
- User friendliness: all results are used to improve the website concerning content, design, structure and usability.
- Year 2003, design was being improved. A common logotype was implemented for www.trafiken.nu in the regions/counties of Stockholm, Skåne and Gothenburg.
- During 2003-2004 adjustments were being made in language and usability both for the website and the wapsite.
- Results from 2004/2005 will be used to improve first page / home page in design and usability.

Traveller Planner
- Pre-studies have been carried out to prepare for an optimal trip planning.
A lot of complex issues have been identified both technical and usability issues as well as cooperation issues in integrate several organisations (24 different municipalities) and travel modes.

- In an advanced dynamic route planner, where all transport modes are included (public transport, bicycling, walking, vehicles etc.), information about travel times, incidents etc. from the road traffic is needed. With higher quality of the actual level of service, a more fair comparison between transport types can be done. This will increase the confidence in a dynamic route planner.

Creation of a visitor web for optimal trip planning (10.3)
- User statistics uses to follow up the tactical goals, yearly.
- Customer knowledge uses to follow up the tactical goals, yearly.
- User friendliness: all results are used to improve the website concerning content, design, structure and usability.
- Year 2003, design was being improved. The same technical platform is implemented for several of the regional applications which also has lead to a new regional application in south east of Sweden (Öland/Kalmar). Besides a common logotype was implemented for www.trafiken.nu in all the regions/counties of Stockholm, Skåne and Gothenburg.
- During 2003-2004 adjustments were being made in language and usability both for the web site and the wapsite.
- Results from 2004/2005 will be used to improve first page/home page in design and usability.

Mobile service
Studies have carried out to improve the wapsite as well as building a knowledge platform for more mobile services.

Traveller Planner
Pre-studies have been carried out to prepare for an optimal trip planning. A lot of complex issues have been identified both technical; usability issues as well as cooperation issues in integrate several organisations and travel modes.

- In an advanced dynamic route planner, where all transport modes are included (public transport, bicycling, walking, vehicles etc.), information about travel times, incidents etc. from the road traffic is needed. With higher quality of the actual level of service, a more fair comparison between transport types can be done. This will increase the confidence in a dynamic route planner.

Taxi drivers as information multipliers for clean urban transport (10.4)

Before scenario:
On average about 575 taxis are operational in Graz. Taxi drivers have not informed their customers about bio diesel and a majority of people in Graz was not aware of the success story of bio diesel.
After scenario:
Passengers of 878 City Funk GmbH are informed by taxi drivers about the advantages of bio diesel and the environmental issues of TRENDSETTER. This would mean thousands of personal contacts per year and increase collection of waste cooking oil due to taxi drivers advisory service.

Business as usual scenario
Taxi drivers as information multipliers for a cleaner urban transport is an innovate project aiming to increase awareness of bio diesel in Graz. The implementation of such a project would not be realised without TRENDSETTER.

Marketing/information and quality management (10.5)

QM system:
Over time, since its introduction, the negative reports were reduced. After initial resistance by some of the transport operators (mystery shoppers as spies), the hidden checks are now considered as an important part of improving the PT system and raise customer satisfaction as well as operator and contractor satisfaction.

BusBahnBim
Since its first public promotion in July '03, the internet information has faced an ever increasing usage, as the following graph can show:

A first height in September '03 is due to the start of school, where normally a lot of information is requested. At the same time, 45% of the PT customers knew the web site and its service, 18% said they use it and 90% were satisfied with it. Since July '04, a link was placed on the city's web site, which might explain the steep increase of the curve from then on. However, part of the increase will also be due to the upcoming start of the school year.

A survey among young PT users (86% were younger than 36) in 2004 revealed, that 47% found that www.busbahnbim.at makes PT more attractive for them. 37% of those who knew the web site, had already used it and gave a mark of 1.9 (on a scale from 1 excellent to 5 poor) - 83% were satisfied with it.
A survey among inhabitants of Styria (1000 interviewees, representative random sample) in March 2005 shows, that the satisfaction with busbahnbim increased from 90% in 2004 to 94% in 2005.

Marketing
A survey among PT users in Graz revealed, that 28% knew the leisure ticket. A representative survey among inhabitants of the Province of Styria revealed a percentage of 44% for the brand and a survey among young PT users (86% were younger than 36) in 2004 revealed, that up to 53% for the ticket (after a short explanation), who know it. 47% found that the leisure ticket increases the attractiveness of PT for them, with a mark of 1.5 for the idea of the leisure ticket (on a scale from 1 excellent to 5 poor). Around 8% had already used the leisure ticket, and 59% found such an offer important for a positive image of PT. This is comparably low and received an average mark of 2.38 (on a scale from 1 very important to 5 irrelevant) (for a comparison: B&R received a mark of 3, the least important measure, the new user-friendly buses being very important with a mark of 1.3).

Asking the users of the leisure ticket, what they would have done, if that ticket wouldn’t have been available at their last trip, either they would not have made the trip or they would have used another type of ticket. This finding however would need more investigation, as it bases on a total of 9 persons.

In general, success of marketing activities is hard to assess: sometimes it is even more successful, if there are just very small but pointed activities that raise a lot of interest. Sometimes it is difficult to find the right balance.

The general trend for PT is shown in the graph below (yellow):

Throughout TRENDSETTER, it has therefore succeeded to further increase PT usage which is a considerable increase seating the past 10 years, which have been more or less stagnant or even with a negative trend. However, car share has also increased, so probably customers come from the pedestrians.

The users of public transport in Graz enhances from 43.345.151 persons in 2002 to 45.790.331 persons in 2003 that is an increase of 5%.
Awareness for speed reduction and less car use (10.6)

Car free day

It could well be the case, that the car free day would have been completely skipped without TRENDSETTER. The assessment of the activities during the CFD was as follows:

10% of the visitors to the CFD did not know in advance, that it was the CDF that day. 66% of them from the newspaper and 42% from the radio (attention: multiple answers were possible) only 72% of the visitors knew in advance, that PT was free during the CFD. A huge majority found a CFD a very good idea:

How do you like the idea of a CFD?

- 48% great
- 25% once a year, this is good
- 16% triggers thoughts
- 8% at least 1 day with less cars
- 2% cannot imagine to do without car

Comparing the modal split of the CFD visitors with their normal travel behaviour shows, that car usage and PT have been reduced in favour of walking.

However, comparing the modal split of the visitors to the normal modal split in Graz, it becomes clear, that the sample is not at all representative - the normal person moves about in Graz by car, PT share is much smaller than that of the sample:
This also shows, that the main population has not been attracted by the CFD.

Suggestions for improvement (open answers) were: more repetitions over the year (26 of 160 respondents), more activities during the CFD (17), more street closures (13), more awareness raising (8)

Another survey among PT users independent of the CFD found a general knowledge of the CFD of 92 % (although only 8 % of the interviewees had already participated in a CFD before). Among those PT users, who frequently use the car for their daily trips, 36% considered the CFD as a bad initiative. Among the regular PT users these were 12%- this has to be interpreted carefully due to the small amount of frequent car drivers among the interviewees (11 of 100). Altogether, 66% of the interviewees assessed the CFD as a good action, whereas 16% thought this was a bad action.

**Speed 30**

Since years, a revised check of the existing "speed 50" roads was overdue. The revision resulted in a new assignment of new roads with "speed 30" which equals a total of 80% of all roads in the city centre. This has contributed to a reduction in accidents (see the graph below) and noise and an increase in living quality and better coexistence of pedestrians, cars, and bikers.
Speed Control Devices
It is hard to estimate, how the speed of cars in the inner city would develop without speed controls - esp. the effects on traffic safety are hard to estimate. However, the control devices result in an average of a 9.9% reduction in speed. The average speed reduction in streets with a speed limit of 30 km/h amounted to 12.2% and in streets with a speed limit of 50 km/h to 8.7 %, thus reducing noise as well as accidents and the deadly impacts of an accident especially for children in residential areas.

In a survey among PT users, 95% of the interviewees knew the speed control devices. About half of them believe that car drivers are slowed down by such devices.

5.2 Analysis and comparison of results on indicator level
Highlight the most interesting results

Indicators by Comparison – striking Results - some Highlights:

<table>
<thead>
<tr>
<th>Sample: 78 PT-Users/Andritz</th>
<th>Awareness</th>
<th>Increase attractiveness</th>
<th>PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.1 B&amp;R Andritz</td>
<td>45%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>10.5 Leisure ticket</td>
<td>28%</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>10.6 Car free day</td>
<td>92%</td>
<td>-----</td>
<td></td>
</tr>
<tr>
<td>10.6 Speed control devices</td>
<td>95%</td>
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<table>
<thead>
<tr>
<th>Sample: 77 PT-Users/Mariatrost</th>
<th>Awareness</th>
<th>Increase attractiveness</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.5 BusBahnBim</td>
<td>56%</td>
<td>47%</td>
</tr>
</tbody>
</table>

Eine Geschwindigkeitsreduktion senkt das Unfallrisiko

Anzahl der Unfälle pro Jahr

Number of accidents/year (yellow: 30km/h; blue: 50km/h)
• A comparison concerning the indicator awareness between B&R, Leisure ticket, car free day and speed control devices shows that the speed control device is the most common measure (95% of the interviewees know about it).

• Only 28% of the interviewees know the leisure ticket. The users of the leisure ticket are mostly elderly and 72% of the interviewees in this sample are people under 36 years. Maybe the result follows from 23% pupils in the sample. For them some tickets can be cheaper than the leisure ticket and so they don’t use it and don’t know about it. But for 47% the leisure ticket increases the attractiveness of Public Transport.

• For 35% of the interviewees the attractiveness of Public Transport increases because of the B&R place at the terminal station. 9 people of the 33 interviewees even indicated a behaviour change from using the car before the new B&R facility in Andritz was built ("How did you travel (to work/school etc) before the B&R facility had been built?")!

• The teachers and directors of different schools assessed the bike training in the real traffic environment as very good with an average mark of 1.2 (on a scale of 1 excellent to 5 very poor).

• The access to BusBahnBim increased from 64,184 in September 2003 to 167,715 in September 2004. So this service is accepted and used.

• The speed reduction from “speed 50” to “speed 30” contributed to a reduction in accidents and noise and an increase in living quality and better coexistence of pedestrians, cars, and bikers.

• The speed reduction of almost 10% by merely providing feedback to car drivers (without any enforcement) is quite remarkable

• The increase of almost 120% of the walk-in customers to the integrated mobility centre as well as an increase of almost 70% in ticket sales surpassed all expectations (10.7).

• The users of public transport in Graz enhances from 43,345,151 persons in 2002 to 45,790,331 persons in 2003, that is an increase of 5%.
Looking at the modal split in Graz, TRENDSETTER didn't manage to stop or slow down the increase in car usage. With 47% it accounts for almost half of the transport modes in the city. The increase in bike usage could be attributed to the normal positive trend, which is probably due to a constant bike-friendly policy and the revival of the bike as a fashionable and healthy fitness tool. PT is more or less stable, and the positive trend within TRENDSETTER is encouraging. However, looking at the pedestrians, it seems there is a big distraction from pedestrians to other modes - instead of a reduced car usage, walking gets less and less, even though the negative trend has been slowed down in the last 10 years.
6. Fulfilment of Objectives

6.1 Achievement of WP objectives

**WP Objectives**

1. Achieve a reduction in solo car use and an increase of the sustainable modes with high quality information pre trip and on trip, awareness raising campaigns for less car use and speed reduction under involvement of opinion multipliers and the use of the web

2. Increase of use of sustainable modes by disabled & elderly as well as by young people

3. Demonstrate the cost-effectiveness of such measures

**WP Objective 1**

The effects of any of the measures on actual car usage are very hard to measure. However, the results indicate that 1) a mobility centre reduced solo car usage by 5% and an effect, which is even bigger for the integrated mobility centre in 10.7 - as the number of walk-in customers has tremendously increased. 2) PT has become more attractive through bike & ride facilities, better information, the mobility centre, the leisure ticket and BusBahnBim. The increased effectiveness is likely to contribute to an increased usage of sustainable modes - however it cannot be avoided, that the modes are competing against each other and don't attract former car drivers.

**WP Objective 2**

Young people are especially reactive to electronic information and bike related measures, whereas the elderly and the young are the main customers in the mobility centre (pupils are the main target group for the leisure ticket). The elderly and disabled benefit of those quality criteria for PT, that refer to the equipment and user friendliness of the busses/trams and stops.

Relating to the carfree day and its function: it is a matter of principle, whether car drivers are protected or annoyed, or whether the weaker traffic participants are protected or given extra attention. A temporary closure of streets might not help to achieve a behaviour change, but it helps to demonstrate other options and creates a platform for the presentation of soft policies. Usually, soft measures don't really "hurt", as they are pull measures (instead of push-measures), and they are not as cost intensive as infrastructural measures. Therefore, they are usually very well accepted - by politicians as well as end users and citizens in general.

**WP Objective 3**

The study about the mobility centre showed, that such an integrated service pays back after one year of running the mobility centre already. Many soft measures increase the efficiency of hard measures (new buses, new B&R facilities etc) indirectly, as they help to sell them.

As a speed limit (in speed 30 zones and through effects by feedback on speeding) decreases the number of accidents and noise, costs in the health sector decrease. The
feedback speed control devices are rather cheap, compared to traditional radar, but they are still effective - thus helping to save costs either.

The quality management established by the Styrian Transport Association makes quality a matter of course from the start of offering any services. Clear and transparent criteria facilitate to keep quality on a high level. The quality assurance helps to reduce reasons for complaints. As complaints are more likely to be told to others than positive remarks, there is an indirect benefit for the PT operator (related to image, and maybe usage). In addition, the quality system sets off the basis for long-term strategic planning and implementation, which is also the case for the bike policy audit. This might help to prevent costs by creating synergies and by the enforcing effect the measures have on each other.

6.2 Contribution to Trendsetter objectives

The contribution from the WP to the Trendsetter objectives (High level, Demonstration and Scientific/Technical) is shown. The Trendsetter objectives are shown in chapter 2.2

The following TRENDSEETTER objectives have been reached:

Provide examples
- Provide input to European policy making and promote a sustainable transport future in Europe (all measures)
- Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets. (10.4)
- Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology. (10.4)

Increase Mobility
- Promote the use of public transport and other alternatives to private cars (10.2, 10.3, 10.5, 10.7)

Enhance Environment
- Reduce annual fossil CO₂ emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year. (WP 10 saved 632,23 tonnes/year)
- Reduce NOₓ emissions by 900 tonnes/year (2,51 tonnes) and particulate matter by at least 1800 tonnes/year (WP 10 saved 0,1793 tonnes/year)
- Reduce noise levels in demonstrating cities (10.1, 10.6)

Save Energy
- Save over 850 TJ (≈ 20 300 TOE) energy per year (WP 10 saved 18,87 TJ/year)
7. Used Technology

7.1 Overview of used technology within WP

In WP 10, the only technologies needed were to set up the web sites (10.1, 10.2, 10.3) and run the data bases in the background, and the devices for the feedback of speed.

For WP 10.5 “BusBahnBim” software system is needed that allows to manage, update and import data concerning the schedules and stops. In addition, information such as geographic data (GIS-Data), pedestrian paths etc. is needed. A separate module in the software serves as interface to present the data to the customers in a user friendly format.

7.2 Positive aspects, problems & solutions, new concepts

The automatic bike counters were subject to vandalism. They are obviously appealing for people to hang themselves onto them and swing. However, a certain height cannot be surpassed, as the counts get unreliable then. It is recommendable, whenever feasible, to attach the counters to underpasses.

In WP 10.2 (B&R Information on the Internet) there are no specific problems identified from technical point of view, but more institutional. This means the possibility to get the digitised maps from all local authorities.
8. Economical Aspects, Cost Benefit

8.1 Per measure

*Innovations in bicycle transport (10.1)*

There are heavy discussions in Graz to finance the **B&R facilities** with advertisements: existing offers include racks, which are not really user-friendly. On the other hand, these racks would be available for free, so more racks could be built all over the whole city area. A trade-off needs to be taken.

*Make bicycling attractive (B&R information on the Internet) and Creation of a visitor web for optimal trip planning (10.2 and 10.3)*

From the user point of view it is essential to have all traffic related information in one web entrance. Therefore we have linked a new web application (the bike one) to an existing system, which is already well known.

*Taxi drivers as information multipliers for clean transport (10.4)*

The further education of the taxi drivers not only covers the promotion of biodiesel, but at the same time enhances skills in the communication with customers. Obviously, these results in a higher amount of tip for the trained drivers compared to the situation before (individual reports by the teachers).

8.2 Positive aspects, problems and solutions

*Make bicycling attractive (B&R information on the Internet) and Creation of a visitor web for optimal trip planning (10.2 and 10.3)*

The projects of the visitor web for optimal trip planning and the B&R information on the Internet had a small budget and tried to use as much work being done in the difference organisations as possible. With small means it has been tempted to reach great results.

*Taxi drivers as information multipliers for clean transport (10.4)*

Although the city of Graz was successful in doing pioneering work in the field of biodiesel most inhabitants of Graz were not aware of this subject. So it was time to make a useful contribution to this issue, which was addressed by this project. But it seems hard to count positive aspects or even economic aspects of awareness campaigns.

*Marketing/information and quality management (10.5)*

Busbahnbim: When it comes to using one central data base and web site for the provision of general PT information, there might be a dilemma concerned with the budget: of course, it is desirable, that all transport operators utilise and promote the Verbund (Styrian Transport Association) web site. On the other hand, they might fear that they could be charged for that service. However, the contractors of the Verbund would clearly see this as the task of the Verbund - the building up and running of an information system for the potential passengers has even become an integral part of its contract, which is also signed by political representatives. This creates an immediate advantage for the end users,
which indirectly might create a benefit for the transport operators on the long run (through increased passenger numbers).

Innovative Marketing: Small but innovative promotion actions might raise more media coverage than expensive advertisements. However, it is difficult to predict, which actions are suitable for that. They seem to be a bit "on the boarder" and provocative, and they might regarded extremely different by different customer groups (traditional folk music "deters" young customers, whereas a flirt tram might be considered tasteless by elder customers etc.). A targeted approach is useful.

**Awareness for speed reduction and less car use (10.6)**

**Carfree day:**
Especially with respect to the car free day, the business sector reacts very sensitive. This is not so much the case for events, where the whole city centre is blocked for motorised transport during large scale events, which attract a lot of visitors. There, the benefits for the shops are obviously perceived bigger than the disadvantages.

**Speeding Displays:**
As the displays for feeding back speed are comparably cheap (3000,-€ as compared to 9000,-€ for traditional radar), any city should consider to install such displays. The advantage is that they are more flexible to be placed, easier to handle and at the same time can be used for counts. With respect to the costs, however, it has to be considered, that the traditional radars pay back through the enforcement of speeding, which is not possible with the feedback displays.

As a reduction of speed results in a reduction of accidents and noise levels, there are - in the long run - economic benefits for the health sector.

**Integrated Mobility Centre (10.7)**
A study on the mobility centre in Graz showed, that the investments in a mobility centre are paying off in less than one year – by inducing modal change and thereby directly generating additional income for the local public transport companies.
9. Synergies

9.1 Need for supplementary measures

_Innovations in bicycle transport (10.1)_

*Quality Management Process:*
As the policy audit covers all aspects of creating an attractive bike system, it is very far reaching in its consequences and a very comprehensive strategy. This creates synergies by itself, as the individual measures enforce each other.

*Bike map:*
The routes, which are in the map now, need sufficient signing. The existing signs are not up to date anymore.

There are heavy discussions to finance the **B&R facilities** with advertisements: existing offers include racks, which are not really user-friendly. On the other hand, these racks would be available for free, so more racks could be built all over the whole city area.

*Bike training:*
Before the pupils get out on the roads, they have to be taught some principal rules, the conditions of their bikes have to be checked, and their biking skills are checked. Together with the theoretic explanations, mobility is explained in a playful way. Fantasy figures as identification means as well as a movie showing correct and incorrect bikers' behaviour are utilised and insights are elaborated altogether. Awareness has to be raised about sustainable mobility among the teachers, as many of them seem to be unwilling to go to school without their own car - hence themselves causing a risk for the pupils that walk or bike to school.

_Make bicycling attractive (B&R information on the Internet) and Creation of a visitor web for optimal trip planning (10.2 and 10.3)_

There are two main centres, partly the joint centre of Traffic Management Centre between the city and the Road Administration, partly the Stockholm Transport. Both support the web site with defined information such as:

- a quality assured information. This means to collaborate with responsible organisation supporting with information a methods to make corrections and equalise/harmonise similar information described on different media of exposure
- Gather digitised information from each of the connected cities/municipalities to be performed in a correct way.
- This project has a connection to Trendsetter 11.2 Monitoring and Supervision, which is a main source of real time traffic data)

A synergy with awareness raising activities might be even more exploited, in case the comparison of time needed for travel by car or bike would be enriched by further dimensions related to modal change: personal health (calories burnt on the way, health, risk, beauty etc.).
The signing in the streets should give further guidance to the information of the web, that forms a certain mental map in the users.

**Taxi drivers as information multipliers for clean transport (10.4)**
The main focus of 10.4. was to train taxi drivers about positive aspects of bio diesel. This was a very theoretical approach without establishing a quality assurance. For up coming measures it will be crucial to install a quality assurance mechanism and to create a more practical approach of the training – training on the job.

**Marketing/information and quality management (10.5)**

*QM*
It would be good to not only involve the management level, but really to train the bus drivers or responsible coordinator of the route planning

Customer satisfaction could be additional criteria.

All marketing activities, and also BusBahnBim have to be an integrated part of a whole picture. This also refers to the media used and serves to target different groups and segments.

Intermodality is covered in BusBahnBim only by including pedestrian information (walking distance in minutes is indicated). Measure 10.2 and 10.3 show, that an integrated approach could be possible; however, even there, information stays in coexistence/in parallel, instead of allowing direct comparisons between different modes.

Micromarketing through the city district brochure does not yet include "line marketing": all the facilities allocated alongside of a PT line could make PT more attractive but also the area alongside that line.

**Awareness for speed reduction and less car use (10.6)**

*CFD*
Accompanying activities need to be attractive for politicians as well and give them a floor to present themselves. Further recommendations were:

- combine related other activities with CFD (such as the various running-events, or scooter and bike races through the city centre)
- early planning facilitates sponsorships, raffles attract visitors
- earlier information of the public, e.g. about free PT during the CFD
- press work AFTER the CFD: After a CFD, the news in the radio and the press are often negative. Therefore, cooperation with the media should also be realised AFTER the event.

Cooperation with schools proved to be a very good way to 1) involve the future generation and 2) create a critical mass of active participation.

To provide PT for free during the CFD is a very good measure, that also helps car drivers to switch, but it should be announced long in advance.
Speed 30
It would be desirable to reconstruct roads and make their appearance less friendly for speeding or cars. Not only "safety sells", but also the reduction of noise through a reduced speed. This was a very well accepted argument for the residents alongside streets with reduced speed. In some streets, PT was negatively affected - the disadvantages have to be assessed in relation to the advantages of speed 30 in those streets.

Speed 30 enables a safe coexistence between bike and car.

Speed reduction by feedback devices
Although in most cases, the mere feedback of the actual speed is already sufficient to slow down car drivers. More attention should be paid to those drivers that obviously provoke a maximum speed instead of just publishing the "sad records" (where drivers go 90 instead of 30).

Integrated Mobility Centre (10.7)
In general, the mobility centre serves as a dissemination information centre for most measures of Trendsetter (WP3). Beyond that, the mobility centre provides information and advice on the new parking scheme (WP6.4), uses real time displays in the centre (WP 7.5), provides information and consultancy for new services (WP 8.1), for increasing car occupancy (WP8.3) for site level mobility management (WP8.4.) and about innovations in bicycle transport (WP 10.1). It integrates and uses part of the data from the customer information (WP 11.1) and the dynamic traffic management system (WP 11.3) and serves as one more information and collection centre in order to optimise waste cooking oil collection (WP12.8).

9.2 Comparison and conclusions
In all cases, where information is given to existing or potential new customers/users, two aspects shouldn't be forgotten: 1) Marketing helps to sell the information in an attractive way. 2) The information given, especially when promoted by marketing, should reflect the quality of the service and not raise unrealistic expectations: if a service is bad, the chance is high that customers are disappointed - and a negative experience is told to others more often than a positive one. For maps, the latter point has another dimension: the map provided should be easy to read so users find their way in the real environment. This means, that graphic elements should be carefully used, esp. if a map is not geographic but schematic.

The selection of the information given is already crucial: information can be set up and utilised to influence behaviour: e.g. the route finder of Stockholm allows to compare, one by one, the time needed to travel by the individual modes. It does not, though, give the possibility to directly compare time efficiency, environmental aspects, and burnt calories by choosing the bike vs. the car, safety of the different modes at one glance.
10. Political and Administrative Aspects

10.1 Overview of major political and administrative aspects influencing the measures

Innovations in bicycle transport (10.1)
The formation of a working group / round table forces all responsible stakeholders to coordinate and exchange. It creates a common understanding and short ways of communication, hence limiting / reducing rejections or extreme positions. The policy audit enables structured and proactive planning, the involvement of the political level guarantees political support for the planned activities and facilitates the dedication of budget. The detailed analysis of weak and strong aspects of the existing system helps to rank priorities for action.

Bike Training
"Children sell": bike training is a nice possibility for politicians to show they care for the young generation and their safety.

Marketing/information and quality management (10.5)
The joint definition and transparency of quality criteria helps transport operators to take proactive actions and to keep the defined level of quality. Also, it creates a bigger acceptance of the criteria, so quality becomes a matter of course.

The emotional marketing approach is favored as a very modern and customer oriented approach.

Awareness for speed reduction and less car use (10.6)

CFD
It was decided, that the city doesn't want to be "anti-car" anymore, so the concept of the CFD had to be changed. Whereas Graz had been a forerunner and had won a prize for its realisation of the CFD in 2002, its realisation (the "Radsternfährt", organised bike tours ending in city centre) is not comparable to other cities anymore. However, Graz closes down streets for other events - obviously priorities have changed.

10.2 Positive aspects, problems and solutions (if applicable)

It is necessary to involve the right level of responsibility: e.g. when a quality management scheme is implemented, it would be recommendable to also involve the route managers apart from the directors of the bus operators. For immediate feedback, the bus drivers could be extremely helpful, on one hand as they are in daily interaction with the end users, on the other hand, as they have to "live" the quality level, that has been agreed.

Clear responsibilities - such as the existence of a local bike manager - not only give attention and weight to the policy objectives and their implementation, but it supports the upgrading and further development: whereas in the beginning of his installation of the
bike manager in Graz, he had to claim in interests very proactively. In the meantime he is actively approached by others, who ask him for advice and point out weak points to him.

10.3 Comparison and conclusions
In general, it is extremely helpful, if local elections and the related campaigning can be utilised to start off innovative and citizen-friendly actions. The motivation and drive behind it can be exploited very well. This accounts especially for target groups, which are often neglected or weak groups.

Altogether, it is a politically basic decision, whether and how car usage should be decreased or even diminished. It is often a question, whether politicians are willing and courageous enough to be also restrictive or to implement push measures.
11. Up-scaling and Transferability

11.1 Potential for up-scaling and transferability to other cities

Innovations in bicycle transport (10.1)

Bike racks: If it is decided, that the bike racks should be financed by advertisement, ALL bus and tram stops will receive one. There is still one question to clarify: there is a monopoly of the city owned marketing agency to utilise public space for advertisements - it will be clarified, whether it is possible to contract an additional company with the bike racks.

Bicycle Underpasses: More underpasses than the ones currently built are not planned. There would just be more possibilities towards the North, but the responsibility thereof is with the railways, and the city will not interfere here. However, it could be, that a short connection will be built directly connecting the railway station with the bordering city district. This is in discussion since a long time already.

Bike training: The bike training might be offered outside the city borders. This is a matter of budget.

QM: to apply the QM scheme for cars is obviously not desirable. For pedestrians it might be possible, but there are probably too many pedestrian-related areas to investigate (as pedestrians are everywhere).

Make bicycling attractive (B&R information on the Internet) and Creation of a visitor web for optimal trip planning (10.2 and 10.3)

The web-site could get to be the one presenting a comprehensive transport actuality and a traveller planner with a greater coverage for the whole region and the commuting to Stockholm. Environmental information could be included.

A co-operation and integrating www.trafiken.nu in Skåne region and Gothenburg region as well as the national traffic information at www.vv.se and further on integrated with a national traffic portal with full intermodal information could be initialised.

Marketing/information and quality management (10.5)

Busbahnmim

It is discussed to integrate various information systems all over Austria, but to utilise decentralised data bases or networks. The new system would therefore require an interface in order to provide access and extract information to / from the various sources.

QM

The existing scheme should preferably develop into a total quality scheme, which would include an increased awareness and acceptance of quality by all actors involved. This might reduce the effort required to follow up and control the quality.

The system could include an assessment by the customers in order to facilitate the deduction of a line specific satisfaction level. It could also make sense to interview the
bus drivers, as they are at the front of the happenings and know where the strong and weak points are.

**Awareness for speed reduction and less car use (10.6)**

In Graz, it seems not realistic to close down a wider area in the inner city or in certain districts

**Integrated Mobility Centre (10.7)**

Currently the mobility centre is open 60 hours per week (7-19 on weekdays, 9-13 on Saturdays). There is a demand for much longer opening hours, however, this would mean extra personnel, that also would have to be paid significantly more, as night-time work and weekend work requires about 50% extra wages.

More marketing for the service would also yield higher customer numbers and would again require a higher number of personnel, as today personnel is often at the limit of its capacity

**Well suitable for transfer to other cities are:**

Bike policy audit (it gives guidance to the criteria to be assessed but leaves room to integrate the local circumstances and develop own actions), bike training in real traffic, speed 30 (might require legal check), displays with feedback on speed, information systems for bike/PT, innovative marketing (with locally adapted attractions), QM for PT (it might require different criteria).

**11.2 Comparison and conclusion**

The barriers against up scaling can be grouped into 4 categories:

- finances (e.g. B&R, bike training)
- usefulness (e.g. a car free month with wide closure of the city centre)
- technical constraints (e.g. compatibility of data bases for door-to-door PT information system)
- interests (benefits or loss of tasks, if up scaling requires cooperation - e.g. if a bus operator has to promote the Styrian wide PT association instead of marketing his own company or in case of an Europe-wide information system for PT)
## 12. Assessment of All Measures

Below is a list of the measures, with comments of their implementation (e.g. implemented as planned/partly implemented/not implemented) and fulfilment of measure objectives and contribution to WP objectives.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives (yes/no)</th>
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<tr>
<td>10.1 Innovations in bicycle transport</td>
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<td>10.2 Make bicycling attractive (B&amp;R information on the Internet)</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>10.3 Creation of a visitor web for optimal trip planning</td>
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<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>10.4 Taxi drivers as information multipliers for clean transport</td>
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<td>Partly</td>
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<td>10.5 Marketing/information and quality management</td>
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<td>Yes</td>
<td>Yes</td>
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<td>10.6 Awareness for speed reduction and less car use</td>
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<td>Yes</td>
</tr>
<tr>
<td>10.7 Integrated Mobility Centre</td>
<td>as planned</td>
<td>yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
PART D – Conclusions and Recommendations

13. Barriers and Drivers of the Measure Implementation

13.1 Technical barriers and drivers
- Barriers for B&R / bike under-paths: ownership of space (10.1)
- Technical problems (10.1, 10.2 and 10.3 (bike maps), 10.4 (problems with bio diesel), 10.5 (Busbahnbim-info)
- Speed 30: In some streets, public transport is negatively affected, so that the schedule had to be adapted (the bus now takes longer for the same route). Still, the feedback by the citizens and the reduction in noise and improvements in safety are enormous, so that the speed zones will be further extended. (10.6)

13.2 Synergies barriers and drivers
- Motivation of effected taxi drivers to talk about biodiesel (10.4) or of bus drivers to accept quality level and contribute to it (10.5)
- Synergies Busbahnbim: interfaces to and data from GVB, Postbus, ÖBB could be used – for most of the other transport operators it was necessary to type in the required data manually. In the future, all transport operators might receive an access to directly update their data in the data base. (10.5)
- Synergies Mobility Centre: There were no synergies during the planning and implementation phase. They are only new developing during the operational phase. (10.7)
- Synergies of creating a web site: Cooperation with other projects and web-sites concerning the transport area. (10.3)

13.3 Political and administrative barriers and drivers
- Barriers to finance bike racks by external advertisement: monopoly of city owned marketing agency. (10.1)
- Organisational (Mobility Centre): the organisation of the moving together of very different institution was extremely difficult. Different agreements were made between hierarchy levels. Good communication between all hierarchy levels is essential and can avoid many conflicts. (10.7)
- Political (Mobility Centre): Continuous political support was essential and one of the drivers of the move. The cooperation of the various involve organisations sitting together in the advisory board was also crucial. (10.7)
- As contract negotiations & keeping the contract belongs to the tasks of the Verbund, it is also clearly the task of the Verbund to guarantee a consistent quality. (10.5)
• The car lobby is quite strong in Graz. Therefore, any measure limiting car usage requires strong political commitment, statements and convincing actions as well as courage. (10.6)

• Various stakeholders with different focus, economically, private versus commercial etc. are delaying procedures. (10.3)

• Create the web site as a tool for intermodal travelling which makes it easier for the traveller and a gain for society. (10.3)

12.4 Economical barriers and drivers

• Cost benefit QM: once the first scan has been realised, this is not necessary anymore, and the time required is limited. The involved participants are forced to do some theoretic work, which usually comes short during the daily activities. (10.1)

• Transport quality criteria are extremely helpful, in case new services are contracted. The system is still growing, as over time new criteria get relevant. (10.5)

• Economical (Mobility Centre): The availability of a clear project with a clear budget was helpful (10.7)
14. Lessons to Consider for Replication and Take-up by Other Cities

14.1 Technical issues

- Measure 10.4 was closely linked with measure 12.7 – bio diesel taxi fleet and bio diesel service station. When bio diesel taxis failed due to technical problems this measure was affected as well.

14.2 Synergies

- In addition to the normal safety training by the police (in the protected traffic garden), the real life bike training in the streets enhances optimally the biking skills of children. It makes them more confident in the traffic and teaches them how to interact with other traffic participants. (10.1)

- The bike training should be given in connection with by mobility education that teaches children usage of different modes of transport and their properties (10.1).

- The integration of topics related to the advantages of bio diesel into the communication training of taxi drivers can be easily transferred to other cities, a practical approach (e.g. training on the job) is preferable. (10.4.)

- Furthermore knowledge transfer between taxi driver and passenger always depends on the level of motivation of both participants. Therefore, the training of communication skills is essential. (10.4)

- As several organisations are working together (StVG, GVB, Post-bus, City, Province, FGM-AMOR), they do not need all their separate infrastructure, personnel, marketing etc. etc. This leads to cost savings and better accessibility for the customers. (10.7)

14.3 Political and administrative issues

- Best progress is made, if realisation of tasks is contracted out of house after profound planning within the city administration and after the approval of the political level. Support by freelancers is very valuable. (10.1: Bike and Ride, Bike training, moderation of the quality management process)

- QM. The size of the group (8 participants) was very well perceived, guidance by an external moderator is crucial. (10.1. policy audit)

- It is good to elaborate a master plan and political commitment in the form of a QM-plan, so that the theory is not subject to neglect during daily hassle and work. (10.1, 10.5)
14.4 Economical issues

- In general, soft measures are much cheaper than hard (infrastructural) measures. Apart from that, their effectiveness is reasonable.

- 10.1 and 10.5: QM: Criteria should be defined in a cooperative manner, in order to guarantee acceptance – only then, the customers will in the end benefit from the system.

- 10.5: The Verbund prefers also a cooperative manner to deal with deviations in the quality measured. There never have been situations, where the Verbund would have had to enforce quality by penalties. This creates a motivating atmosphere of voluntary cooperation.

- 10.5: Marketing: It is not really predictable, which measures receive most publicity – sometimes it is the very small provocative actions that usually don’t have a wide direct impact, that get into the media.

- Speed 30 (10.6): It is not sufficient to sell the concept, but especially its effects on safety, noise and a better coexistence of bikers and car drivers. Intensive press work is needed. The legal framework conditions have to be explored.

- Speeding and feedback: As the mere feedback of the actual speed on average achieves a reduction in speed of 10% and as speeding devices are much cheaper, this action is in any case recommendable to be taken up by other cities. (10.6)

- The mobility centre is an integrated one stop service – where the customer gets all services and information concentrated in one place. The integrated mobility centre achieved a more prominent positioning and a more complete integration of services, which led to very significant increase in the number of customers. (10.7)

- The services provided by the integrated mobility centre lead to a modal shift, which lead to more revenue of the public transport companies. The revenue is such that it is at least double the investment and costs of the mobility centre. (10.7)
15. Recommendations to EC and Other Actors

- Continuously increase infrastructure for cyclists (sheltered and theft protected cycle racks, bicycle training for children) to ensure an increase of cyclists
- Health and safety arguments more efficient than environmental arguments. Savings of time and money also of more interest than environment in many cases
- Public transport trip planning is a cheap measure with big value for travellers – increases the number of PT passengers
- Put more effort to awareness campaigns – software. Do not just subsidise basic hardware, but try to raise awareness among people. Always force both strands: hardware and software.
- EC should support local authorities to install door to door information in their city or region.
- Funding programmes such as CIVITAS are extremely helpful on the local level, as
  - measures might not have been implemented without it, they have been speeded up or were implemented on a wider scale (20 reasons for biking brochure, extended bike training, further education taxi drivers, integrated mobility centre)
  - exchange with other cities is supportive, but should have gone further / beyond project boarders
  - they force local stakeholders to cooperate and bring them together at "round tables"
  - they facilitate the implementation of far reaching, rounded-off programmes
- Push and pull: the discussion about a right balance of push and pull continues. On the local level, with respect to transport, push measures definitely enforce the effectiveness of pull measures. It is not clear, whether this is also the case for European interference on the local level: e.g. whether the funding - i.e. the voluntary take up of ideas by the local level - is more efficient than legal prescriptions.
## Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
</tr>
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<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.1</td>
<td>Widening of the Environmental Zone</td>
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<tr>
<td></td>
<td></td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
<td>Prague</td>
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<td>5.6</td>
<td>Congestion charging</td>
<td>Stockholm</td>
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<td>5.3</td>
<td>Implementation of strolling zones</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
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<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
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<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
<td>6.1</td>
<td>Smart card systems and integrated ticketing</td>
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<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
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<td></td>
<td></td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
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</tr>
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<td></td>
<td></td>
<td>6.4</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td></td>
<td></td>
<td>6.5</td>
<td>Establishment of a zone-model parking in the central city area</td>
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</tr>
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<td>WP7 Public Passenger Transport</td>
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<td>7.5</td>
<td>Customer friendly stops for bus and tram</td>
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<td>Public transport safety</td>
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<td>Public transport safety</td>
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<td>PT intermodality</td>
<td>7.3</td>
<td>Intermodal local/regional transport interchanges</td>
<td>Lille</td>
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<td>7.4</td>
<td>Seamless linkage of modes</td>
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<td>7.6</td>
<td>Park and Ride facilities</td>
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<td>Linking different ways of public transport</td>
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<td>Car pooling/sharing</td>
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<td></td>
<td>8.3</td>
<td>Increasing car occupancy</td>
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<td>Awareness rising</td>
<td></td>
<td>8.4</td>
<td>Site level Mobility Management</td>
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<td></td>
<td>8.5</td>
<td>Urban Mobility Plan</td>
<td>Lille</td>
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<td>WP9 New Concepts for the Distribution of Goods</td>
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<td>9.2</td>
<td>Distribution of goods - Green city logistics</td>
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<td>9.3</td>
<td>Logistic centre for Old Town of Stockholm</td>
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<td>10.2</td>
<td>Make bicycling attractive (B&amp;R information on the Internet)</td>
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<td>Trip planning</td>
<td>10.3</td>
<td>Creation of a visitor web for optimal trip planning</td>
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<tr>
<td></td>
<td></td>
<td>10.5</td>
<td>Marketing/information and quality management</td>
<td>Graz</td>
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<tr>
<td></td>
<td>Awareness of clean transport and safety</td>
<td>10.6</td>
<td>Awareness for speed reduction and less car use</td>
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<td></td>
<td></td>
<td>10.4</td>
<td>Taxi drivers as information multipliers for clean transport</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>Traffic information</td>
<td>11.2</td>
<td>Traffic monitoring and supervision</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.3</td>
<td>Dynamic traffic management system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.4</td>
<td>Accessible road network (street) data</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Improving PT traffic flow</td>
<td>11.5</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.7</td>
<td>High level service bus routes</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.1</td>
<td>Technical basis for an efficient customer focussed operation and information</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>Heavy vehicles</td>
<td>12.1</td>
<td>Clean and efficient heavy vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2</td>
<td>Biogas bus fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.6</td>
<td>Waste collection with biogas-vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>12.4</td>
<td>Clean municipal fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.5</td>
<td>Clean municipal fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7</td>
<td>Bio-diesel taxi fleet and bio diesel service station</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.11</td>
<td>Making Clean Vehicles less expensive</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.13</td>
<td>Increasing clean vehicle use in private company fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.14</td>
<td>Web-portal for drivers of clean vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>12.8</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 2 – Trendsetter cities

The five Trendsetter cities are described below.

Graz

With nearly 230,000 inhabitants, Graz is the second largest city in Austria, the capital of the Styria province and the cultural, economic and university centre of the region. About 80,000 commuters travel to the city of Graz daily. On an average weekday, 47% of commuters travel by car, 19% use public transport, 20% are pedestrians and 14% cycle.

Graz has a historic centre with many pedestrian precincts and much bicycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city area (except major roads) and the first Austrian city to open a mobility centre.

The main problem Graz faces is the rise of car use due to a tendency of people moving to the city outskirts. The increasing traffic as well as the topography and climate in Graz, lead to high air pollution levels in the city. Information technology will be used to make public transport more user-friendly and the services more attractive.

The following measures have been implemented in Graz within Trendsetter

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Project Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP1)</td>
<td>Strolling zones</td>
<td>Implementation of strolling zones</td>
<td>5.3</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP2)</td>
<td>Parking</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicle</td>
<td>6.4</td>
</tr>
<tr>
<td>Public Passenger Transport (WP3)</td>
<td>Information to passengers</td>
<td>Customer friendly stops for bus and tram</td>
<td>7.5</td>
</tr>
<tr>
<td>Public Passenger Transport (WP3)</td>
<td>Intermodality</td>
<td>Seamless linkage of modes</td>
<td>7.4</td>
</tr>
<tr>
<td>New Forms of Vehicle Use (WP4)</td>
<td>New services and services for special customer groups</td>
<td>8.1</td>
<td></td>
</tr>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Awareness raising</td>
<td>Site level Mobility Management</td>
<td>8.4</td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Bicycle measures</td>
<td>10.1</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Macroplanning</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Awareness raising</td>
<td>10.3</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Integration of Motors and transport systems</td>
<td>10.4</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Traffic information</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Awareness raising</td>
<td>10.6</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Taxi drivers as information multipliers for clean transport</td>
<td>10.7</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Awareness of clean transport and trip planning</td>
<td>10.8</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Traffic information</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP9)</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>10.10</td>
<td></td>
</tr>
</tbody>
</table>

The map below shows the City of Graz.
Lille

Lille Metropole in France is an urban network of 85 communes with 1.2 million inhabitants. The community is close to the Belgian border and cooperates closely with its counterparts in Belgium. It is a base for distribution and a node for major routes north-south and east-west in Europe. Lille has built up a strong public transport network. On an average weekday, 150,000 passengers travel by bus, tram, commuter trains or metro. The following measures have been implemented in Lille within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of measures</th>
<th>Measure description</th>
<th>Measure Nº</th>
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</thead>
<tbody>
<tr>
<td>Integrated pricing strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Public Transport safety</td>
<td>Public Transport Safety</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>Public Transport intermodality</td>
<td>Intermodal local/regional transport interchanges</td>
<td>7.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Park &amp; Ride facilities</td>
<td>7.6</td>
</tr>
<tr>
<td>New forms of vehicle use (WP8)</td>
<td>Car pooling/sharing</td>
<td>Company Mobility Plan in the administration fleet</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>Awareness raising</td>
<td>Urban Mobility Plan</td>
<td>8.5</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving Public Transport traffic flow</td>
<td>High Level Service Bus Routes</td>
<td>11.7</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Biogas Bus Fleets</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Clean Municipal Fleets</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>Clean Fuel distribution</td>
<td>Analysis of the biogas experience</td>
<td>12.9</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Lille.
**Pécs**

The City of Pécs with 170,000 inhabitants is a middle-sized cultural, educational, commercial and health centre in Hungary, 40 km from the Croatian border. In the last decade the number of cars and the number of tourists and students have increased rapidly, creating a huge demand for parking spaces and public transport. In November 2000, the early Christian burial chambers in the city centre received UNESCO World Heritage status, providing the municipality with new tasks to protect and preserve the heritage.

The following measures have been implemented in Pécs within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
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<td>Establishment of a car-free zone in the inner city</td>
<td>5.4</td>
</tr>
<tr>
<td></td>
<td>Strolling zones</td>
<td>Preparation of a new traffic and transport strategy</td>
<td>5.5</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The map below shows the location of the parking-zones and the access restriction areas in Pécs.
**Prague**

The City of Prague is the capital of the Czech Republic and the country’s largest city with 1,300,000 inhabitants. On an average weekday, 44% of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 1.60 million passengers per year uses the public transport system in Prague.

Prague has a high concentration of both political and economic administration, industry, trade, education, research and tourism. This requires good traffic management. One of the biggest problems is the very fast increasing number of private cars. It has more than doubled since 1990. A new traffic policy promotes public transport, development of traffic infrastructure and regulation of car traffic, particularly in the city centre.

The following measures have been implemented in Prague within Trendsetter:

<table>
<thead>
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<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure nr</th>
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</thead>
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<td>Access Restrictions (WP5)</td>
<td>Environmental Zones</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
<td>5.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>PT intermodality</td>
<td>Linking different ways of public transport</td>
<td>7.7</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.6</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Prague.
Stockholm

The City of Stockholm is the capital of Sweden and the country’s largest city with 770,000 inhabitants. On an average weekday, over 600,000 passengers travel by public transport in the county of Stockholm. Of all travellers, 46% go by car, 23% use public transport, 29% are pedestrians and cyclists and 2% use other modes.

The biggest traffic problems include an increasing number of vehicles, congestion on many main roads, heavy duty traffic, limited rail track capacity and few cyclists. Moreover, there are problems with the air quality in inner city areas especially due to a high concentration of NOx and particulate matter. Noise levels are also high.

Stockholm is improving its transport system environmentally by substituting conventional vehicles with clean ones and making logistic services more effective. Better public transport and intelligent traffic information techniques are other important fields.

The following measures have been implemented in Stockholm within Trendssetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure No.</th>
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<td>Widening of the Environmental Zone</td>
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<td>Parking</td>
<td>Small Card Systems</td>
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<td></td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Reducing parking fees to promote clean vehicles</td>
<td>7.3</td>
<td></td>
</tr>
<tr>
<td>Environmental Zones</td>
<td>Increasing public transport passengers</td>
<td>7.1</td>
<td></td>
</tr>
<tr>
<td>New Concepts for the Distribution of Goods (WP11)</td>
<td>Material logistics centres to optimise freight deliveries at construction sites</td>
<td>11.1</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP10)</td>
<td>Logistics centre for Old Town of Stockholm</td>
<td>11.3</td>
<td></td>
</tr>
<tr>
<td>Bicycle measures</td>
<td>Make cycling attractive (B&amp;I)</td>
<td>10.2</td>
<td></td>
</tr>
<tr>
<td>Traffic planning</td>
<td>Creation of a better web for optimal trip planning</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>Traffic information</td>
<td>Traffic monitoring and supervision</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Improving PT Traffic Flow</td>
<td>Improved real-time signal control in a bus priority system</td>
<td>11.5</td>
<td></td>
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<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and efficient heavy vehicles</td>
<td>12.1</td>
</tr>
<tr>
<td>Light vehicles</td>
<td>Waste collection with biogas-vehicles</td>
<td>12.4</td>
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<tr>
<td></td>
<td>Clean municipal fleets</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Raising Clean Vehicles less expensive</td>
<td>12.11</td>
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<tr>
<td></td>
<td>Measure fused with 12.11</td>
<td>12.12</td>
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</tr>
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<td>Increasing clean vehicle use in private company fleets</td>
<td>12.13</td>
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<td></td>
<td>Web-portal for drivers of clean vehicles</td>
<td>12.14</td>
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<td></td>
<td>Improved biogas refuelling infrastructure</td>
<td>12.15</td>
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</table>

The map below shows the geographical context of measures in Stockholm.
## Appendix 3 – Wordlist

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
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<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
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<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
</tr>
<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>RKF</td>
<td>Resekortsföreningen I Norden -</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
<tr>
<td>SL</td>
<td>Stockholm Transport</td>
</tr>
<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l'Integration Reseaux et des Tarifs</td>
</tr>
<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDSETTER</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
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<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
The European project Trendsetter involves 50 individual projects, all of which aim to improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union. Read more about Trendsetter at www.trendsetter-europe.org.

Read more about the Civitas project at www.civitas-initiative.org
Contract No: NNE-2001-00323

Contractors
1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
7. Swedish National Road Administration, Stockholm Region
8. Stockholm Real Estate and Traffic Administration
9. Public Transport Company of Graz
10. Taxi Group 878 Cityfunk Ltd
11. Styrian Transport Association, STVG Ltd
12. Erlach Consulting & Engineering
13. Province of Styria
14. Austrian Mobility Research
15. City of Pécs
16. Pécs Municipal Operations and Property Management Company
17. Syndicat Mixte des Transports
18. Statoil Detaljhandel AB
19. AGA Gas AB
20. Home 2 You AB

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PART A – Report Summary

Trendsetter is one of the four demonstration projects within the Civitas I initiative. The other projects are Vivaldi, Tellus and Miracles. The Trendsetter project aim at improving mobility, air quality and quality of life while reducing noise pollution and traffic congestion by promoting:

- Innovative management methods
- Improved logistics for greater energy efficiency
- The use of public transport and car sharing
- Increased use of zero and low emission vehicles

The five Trendsetter cities Stockholm, Graz, Lille, Prague and Pécs implement 53 measures grouped in eight demonstration work packages; Access restrictions, Integrated pricing strategies, Public passenger transport, New forms of vehicle use, New concepts for the distribution of goods, Innovative soft measures, Integration of transport management systems and Clean public and private fleets.

This Work package Evaluation Report gives an overview of the measures and the results achieved in WP6 – Integrated Pricing Strategies.

In WP6 – Integrated Pricing Strategies, projects dealing with fees and pricing are clustered. The Work package consists of five measures, grouped in two sub-groups; Smart Card system and Parking, see table below.

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 6 – Integrated Pricing Strategies</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Card System</td>
<td>6.1 Smart card systems and integrated ticketing</td>
<td>Stockholm</td>
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<tr>
<td></td>
<td>6.2 Smart card systems and integrated ticketing</td>
<td>Lille</td>
</tr>
<tr>
<td>Parking</td>
<td>6.3 Reduced parking fees to promote clean vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>6.4 Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>6.5 Establishment of a zone-model parking in the central city area</td>
<td>Pécs</td>
</tr>
</tbody>
</table>

With intelligent payment systems in public transport payment can be easier both for customer and public transport operators. Facilitating complicated fare structures lead to substantial increase of the use of public transport. Lille has worked with fare integration within Trendsetter. Both Stockholm and Lille will introduce smart cards systems in public transport, but not within the Trendsetter project period.

In Stockholm and Graz the parking measures aimed at using reduction of parking fees as a tool to favour drivers of clean vehicles. In Pécs, different parking zones reduced the overall traffic in the city centre.
The WP Objectives in WP6 are:

- Achieve a modal shift from private cars to public transport through simpler and accurate pricing of Public Transport i.e. Smart Card system
- Promoting clean vehicles by introducing parking incentives
- By modal shift and shift to clean vehicles reduce emissions, noise levels and energy use

Conclusions

Smart card systems

- For cities with several public transport operators using different pricing systems, fare integration is vital to facilitate travelling. Fare integration can be supported by smart card ticketing
- Ticketing is a tool to the service of the commercial relation between operators and customers, capable of coping with complex fare structures, multi-operator environments and optimisation of exploitation conditions in a user friendly manner
- Implementation of high-technology systems, like smart card systems, take several years, but is an interesting way to implement innovative commercial strategies
- Smart cards make it possible to create databases with travel patterns, which can improve the planning of public transport
- Before-, during- and after- the implementation period, there will be a need of a lot of information and support, as the new ticketing system induces a change in customer behaviour
- Introduction of smart card system is an attractive solution for most of the users of public transports and might give rise to new users. The revenues from ticket sales are assumed to rise.
- Prerequisite for advanced pricing models (according to travel length or time of day)
- Smart cards by themselves are just means for improved service to the customer. Additional services can increase customer acceptance (taxi, trains, car sharing, parking fees etc)
- Safety aspects, to reduce forgery, are one of the drivers to implement the cards.
- Implementing the smart card system drastically reduces the maintenance cost per equipment in the ticketing system, as no mechanical parts are involved in the system. Experiences from Stockholm, including an expansion of the control and automatic vending base (in particular high number of automatic vending machines), leads to a situation where the decrease in unit maintenance costs is offset by the increase in number of equipment. Field experience in implementing smart card system in other cities has shown a decrease of total maintenance costs.
• Smart card system is a tool that favours intermodality between different kinds of public transport systems.
• Development of smart card systems is done where and when there is an actual need for it. Cities and countries do not wait for the EC to get to an agreement. When a common EC-standard will be presented, there will be several different standards in use within Europe

Parking
• Reduces emissions of air pollutants and of green house gases.
• Reduced parking fees are strong economical incentives for car owners. Generally cheap and efficient measures. Loss of income due to free or reduced fee for clean cars is an economical barrier that might cause political problems.
• Reduced parking fees for “clean vehicles” and/or increased fees for “normal vehicles” - will force the shift toward “clean vehicles” and higher use of public transports.
• Implementing of zone-model parking in Pécs has given significant improvements in environmental, living and working condition – reduced traffic in the city centre.
• Depending on the definition of “clean vehicle” – reduced parking fees will give different results, such as: More use of renewable fuels and Lower emissions of a specific pollutant component.
• Lack of political support can cause large delays, like in the measure on free parking for clean vehicles in Stockholm
• Important to find rational methods for registration of “clean vehicles”.

Recommendations to Local Authorities

Smart card systems
• High level of service needed – important that users easily can find a point of sale.
• Implementation of a new system is very complex (administration, cooperation etc)
• Integrate other services on the smart card – taxi, car sharing, parking fees, bonuses etc to make the smart card more attractive.
• Personal integrity must be considered when implementing smart cards
• Since integrated ticketing and smart cards often involves many actors, special organisation authorities might be needed to handle the cooperation (as SMIRT in Lille)
• There are successful examples in Europe – use them!
• One experience from other cities is that it is vital for success to inform and educate the staff initially and the travellers when the system is to be implemented
**Parking**

- The lack of national definition of clean vehicles/less polluting vehicles can be a barrier. To get acceptance within a city might also be time consuming. The definition is needed to be able to implement fair incentives.
- Politicians need to see alternative costs for achieving shift to other transport modes/Clean vehicles.
- New organisations might be needed to be able to work efficiently with the parking issues in a city (examples from Pécs and Graz).
- Changes in the parking legislation might be needed to be able to favour clean or less polluting vehicles.
- Information is needed to get both awareness and acceptance for the implemented measures.
- Support from the media is vital. Important to involve them early in the process.

**Recommendations to EC**

- There are immense efforts going on within Europe implementing measures to achieve sustainable transport systems and sustainable societies. There is a large potential in disseminating the best practice, worst practice and lessons learnt from them to other cities. New projects should be forced to learn from earlier experiences.
- Continue supporting successor countries, to make it possible for them to gain as much as possible from other countries/cities. Support of the more experienced cities/countries is then also needed to finance the transfer of knowledge.
- Harmonisation of “type approval” and “registration papers” all over EU. Same type of documents for all cars and more information (about particle filter, fuels, etc.)
- Definition of clean vehicles / less polluting vehicles help local, national and EC institutions to use incentives as free parking, reduced taxes, subsidies etc to help stimulate the clean vehicle market.
PART B – Common Trendsetter introduction

1. Introduction

1.1 Background
Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 Trendsetter – a part of the Civitas Initiative
The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
Political commitment is a basic requirement
Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

Each city implement a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

The five Trendsetter cities are briefly described in appendix 1.

1.3 Achievements within Trendsetter

Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European
Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

**Improving access to public transport**

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

**Trip planning, traffic control and cycling**

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

**Access restrictions for reduced traffic**

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access restrictions for transit traffic have been extended and stricter rules have been adopted for
part of the zone. Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

**Marketing and mobility management**
Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

**Co-transportation of goods**
Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

**Clean vehicles and fuels**
Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

**Incentives and promotion of clean vehicles**
Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.
1.4 Overview of achieved effects

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
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<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
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<tr>
<td></td>
<td>Long</td>
<td>Large</td>
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</tbody>
</table>

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure.

Time – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emissions</th>
<th>Energy</th>
<th>Mobility</th>
<th>Time</th>
<th>Investment cost</th>
<th>Operational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td></td>
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<tr>
<td></td>
<td>Increased public transport security</td>
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<tr>
<td></td>
<td>Convenient and safe intermodality</td>
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<tr>
<td></td>
<td>Customer-friendly stops</td>
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<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
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<tr>
<td></td>
<td>New services for special needs</td>
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<td>Quality management</td>
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<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
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<td></td>
<td>Planning trips on the web</td>
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<tr>
<td></td>
<td>Integrated public transport services</td>
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<td>Traffic management</td>
<td>Traffic management</td>
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<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
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<td>Selective access restriction for heavy vehicles</td>
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<td>Marketing attractive alternatives</td>
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<tr>
<td></td>
<td>Mobility management</td>
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<tr>
<td>Improved goods distribution</td>
<td>Consolidation of goods *</td>
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<tr>
<td>Clean vehicles and fuels</td>
<td>Biofuelled vehicles</td>
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<tr>
<td></td>
<td>Biofuel production</td>
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</tbody>
</table>

*Measures that mainly have local effect
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 Trendsetter cities after Civitas
The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas I cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1 Evaluation at different levels
The Trendsetter project has been evaluated in different levels; measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:
- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

2.2 Indicator based evaluation
Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dBA</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios
When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.

Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants
spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.

**Methodology**

The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (-- - 0 + ++).
3. Trendsetter objectives

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfillment are shown in the next pages.

3.1 Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provide examples:</strong></td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Increase mobility:</strong></td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Enhance Environment:</strong></td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO₂ emissions by 5 %, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOₓ emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Save Energy</strong></td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO₂, NOₓ and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfil the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.
The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period. The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.

The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
3.2 Demonstration objectives

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. The objectives that are not reached are commented below the table.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324 Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4 Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td>300</td>
<td>3 000</td>
<td>+2 700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1 100</td>
<td>3 000</td>
<td>+1 900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>

3.3 Scientific and technical objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.
### Scientific and technical objectives

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm³ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Each demonstration objective and the fulfilment of it is described below

**Produce a total amount of 11 million Nm³ biogas by the end of the project.**
In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm³, but biogas vehicles have consumed only 4.26 million Nm³. The rest has been used for heating and electricity production or just flared.

Before Trendsetter, the local biogas production in Lille was 0.12 Nm³ biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3.6 million Nm³ per year.

This objective is not applicable for the other three cities.

**Reduce the commercial cost of biogas fuel by 20% in demonstrating cities**
The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.

In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).

This objective is not applicable for the other three cities.

**Implement a complete biogas technology chain in Stockholm and Lille, from production to end use**
In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plants will be ready.
This objective is not applicable for the other three cities.

**Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm**

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now.

The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

**Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision**

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

**Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.**

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.

- A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of fossil CO2, emissions of NOx and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

- A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.
− In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the website has been successful in reaching potential buyers and to have a reliable and relevant content.

− In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

**Evaluate the effectiveness and political acceptability of environmental zones**

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

− An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

− The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

− Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.

− In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

**Develop integrated city mobility plans integrating environmental protection, traffic and public health policies**

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2.200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.
The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4. Overview of WP

4.1 WP objectives
The Work package objectives for WP6 – Integrated Pricing Strategies 6 are:

- Achieve a modal shift from private cars to public transport through simpler and accurate pricing of Public Transport i.e. Smart Card system
- Promoting clean vehicles by introducing parking incentives
- By modal shift and shift to clean vehicles reduce emissions, noise levels and energy use

4.2 Short overview/description of measures within WP
In WP6 – Integrated Pricing Strategies, projects dealing with fees and pricing are clustered. The Work package consists of five measures, grouped in two sub-groups; Smart Card system and Parking, see table below.

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 6 – Integrated Pricing Strategies</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smart Card System</td>
<td>6.1 Smart card systems and integrated ticketing</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>6.2 Smart card systems and integrated ticketing</td>
<td>Lille</td>
</tr>
<tr>
<td>Parking</td>
<td>6.3 Reduced parking fees to promote clean vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>6.4 Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>6.5 Establishment of a zone-model parking in the central city area</td>
<td>Pécs</td>
</tr>
</tbody>
</table>

Fare integration and easy ticketing are tools to improve the attractiveness of public transport. Facilitating complicated fare structures lead to substantial increase of the use of public transport. Lille has worked with fare integration within Trendsetter.

Both Stockholm and Lille Metropole will introduce secure and intelligent smart card systems. The system makes it easier for the traveler to pay and for the public transport operators to manage their income. Smart cards also generate exact information about how and when people travel. These facts can be used to customize public transport services to actual travel needs of passengers. Furthermore, smart cards can be used for advanced pricing models, where the traveller is charged according to travel length or time of day.

In Stockholm and Graz the parking measures aimed at using reduction of parking fees as a tool to favour drivers of clean vehicles. In Pécs, different parking zones reduced the overall traffic in the city centre.

**Smart card systems and integrated ticketing (6.1)**
Stockholm Transport (SL) supplies the County of Stockholm with public passenger transport. SL is responsible for the extent, planning and development of public transport...
as well as for the administration of transport facilities, determination of the output of transport and pricing in accordance with the owners’ decisions. During an average weekday, over 650,000 passengers’ travel by using buses, trams, suburban trains, commuter trains and the underground. Approximately 2.2 million trips are made within the SL system every day. Different traffic operators, via a competitive tender process, serve the actual routes and own the vehicles.

The Stockholmer can choose among several public transport payment methods: seasonal and monthly travel cards, discount coupons or cash on local trains, trams, buses and subways. Since the same authority operates most regional public transport, integrated ticketing across transport modes already exists and it is possible to travel throughout the region with a single travel pass.

The current ticketing system, with tickets carrying a magnetic stripe, is growing old and an upgrade is needed. SL plans to introduce a smart card system for payment. The smart card makes the charging more flexible, taking factors such as trip length and time of the day into account. Other regional public transport operators will also accept the card as payment. Smart card systems also make it possible to gather and present sophisticated statistics about travel patterns. This gives better opportunities to increase public transport service according to actual demands.

SL participates in a cooperative effort among Nordic regional public transport companies and national railway companies to develop standards for the smart cards. Eventually, the smart card could also be used to purchase tickets on the national railways as well as on public transport in other cities. Since the memory capacity of the card is high, it can also include information needed to facilitate payment for other services such as parking fees, car sharing and taxi.

By developing this system, SL will both attract more customers and improve their own planning. The information gathered by the system will make it possible to customise the transport offer to the real travel needs of Stockholm's residents.

The first delivery of equipment was meant to be in September 2004. Amongst others SL was meant to receive card readers for the automatic gates. Due to problems with the supplier as well as internal delays the first delivery is now rescheduled to September 2005.

When the first delivery is received and installed, SL’s personnel and selected groups of passengers will be offered to be the first one to try the system by using a smart card in parallel with the current system. The selected group of passengers may be students and pensioners. The trial period will go on for approximately one year until the system will be in full operation and reachable for all passengers in 2007.

Introducing a Smart Card System in Stockholm will lead to:

- Increasing the number of public transport users
- Achieving a modal shift from private cars to public transport
• Make the access to the public transport system more effective
• Improve the service of public transport
• Making it easier for public transport users to deploy buses, metros and trains
• Reducing emissions, noise levels and energy consumption

Note: Most of the cost related to this measure is being financed by Stockholm Transport, with support from Trendsetter for 3 man months of work and associated travel expenses. The Trendsetter financing mainly covers costs to exchange experiences within Trendsetter and to evaluate and report on the Stockholm experience to European colleagues. Due to the delayed delivery of the system, the evaluation of the measure includes experiences of procurement process and experience from the used project organization in Stockholm (technical, information, education and customers).

**Smart card systems and integrated ticketing (6.2)**

The integration of public transport in the various modes and areas of the Metropolis required a complete rework of the fare integration strategies in order to allow the adequate ticketing solution to be selected and implemented. The fare integration, together with an intermodal interchange strategy, allows a large promotion of public transport solutions and, beyond these, the increased use of public transport in the Metropolis.

The public transport in Lille Metropole is divided among Lille Metropolis, the Nord department, the Nord/Pas-de-Calais region and the Public Transport operators, Transpole and the SNCF being the major ones. Urban Public Transport and trains have their own ticket systems and tariffs. A single card that allows travel throughout the system makes the public transport much more attractive. This was the aim of this Trendsetter measure.

To realise the smart card system Lille has:
• established a single pricing scheme for all public transport allowing in particular short trip fares in urban Public Transport
• reached a consensus among all public transport authorities and operators to introduce integrated ticketing
• specified the requirements of a smart card system in Lille including technical, legal and financial aspects

A single card will simplify travel by public transport and thus encourage car drivers to leave their car at home and choose public transport. The system will also deliver valuable information about travel patterns, facilitating customer-oriented public transport service planning. Innovative aspects include in particular payment of fares with all public transport, including P&R, with the same card.

The new fare range of *Transpole* has been applied since 1st of September 2004. To facilitate fare integration with the train, the limiting date of the new tariffs for youngsters raised from 24 to 25 years, as it is the case for the SNCF.

The technical proposals for fare integration are to be submitted to the final approval of the elected officials. Several, in-house and in exchange was studied in detail and could be implemented quickly in the event of political validation.
Introducing a pricing scheme, an integrated ticketing system and specification of possible Smart Card for the public transport in Lille leads to:

- Improve intermodality between Public Transports
- Improve attractiveness of Public Transport

**Reduced parking fees to promote clean vehicles (6.3)**

Within the Trendsetter measure 6.3, free parking for local residents’ parking and commercial parking in the city was implemented for biogas, ethanol and electric hybrid vehicles. The aim is to encourage use of clean vehicles among citizens and companies. Studies have indicated that reduced parking fees can be a strong incentive for using clean vehicles. Stockholm has strict parking rules with high parking fees in the inner city zones during business hours. For ordinary cars this permit costs 6 000 SEK (about € 600) per year. Prior to Trendsetter there were no reduced parking fees for clean vehicles (biogas, ethanol and electric hybrid vehicles) although this has shown to be an important incentive. In May 2, 2005, Stockholm finally introduced free parking for clean vehicles under certain circumstances. You can apply for a free parking permit if you live and park your car in the central city. Private companies that use cars extensively within the city centre are also entitled to apply for a special parking permits for commercial vehicles for free. The rule about free parking will last at least for three years.

The following work was planned to be performed:

- define, based on environmental properties and the European car labelling directive, which cars will be qualified as clean vehicles and thus have the right to reduced parking fees
- establish a system to mark the cars
- produce an information campaign to citizens and business
- evaluate and report results

The measure was heavily delayed due to lack of political agreement. Much effort has been spent on convincing concerned politicians and salaried employees in different city administrations to support the measure. The final decision on free parking for clean vehicles was taken in April 8, 2005. The free parking is valid since May 2, 2005.

When the decision about free parking was taken, the city started to advertise for the new incentive for clean vehicles. A campaign was launched on web pages and on parking meters all around the city.

Media has covered the news about free parking very well. Media, companies as well as citizens do frequently contact with the project leaders for the clean vehicle project in Stockholm. The interest for the free parking has been great.
Since this action came into force the Traffic Administration in Stockholm has received almost 500 applications for free parking. Most of them, approximately 460, have been approved.

Since the free parking was introduced and until August 2005, 440 private and 390 company/commercial permits have been issued.

Due to the late political decisions the evaluation has focussed on the process and not the indicator based evaluation.

Reduced parking fees, as incentive to clean vehicle use in Stockholm will lead to:
• Increased use of clean vehicles within the inner city
• Reduced emissions, noise levels and energy consumption

Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles (6.4)

The parking measure in Graz aims at promoting cleaner vehicles in the city center. Graz supports vehicles on petrol and diesel as long as the emissions of CO2 are below a threshold.

City of Graz has introduced a new parking system that makes a differentiation between polluting and low-polluting vehicles. Low-polluting vehicles are those that fulfil the Euro IV norm and other cars that emit less than 140 g (130 g for diesel vehicles) CO2 per driven kilometre. They get a decreased parking tariff.

Before April 2004 the parking tariff was € 1 per hour. After April, the drivers of ordinary emission cars paid € 1.20 per hour, 20 cent more than before, the hourly parking tariff for low emission vehicles was reduced by 20 cent to € 0.80 which is a reduction of 1/3.

For getting the special tariff the drivers have to register their vehicle at the city. They receive a so-called Umweltjeton, a special coin to switch the parking machine to the reduced tariff and they also get a special sticker. This is an official document, which is filled out by the city and includes the car number, type of car, colour of the car and an official seal of the city of Graz.

In order to implement the lower parking tariff, the legal regulation, in particularly the local law, which defines the parking tariffs, had to be changed. A paragraph, that declares the term low emission vehicles and the special tariff applied, was added.

The objective of the measure was to:
• Development and implementation of a new parking model system, acceptable for the citizens and technical and organisational feasible
• Increased number of (smaller and/or) low -polluting vehicles in the city centre, with reduced emission, noise levels and energy consumption as consequences.
Establishment of a zone-model parking in the central city area (6.5)
The City of Pécs is co-ordinating the measure that established a zone-model parking, in cooperation with Pécs Municipal and Property Management.

Until recently, parking staff walked the streets of Pécs selling tickets and controlling compliance. Now a comprehensive reform of parking system in Pécs has been carried out. Parking machines have been purchased and the city is divided into four parking zones:

- **Red zone** - the core of the inner city - where parking is expensive
- **Blue zone** - adjacent to the red zone - where parking is moderately priced
- **Yellow zone** - the distant parts of the city centre - subject to a rather low parking fee
- **Green zone** - outside the city centre - where parking is free

In a second step, maximum-parking times will be introduced in the red zone.

The following activities to reform the parking system has been done:

- Installing information boards and marking the streets according to the new regulations
- Installing new parking ticket machines
- Increasing green areas and planting trees in the inner city
- Increasing the number of free parking spaces outside the city centre
- Evaluating and reporting results

The new parking system has reduced the number of cars in the inner city and at the same time makes
parking accessible to more people since parking time is limited.

As the Civitas initiative does not support large-scale infrastructure developments only the complementary actions of the establishment of the zone-model are included in the project: the actions related to traffic planning and operation, some small scale infrastructure developments (positioning of the traffic signs, tables and the establishment of free parking spaces in the P+R car parks.). The actions contribute to significant decrease in private car use in the centre and by that a reduction in the number of cars accessing the centre, the emission of GHG (Green House Gas) and noise pollution.

The objective of the zone-model parking system in the central city areas in Pécs was:
- Reduced emissions through decreased traffic in the central areas of Pécs (-20 to 80% depending on the exact location of the zone)
- Decrease in the average time of parking in the centre (-20% to 30%)
- Reduce the air and noise (-3%) pollution in the centre
- Better living and working environment, better circumstances for tourists
- Better conditions to preserve and protect the UNESCO World Heritage sites

4.3 Problems to be solved by the measures

To achieve a more sustainable transport system, a combination of different measures is needed. Fare integration and intelligent payment systems in the Public Transport as well as parking fees as tools to favour clean vehicles or to reduce overall traffic, are examples of measures needed to achieve the Trendsetter aim to improve mobility, air quality and quality of life while reducing noise pollution and traffic congestion.

**Smart Card System**

Creating a new ticketing system is a step in SL’s endeavour to give passengers a higher quality of travel by providing them with a system that is quick, convenient and easily accessible. The new system shall be able to offer passengers more purchasing opportunities with respect to both the place of purchase and the type of tickets. Speeding up ticket inspection shall shorten trip time, especially on buses. The new system shall also make it possible to introduce tickets and prices that can encourage new passengers to travel by SL. It is also envisaged that the system will give SL greater insight into passenger travel patterns and provide greater flexibility in the introduction of new fares and ticket types. SL also wants a system that minimises the risks of ticket forgery.
The fare integration between the different means of public transport in the region of Lille Metropole was insufficient. The pricing schemes were not the same for all means of transport. Main problems to be solved by the measure Smart card systems and integrated ticketing in Lille refer to the fare system, the financing and the validation system.

The variety of stakeholders at the level of the organising authorities (Lille Métropole, Région Nord Pas-de-Calais, Département) and of the operators (Transpole urban transport, SNCF for trains, other companies for departmental transport) adds to such complexity of decision making.

Parking
The parking measures, in Stockholm and Graz, both aim at promoting cleaner vehicles in the city centres, while the parking measure in Pécs mainly focus on reducing overall traffic. In Stockholm only vehicles fuelled by renewable fuels are supported by the parking incentives. Graz also supports vehicles on petrol and diesel as long as the emissions of CO2 and particulate matters are below a threshold value. In Pécs, the parking measures aimed at solving the situation with far too much traffic in the central parts of the city but no incentives supporting cleaner vehicles is implemented today.

The measure in Stockholm has led to a common agreement within the city on the definition of a clean vehicle. The measure is a supporting measure to other measures in Trendsetter, all aiming at increasing the use of clean vehicles and the use of renewable fuels. One problem to overcome with the measure was the low awareness of the possibilities with clean vehicles and the huge dependency of fossil fuels such as petrol and diesel. Global warming, acidification and eutrophication as well as health hazards in urban areas are overall problems to be solved, by reduction of harmful emissions of carbon dioxide, nitrogen oxides and particles.

In Graz, traffic flow has increased steadily during the last years, like in most other cities in Austria. Although Graz is well known for innovative mobility management practices, there are still the problems of air pollution caused by traffic. Recently the reduction of particulate matters (PM10) caused by industry, private households and cars became an important initiative of the whole region. Due to its position in a basin between hills and special weather conditions in Graz during the winter months, the problem occurs mainly between November and March. One measure that supported the aim to reduce air pollution was to introduce lower parking tariff for low-polluting vehicles (containing not only hybrids, electrical and bio-fuelled vehicles, but also fossil fuelled vehicles but with low emissions). The aim was to raise awareness about emissions (which cars are accepted as “cleaner” cars?) and to motivate people to buy and use cars that produce lesser emission.

The main problem to be solved by the parking measure in Pécs was to reduce the large number of cars visiting the city centre, which results in congestion, significant air and...
noise pollution, and damages to the UNESCO protected sites. The zone-model parking system initiates less private car use – due to parking fees – and an increase in public transportation. By introducing the zone-model parking system and establishing a car-free zone in certain areas of the city centre, significant decreased traffic and improved environmental conditions. A co-ordinated and central management of all parking spaces in the city centre was a prerequisite for success.

4.4 Interaction within WP/Civitas

There have been interactions between the partners within WP6 – Integrated Pricing Strategies. Initially, the measure leaders from all eight demonstration WPs in Trendsetter were invited to a workshop in Graz in June 2001. Evaluation issues were discussed in plenary sessions as well as in WP workshops. After the meetings in Graz, the WP leaders prepared their WP Evaluation Plans, which were included in the overall Evaluation Plan for Trendsetter.

A second workshop in WP 6 was organised in Lille in October 2004. The following issues were discussed; Measure status, Detail the Evaluation Plan, Lessons learnt and conclusions.

The day after the internal Trendsetter workshop in Lille, a large external workshop/seminar was arranged by LMCU on the topic Efficient Public Transport.

The workshop was held in three parts:

- Intermodality – easy travelling with interchanges
- Fare integration – one ticket for the whole trip
- Smart ticketing systems – everything on one card

Public authorities, transport operators and industry provided the latest international findings and practical experience in the field. Focus was put on achievements pioneering and paving the way for European level deployments. 104 delegates registered from 34 cities and 14 countries all around Europe.

The results from each WP (results, drivers and barriers, conclusions and recommendations) were discussed at a Steering committee meeting in April 2005.

Trendsetter, including the work done in WP6, has been presented at many major conferences, both national conferences in the different countries but also on national conferences and seminars.
PART C – Results and Analysis

5. Indicators

5.1 Indicators

Below is a table containing the measures of work package 6 and which Trendsetter Common Core Indicators and WP Common Indicators they use in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
<th>6.1</th>
<th>6.2</th>
<th>6.3</th>
<th>6.4</th>
<th>6.5</th>
<th>CCCI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M4</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of CO₂</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M8</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M10</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M11</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dB(A)</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>M12</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>(M21, 22, 25)</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>M19</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td>M14</td>
</tr>
<tr>
<td>Transport</td>
<td>Modal split (cars – Public Transport, between Public Transport modes)</td>
<td>%</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>M26, 27</td>
</tr>
<tr>
<td>Transport</td>
<td>No. of parking tickets, applications, permits for all vehicles, permits for clean vehicles</td>
<td>No.</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Number of vehicles within specified area</td>
<td>No. Clean veh. No. private cars</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Civitas Common Core Indicators

Below is a description of the evaluation areas and the indicators in each evaluation area.

Energy

The evaluation category Energy describes the annual energy use by traffic, in some measures divided on vehicle categories or modes of transport. The energy use should be divided into total energy use and use of renewable sources.

Environment

The evaluation category Environment consists of four indicators; Emissions of fossil CO₂, Emissions of NOx, Emissions of PM and Noise levels. The emission indicators all describe the annual emission from traffic, in some measures the emission is divided on vehicle categories or modes of transport. The indicator Noise level describes the noise level in dB(A), which is an unwanted or harmful outdoor sound, including noise emitted from traffic.

Mobility

The evaluation category Mobility consists of four indicators; Number of trips, Travel time (not evaluated in this WP), Quality of service and Acceptance.
**Transport**

The evaluation area **Transport** contains eight indicators in this work package. Only three of them are used by more than one measure; Modal split, Number of clean vehicles within specified area and Number of tickets, permits or applications. In measure 6.1 the number of public transport users and the consumption and distribution of magnetic card blanks are evaluated as well. In measure 6.5 the number of cars using the parking facilities in the city centre, the average time of parking in the city centre and the number of purchased parking machines are indicators used in the evaluation.

**Society**

In this work package the evaluation category **Society** evaluates living or working conditions for the persons living in the city (6.5, Pécs) or if they accept the preference of low parking costs for low polluting vehicles (6.4, Graz).

5.2 Analysis and comparison of results on indicator level

**Smart card system and integrated ticketing in Stockholm (6.1)**

The smart card system would make access to the public transport system more effective and improve the service of public transport by making it easier for public transport users to deploy buses, metros and trams.

Since the implementation of the smart card system is delayed, it has not been possible to carry out a quantitative indicator based evaluation within the trendsetter time frame. When the system will be implemented, the energy use and emissions of CO2, NOx and particulate matter (PM) will be reduced. The measure is expected to increase the number of trips with public transport and influence the modal split towards a higher percentage for public transports. SL will work hard to reach a high acceptance of the new smart card system.

The most important evaluation within the Smart Card System project in Stockholm was to measure the number of passengers and their satisfaction using public transport. A comparison between 1998 and 2004 was intended to show the increase of 100 000 new passengers and moreover an increase of 15 % passenger satisfaction. The goal was not reached. SL has achieved 72 000 new passengers and the satisfaction increased with 4 %. The reasons for not reaching the goal are several:

- The population in the County has not increased as predicted
- The contractor responsible for the Commuter trains did not prepare themselves properly when they took over the operation in year 2000. A lack of personnel forced them to cancel several departures, which of course had an impact on the passenger’s opinion of the public transport system.
- The smart card system was delayed due to miscalculated time schedule for preparations before and carrying out the procurement itself, as well as internal problems at the Supplier not being able to set up a proper project organisation.

At the end of 2004 SL could see a clear trend. The numbers of passengers are increasing and so are their opinions of the service. SL feels that if the new system had not been purchased and communicated towards the passengers the increase of new, satisfied passengers had been less. The passenger knows that there is something coming that will ease their daily rounds.
Calculating that the average use of a car is by 1.3 persons and that SL have increased the passengers with 72 000 could mean that there are as much as 55 000 cars less in the City of Stockholm as it would if they all had gone by car instead.

**Smart card systems and integrated ticketing in Lille (6.2)**
The most relevant evaluation relates to the use of different public transport modes. The modal share of public transport in Lille Metropolis (all modes including walk) passed from 7.5% in 1998 to 10% in 2005, for the moment in conformity with the objective of the PDU which is to pass to 14.6% in 2015.

Altogether all Trendsetter measures in Lille aiming at increase the use of public transport have reduced fossil CO2 with 25 500 tonnes, NOx with 58 tonnes and PM with 13 kilos.

**Reduced parking fees to promote clean vehicles (6.3)**
The measure is a supportive measure to other measures promoting the use of clean vehicles in Stockholm, especially the measure “Increasing clean vehicle use in private company fleets”, which was implemented in Trendsetter. The energy and environmental effects of the parking measure will be included in the evaluation of 12.13 since it is not possible to separate the effects. Thus, the reduction in Energy use and Emissions of CO2, NOx and particulate matter (PM) will not be presented separately for this measure. Due to the late implementation, the mobility indicators have not been able to evaluate.

When the decision about free parking was taken, the city started to advertise for the new incentive for clean vehicles. A campaign was launched on web pages and on parking meters all around the city. The first month, the Traffic Administration in Stockholm received almost 500 applications for free parking.

If the project had taken place, the issue about a Stockholm definition on clean vehicles would most likely not have been put on the city agenda. The issue has helped to increase the knowledge and the understanding of clean vehicles among the politicians. Besides this effect, the issue has lead to that clean vehicle as such have gained a lot of attention in the local and national media. The increased coverage and the raised awareness among journalists have increased the public perception considerably. Today, many in Stockholm believe that they will buy a clean vehicle in the future. So the activities in the project have resulted in improvements and higher awareness about clean vehicles and fuels.

Currently, the Swedish Road Administration (SRA) has proposed a nation-wide definition of clean vehicles. A bill is currently prepared by the Ministries and it could be passed in the Parliament by the autumn of 2005. The larger cities, as well as many stakeholders and non-governmental organisations are among the policy making groups that have been involved in the process of preparing the proposal of SRA. This definition by SRA would primarily be used for purchasing of clean vehicle fleets by governmental authorities and other such bodies. On the longer term, this definition, providing that the bill will be passed by the government and thus gain a broad acceptance, could also be used for other purposes.
**Integrated pricing strategy for parking zones (6.4)**

Within the period April 2004 to September 2005, only 41 drivers of low-polluting vehicles were approved by the parking department. The measure reduced fossil CO2 emissions with 435 tonnes per year, NOx emissions with 1.7 tonnes per year and particulate matter with 0.124 tonnes per year. The energy savings are calculated to 10.39 TJ per year.

The knowledge of the measure, i.e. the awareness among PT users was approximately 25%. The acceptance of the lower parking fees for less polluting vehicles was about 60%. 30% of all interviewees assume that car users will be influenced the measure, thus buying new cars or parking outside the inner city.

The expected number of registrations as low-polluting cars could not be reached. The main reason was that only very few cars fulfil the set criteria, mostly because they lack particle filters. Another reason was that producers and retailers do not promote cars that fulfil the criteria actively. As more and more cars fulfilling the criteria becomes available, Graz plan to carry out a special promotion campaign together with the car dealers.

**Establishment of a zone-model parking in the central city area (6.5)**

Before Trendsetter it was impossible to park in the whole city centre of Pécs. People coming to work in the centre parked their cars and left them there for the whole day. During the daytime all car-drivers tried to find free space – without result – and the city centre was always full with cars looking for parking space. This resulted in unnecessary congestions, emission of green house gases and other pollutants. Since parking was free, no income was generated.

After the measure was introduced, much less cars come to the city centre and those who come can almost always find a free parking space immediately. The income generated by the system finances the P&R facilities and other cost-free parking space developments outside the centre. The Municipality of Pécs officially declared that all revenues generated by the system would be utilized for parking infrastructure developments.

A significant increase has been measured in Public Transport occupancy/usage. This extra revenue are also spent on Public Transport development (modernisation of the fleet), which serves environment protection since the old bus fleet fulfilling the Euro 2 norm is exchanges with Euro 4 buses.

Without implementing the zone-model parking system in Pécs, it would be unattractive to park, live and spend the free-time in the centre, as in the last four years a 10% growth in the number of cars has been measured in Hungary. The traffic burden would make the living and working circumstances considerably worse, which would have negative impact on the health and quality of life.
Overall achievements:

- Daily number of cars passing Jókai Square reduced from 2 300 (in 2000) to 0 (in 2004)
- Number of bus season tickets (monthly season tickets per year) sold increased from 760 000 (in 2001) to 860 000 (in 2004)
- Number of city centre access permission decreased from 3 860 (in 2002) to 3 195 (in 2004) due to stricter control
- The number of cars visiting the city centre has been reduced by 600-800 a day, which is an average reduction of 20%.
- Approximately 80% of this traffic has been diverged to the buffer zone (cost free parking space) around the city centre; therefore, the real reduction is around 250 cars per day.
- The occupancy in the public transport system has increased by approximately 1-2% in the last years

The table below showing the changes concentration of the different gases in the air on Pécs

<table>
<thead>
<tr>
<th></th>
<th>2003</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO2 µg/m3 / average day</td>
<td>6</td>
<td>5</td>
</tr>
<tr>
<td>NO2 µg/m3 / average day</td>
<td>33</td>
<td>22</td>
</tr>
<tr>
<td>NOx µg/m3 / average day</td>
<td>131,61</td>
<td>89,4</td>
</tr>
<tr>
<td>Particle / m³ daily average</td>
<td>62,6</td>
<td>44</td>
</tr>
<tr>
<td>CO mg / m³ yearly average</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Due to the fuel change of the Pécs Power Plant (from coal to biomass) the SOx emission in Pécs has reduced by 50%, but it is not related to the traffic development projects.

The achievements give significant improvements in environmental and living & working conditions.

Modal Split

In Pécs, 50% of the transportation in the external districts and in the city centre, together, is done by public transport (buses) and the other 45% done by private transportation (cars). People that are walking and bicycling are not included in the modal split. In Pécs only 14 km of bicycling road exists.

Quality of service public transport

Below is a figure of the satisfaction with the public transport quality, with the number of lines and with the level of service. 47 % are extremely or overall satisfied, 26 % are partly satisfied while 18 % are dissatisfied. Those partly satisfied lacked some lines.
Figure 1   Satisfaction with the public transport quality, with the number of lines and with the level of service

Extremely satisfied: 7%
Satisfied: 40%
Partly satisfied: 26%
Not satisfied: 18%
Don't know: 9%
6. Fulfilment of Objectives

6.1 Achievement of measure objectives

*Measure objectives - Smart card systems*

The main objective for introducing a Smart Card System in Stockholm (6.1) was to increasing the number of public transport users, by a modal shift from private cars to public transport. This would reduce emissions, noise levels and energy consumption. The smart card system would make the access to the public transport system more effective and improve the service of public transport by making it easier for public transport users to deploy buses, metros and trains.

Due to the delayed implementation of the system in Stockholm, the measure objectives are not reached. When implemented, the smart card system is still expected to meet the measure objectives. As earlier described, the number of passengers and the satisfaction has increased, but not as much as expected.

Introducing a pricing scheme, an integrated ticketing system and specification of possible Smart Card for the public transport in Lille (6.2) leads to improved intermodality and improved attractiveness of Public Transport. These measure objectives are met. These actions also increase the number of public transport users and reduce emissions, noise and energy consumption. Additionally, the smart card system will not only favour intermodality between public transports, but also between public transport, cars and two-wheelers. The car-convenience parking fees will also be charged on the smart card.

*Measure objectives - Parking*

The parking measures all have objectives to reduce emissions, noise levels and energy consumption within the city centres.

Reduced parking fees, as incentive to clean vehicle use in Stockholm (6.3), leads to increased use of clean vehicles within the inner city. Due to late decisions by the politicians in Stockholm, the parking measure was delayed. The reduced parking fee has been available since May 2005 and until August 2005 about 830 applications for free parking has been issued.

The new parking system in Graz (6.4) includes differentiation between polluting and low-polluting vehicles. In addition to reduction of emission, noise levels and energy consumption, measure objectives were to develop and implement a new parking model system, acceptable for the citizens and technical and organisational feasible. The measure
objectives have been met but the number low-polluting vehicles in the city centre has only increased slightly. In September 2005, only 41 permits have been issued.

In Graz, the new parking tariff for low emission vehicles was introduced in April 2004. Graz estimated that approximately 3,500 vehicles are able to surpass the set criteria.

During the introduction of the new parking tariff in Graz, the interest of the general public was quite high. Nevertheless it appeared that most vehicles were not able to fulfil the set criteria since particulate matters filter for diesel engines only were offered for a few cars. Even the interest of drivers of petrol powered vehicles was not as high as expected. An awareness campaign was carried out during the starting phase of the project but no further promotion campaign for the new parking tariff was conducted. Now, Graz plans to carry out a special promotion campaign together with the car retailers.

The city of Pécs introduced a zone-model parking system in the central city areas (6.5). Additional to reduced emissions, noise levels and energy consumption, the objectives were to decreased traffic in the central areas of Pécs (20 to 80% depending on the exact location of the zone), decrease in the average time of parking in the centre with 20%. Private car use has been decreased in certain areas by 100% because some parts been completely closed and blocked, car-free zone the decrease has been 80% and in access restriction zone (access is permitted with municipal permission) the decrease has been about 20%. The objective concerning average parking time has also been reashed.

The measure have led to better living and working environment, better circumstances for tourists as well as better conditions to preserve and protect the UNESCO World Heritage sites.

### 6.2 Achievement of WP Objectives

The objectives for WP 6, Integrated Pricing Strategies, were defined as achieving a modal shift from private cars to public transport through simpler and accurate pricing of Public Transport, i.e. Smart Card system as well as promoting clean vehicles by introducing parking incentives. The measures within the WP should, by modal shift and shift to clean vehicles, reduce emissions, noise levels and energy use. Below is the WP objectives and descriptions of how they are achieved.

**Achieve a modal shift from private cars to public transport through simpler and accurate pricing of Public Transport, i.e. Smart Card system.**

The two measures concerning smart cards will lead to a modal shift from private cars to public transport when the systems are implemented.

**Promoting clean vehicles by introducing parking incentives.**

The parking measures in Stockholm and Graz aim at promoting clean vehicles. The measure in Stockholm aim at promoting clean vehicles fuelled by renewable fuels, the
measure in Graz promotes both renewable fuels and low polluting fossil fuelled vehicles. In Pécs, the parking restrictions have reduced the traffic in the city centre, not differentiating on emission levels.

*By modal shift and shift to clean vehicles reduce emissions, noise levels and energy use*

All measures support the objective to reduce emissions, noise levels and energy use. The measures that are not implemented yet have the potential for reductions of emissions, noise levels and energy consumption.

### 6.3 Contribution to Trendsetter objectives

**Trendsetter High level objectives**

Trendsetter’s objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life.

Provide examples:

- *Provide input to European policy making and promote a sustainable transport future in Europe.*
  
  All five measures contribute to the objective.

- *Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.*
  
  The smart card system measure in Lille and Stockholm contributes to the measure. The objective is not applicable to the other measures.

- *Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.*
  
  The parking measure in Stockholm and Graz contribute to the objective.

**Increase mobility:**

- *Promote the use of public transport and other alternatives to private cars*
  
  The two Smart Card Systems measures as well as the Parking zones in Pécs contribute to the objective. The objective is not applicable for the remaining two projects.

- *Demonstrate new ways to improve urban goods logistics and efficiency.*
  
  Not applicable for these measures.
Enhance Environment:

- Reduce annual fossil CO2 emissions by 5%, approximately 75 000 tonnes per year, for all cities within Trendsetter
  Achievements: All measures contribute to the objective when implemented. See table below.

- Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.
  Achievements: All measures contribute to the objective when implemented. See table below.

- Reduce noise levels in all cities within Trendsetter
  Achievements: The parking measures contribute to the objective. Only the measure in Pécs evaluated it on indicator level. See table below.

Save Energy

- Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter
  Achievements: All measures contribute to the objective when implemented. See table below.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>6.1</th>
<th>6.2</th>
<th>6.3</th>
<th>6.4</th>
<th>6.5</th>
</tr>
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<tr>
<td>CO₂</td>
<td>ton /year</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
</tr>
<tr>
<td>Energy</td>
<td>TJ / year</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>10.39</td>
<td>↓</td>
</tr>
<tr>
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<td>ton/year</td>
<td>↓</td>
<td>↓</td>
<td>↓</td>
<td>1.7</td>
<td>↓</td>
</tr>
<tr>
<td>PM</td>
<td>ton/year</td>
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<td>↓</td>
<td>↓</td>
<td>0.124</td>
<td>↓</td>
</tr>
<tr>
<td>Noise</td>
<td>(i)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>↓</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
- Symbols within parenthesis designate targets for measures that have not been implemented.
- Arrows indicate an increase or decrease but that either the results or the targets are not quantifiable.
- “X” indicates that both the results and targets are not applicable.
6.4 Trendsetter Demonstration objectives

Most of the demonstration objectives are not applicable for the measures in the work package Integrated Pricing Strategies, see chapter 2.2 for a compilation of all demonstration objectives. The applicable objectives and which measures that contribute to the achievement of them are presented below.

**Smart card system in Stockholm**
The smart card system is delayed due to miscalculated time schedule for preparations before and carrying out the procurement itself. It is also delayed due to internal problems at the supplier not being able to set up a proper project organisation. The system is planned to be in operation in the beginning of year 2007 and will replace the current system after a migration period of approximately 8 months.

**One environmentally oriented Parking zone in the city of Graz.**
The demonstration objective is achieved; cheaper parking for low-polluting cars has been implemented for all parking zones.

**One environmentally oriented Parking zone in Pécs**
The demonstration objective is achieved.

6.5 Trendsetter Scientific/technical objectives

Most of the scientific/technical objectives are not applicable for the measures in the work package Integrated Pricing Strategies, see chapter 2.2 for a compilation of all scientific/technical objectives. The applicable objectives and which measures that contribute to the achievement of them are presented below.

**Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision**
The two Smart card projects (in Stockholm and Lille) both contribute to the achievement of the objective. The objective is not applicable for the other three measures.

**Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.**
The two Smart card projects (in Stockholm and Lille) both contribute to the achievement of the objective. The objective is not applicable for the other three measures.

**Evaluate the effectiveness and political acceptability of environmental zones**
The parking zones in Pécs contribute to effectiveness and the political acceptability of environmental zones. The objective is not applicable for the other measures.

**Develop integrated city mobility plans integrating environmental protection, traffic and public health policies**
Smart card systems and integrated ticketing in Lille contributes to the objective. The objective is not applicable for the other measures.
7. Used Technology

7.1 Overview of used technology within WP

In Stockholm, SL has purchased a Smart Card System consisting of Back Office functionality and Front Office (Sales equipment).

The system is modern but not totally new. SL wants to have a reliable and well-tried system to avoid surprises that will affect the passengers in a negative way. The system is built in such a way, using modules that changes in the future will be easy to implement. The card itself is built on a standard called RKF (Resekortsföreningen i Norden). By using the same standard in Sweden and its neighbouring countries the passengers will have a boundless travelling which they will benefit from as well as the transport principals.

The Back Office includes a Clearing system that will be used to clear transactions between transport principals as well as a tool to calculate and transfer incentives towards the contractors.

Front Office consists of all types of sales equipment. There are only a few automatic ticket dispensers in the current system and Internet trade is also a very small part. Implementing the smart card system will be the start of a new concept of sales strategy as self-service will be a bigger part of sales. Surveys have shown that the passengers miss those channels in today’s system.

Representatives of the Lille Metropolis have met the technical groups to decide the objective of the new integrated ticketing (6.2). The team has defined the system's functionalities. An in-depth study of fare integration with the region and operators (Transpole and SNCF), including scenario building, has been performed. This will be used for functional description and implementation specification.

The information campaign to support the reduced parking fees for clean vehicles in Stockholm (6.3) may include information channels as; city owned information stands, parking meters, city advertisements in media, brochures, stickers and letters to companies with parking permits.

In Graz, a special software was installed in the parking meters, which allows distinguishing between two different parking tariffs (ordinary vehicles - low emission vehicles). The technical solution was relatively simple to get integrated into the new types of parking machines and the software was already tested by other customers.

For getting the special tariff the drivers have to register their vehicle at the city for the so-called Umweltjeton (special coin) and a special sticker. The sticker is an official document, which is filled out by the city and includes the car number, type of car, colour of the car and an official seal of the city of Graz. The Umweltjeton and the special sticker are generally for free, so no extra registration fee is applicable. The sticker is valid for up to two years, after this the user has to apply for an extension of the sticker.
The Umweltjeton has to be thrown into one of the parking machines, to switch it to the reduced tariff. The parking ticket is marked in the upper corner with a “U” which stands for Umweltticket (environmental friendly ticket). The sticker has to be located on the dashboard behind the windscreen to be clearly visible for the observance.

A limit was set up for so called low emission vehicles. The Technical University of Graz and the Environmental Department defined the limits: all vehicles have to achieve the Euro IV norm, petrol powered vehicles have to emit less than 140 g CO2 per kilometre, diesel powered vehicles have to emit less than 130 g CO2 per kilometre and have a filter for particulate matters. It was estimated that approximately 5 percent of all registered vehicles in Graz are able to fulfil this criteria.

The measure in Pécs used the technology of Graz. As a follower city, Pécs has implemented a system that is functioning well in a lead city. No innovative technologies, or actions have been used for the implementation of the measure. Actual work performed was:

- Positioning new tables, painting the necessary traffic modifications
- Positioning new parking ticket machines
- Positioning fixed road blocks and jet polls
- Agreement with the municipal police on the increased control

7.2 Positive aspects, problems & solutions, new concepts

The smart card can make the charging more flexible, taking factors such as trip length and time of the day into account. Other regional public transport operators can accept the card as payment. Smart card systems also make it possible to gather and present sophisticated statistics about travel patterns. This gives better opportunities to increase public transport service according to actual demands.

Since banks are developing systems to make it possible for the user to add money to the card using automatic teller machines, the smart card could also be used to purchase tickets on the national railways as well as on public transport in other cities. Since the memory capacity of the card is high, it can also include information needed to facilitate payment for other services such as parking fees, car sharing and taxi.

In Graz the project still faces difficulties e.g. just a hand full of diesel-powered vehicles is equipped with a particulate matters filter. But since the measure had started more and more new car models are being provided with filters. Owners of cars, which are already in use, may get financial support for filter adaptation. In connection to these tendencies the parking model in Graz is certainly one more factor to prefer PM filter equipped diesel cars. On a general level it would be necessary to bind car producers to declare the pollution of engines according to a common standard. This would be helpful for drivers to get their car registered as low polluting.

7.3 Comparison and conclusions

The technical level in the measures varies. No measures implement totally new technical solutions, but techniques, which are already on the market.
8. Economical Aspects

8.1 Per measure

Smart card systems and integrated ticketing in Stockholm
The initial investments are large when implementing a smart card system. The System in Stockholm needed investments amounting to about SEK 267 million (approx. € 45 million). Implementing the smart card system might also increase the total maintenance cost even though the cost per unit decreases due to that the system does not include any mechanical parts. In Stockholm, several hundred automatic ticket devices are purchased which are not used in the current system. The reason for that is to support the passenger needs in finding a point of sale with as little effort as possible. In turn, hopefully the number of passenger will increase when spontaneous trips do not end with the car/taxi but the public transport as buying a ticket is smooth and easy. The maintenance costs do not have to increase in all cities implementing smart card systems. It depends on the current situation and the kind of system that will be implemented.

Smart card systems and integrated ticketing in Lille
The economical analysis of the impact of the measure is detailed in the deliverable “Implementation study for a smart card system in Lille Metropole”

Reduced parking fees to promote clean vehicles
The reduced parking fees for clean vehicles in Stockholm provide positive economical incentives to purchase a clean car. The calculated loss of income will be about SEK 1,8 million (€ 200 000) per year. The three year testing period will lead to a loss of income for the city by about city loss of income of about SEK 5,4 million (€ 600 000 ).

Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles
As there are still only few cars registered as low-polluting the economical aspect of the measure is not relevant at the moment. It could get more considerable for the city with regard to the revenue of parking fees in future. But even if the number of low-polluting cars would increase dramatically, the loss of revenue should be regarded as an important contribution to improve the environment. As for now the over all potential of low-polluting cars in Graz is only about 5%.

Since 2004, drivers of low polluting vehicles can receive a €0.40/hour discount on the parking fee in Graz. The ordinary tariff is €1.20/hour. The Parking Department postponed the introduction of the parking discount due to high costs for converting the parking machines. Finally, the new tariff was introduced at the same time as the parking fees for ordinary cars were raised and the vending machines had to be converted anyhow.

Establishment of a zone-model parking in the central city area
The system practically does not generate revenue for the municipality, thought all income is spent by the company of the city (Pécs Property) to improve parking facilities within the city. At least 10 years are needed to reach a level, when the city municipality may take the revenues out from the zone-model parking system.
8.2 Positive aspects, problems and solutions

The participation in a EU-project has been helpful to drive some questions and get political support. The possible EC funding has put pressure on some local politicians. In other measures, as in the parking measure in Stockholm (6.3), the political process has still been very long and time consuming.

8.3 Comparison and conclusions

Implementing smart card systems need large initial investments. The maintenance costs might also be increased as calculations concerning the new system in Stockholm shows. Smart card systems often lead to lower maintenance costs per unit/equipment. In Stockholm, the number of units/equipment is so large that the total costs will increase even though the average costs per unit reduces due to less mechanical parts. Since smart card systems hopefully increases the number of passengers, the revenues increases. Costs for personal will initially increase when the system is implemented, since more personal will be needed initially for educating and assisting the passengers.

Reduced parking fees in Stockholm and Graz are positive economical incentives for car owners. The cities revenues will be lower due to the reduction. The costs for the systems are reasonable. Parking zones like in Pécs will generate revenues in the long run, but initially all revenues are needed to support the system.
9. Synergies

9.1 Need for supplementary measures

Different kinds of measures often require complementary measures. Therefore a comprehensive view is necessary when a sustainable urban transport system is the target.

The smart card system is one component in achieving an attractive and competitive public transport offer. The attractiveness increases when using a standard on the smart card that is common in the surroundings of the county/country to achieve a boundless travelling for the passengers.

Surveys in Stockholm show that other vital factors for the passengers are punctuality and cleanliness. Thus, constructive work has to be done together with the contractors responsible for the traffic in operation. Other important factors are easiness to buy a ticket and being received with kindness and professional service by the personnel. Information on disruptions in the traffic is also vital. In addition to more frequently used channels; information on stations and on the radio, technique for mobile phones to reach out to passengers via short messages is desired.

In Lille Metropole, SMIRT (Syndicat Mixte pour l'Intégration des Réseaux et des Tarifs) has been created, an essential tool to allow political and financial commitments and to cooperate in regional projects of fare integration and ticketing (6.2).

The reduced parking fees for clean vehicles in Stockholm (6.3) were a supportive measures to other Trendsetter measures, in work package 12 – Clean Public and Private fleets. The measure is closely related to the measures Increasing clean vehicle use in private company fleets (12.13), Web portal for clean vehicles (12.14), Improved biogas refuelling structure (12.10), Making clean vehicles less expensive (12.11). A political long-term strategy for clean vehicles would help to make the measure more successful.

Promoting low-polluting cars by reducing parking fees for them needs well defined standards. In Austria car producers and car sellers are not obliged to declare the pollution of their engines and there do not exist standards on this issue. This should be implemented to make the registration for low polluting easier and less bureaucratic.

The implementation of parking zones in Pécs reduces the traffic in the city centre (6.5). Development of Park and Ride facilities is important to get acceptance for the measure. To provide attractive alternatives to the private car is also important, like efficient Public transport and safe and attractive solutions for the pedestrians.

9.2 Comparison and conclusions

The smart card systems and their related services aim at making travelling with public transport more attractive. The parking measure in Pécs will also increase the attractiveness of public transport when the access to the city centre is limited. The parking measures in Stockholm and Graz are more supportive measures to measures aiming at increasing the use of clean or less polluting vehicles.
10. Political and Administrative Aspects

10.1 Overview of major political and administrative aspects influencing the measures

Stockholm Transport has a political board (6.1). The board has supported the measure, which is inevitable for a successful implementation.

The project of fare integration, an initiative from Lille Metropolis, develops to a regional dimension, through the imminent creation of the SMIRT (Regional Intermodal Mixed Union) (6.2)

As for the Stockholm project on clean vehicles, a political committee chaired by the Vice Mayor for Environment supervises the parking measure in Stockholm (6.3). This ensures a stable control of the local actions.

Free parking for electric vehicles had been introduced prior to Trendsetter in Stockholm.

The issue whether or not to offer free parking for other clean vehicles than electric has been widely debated. The issue has led to legal concerns on both local and national level. The decision about free parking was difficult to take for local politicians in Stockholm as some lawyers claim that such a decision would not be legal according to Swedish national law. However, free parking for clean vehicles has been implemented in many other Swedish cities. This taken together has lead to that the Swedish government has appointed a commission to investigate if there is a need for changes in the present regulation on parking.

The salaried employees have worked closely with both local and national politicians to convince them in the matter. A meeting with the Vice-minister of Finance has been held to discuss the free parking legislation (this meeting also involves projects 12.1, 12.4, 12.6 and 12.10-14.). A letter discussing issues involving extending the legislation to all-clean vehicles has also been sent to the Minister of Industry.

Meetings and discussions with the Vice mayor of Environment has been held, as well as meetings with the Traffic Administration to discuss the delay in implementing the free parking legislation and the political steering board was actively involved.

The political decision was delayed but finally taken by the Traffic Board in December 2004. Decisions were also taken in the city executive committee in February 2005 and in the city council in April 2005. The free parking is available since May 2, 2005.

Due to an opinion poll made in April 2005 by one of the biggest evening paper in Sweden (Aftonbladet), 70 percent think that free parking for clean vehicles is a good thing. In Graz (6.4) it was necessary to implement new guidelines due to the new parking tariff, which turned out to be the most difficult task. Within the steering group various opinions about pollution limits were discussed, but finally a consensus was reached. As drivers of electric powered vehicles already did not have to pay a parking fee since 1997, the introduction of a new parking tariff is just a further step on the ladder of a consistent sustainable transport policy of the city of Graz.

This was the main important aspect for the preliminary decision by the City Council about the acceptable technologies and the threshold limits for environmental parking. It turned out that the legal framework defined by the existing law had to be changed by the
provincial government in order to enable the City of Graz to charge different parking fees for polluting and low-polluting vehicles.

All political parties in Pécs have supported the introduction of the system (6.5). Despite that, political debates have been ongoing about the cost of parking, the financing of the new parking facilities, etc. The city administration has worked in close co-operation with the city company (Pécs Property) to install and operate the system successfully. A coordinated and central management of all parking spaces in the city centre was necessary for the successful implementation.

A municipal resolution on the zone-model parking system was taken in 2002. Another municipal resolution on the car-free zone was taken the year after. Since 2003 the municipal and the police strictly control the access.

10.2 Comparison and conclusions

Political support is a very important factor for successfully implementing measures in the cities. New kinds of measures might also need new organisations (fare integration in Lille and parking management in Graz) or at least new forms for co-operation within the city. Legal aspects are also vital
11. Up-scaling and Transferability

11.1 Potential for up-scaling and transferability to other cities

Up-scaling of the measures in WP6 - Integrated Pricing Strategies can be done, but in different aspects. Since the measures can be considered performed in full-scale, a geographical up-scaling is not of main interest. All five measures in WP 6 are possible to transfer to other cities. New regulations might be needed in some cases (parking measures supporting clean vehicles or restricting different kinds of vehicles in some areas).

An up-scaling of the smart card system in Stockholm could involve other services, like payments for parking fees, taxi, car sharing, national railways, public transport in other Swedish and Nordic cities etc. Scaling-up could also imply building an association of transport principals. The association can decide a standard that all transport principals will commit to which will benefit the passenger. The standard have no impact whatsoever on the regulations concerning the rate. The rate is always an issue for the transport principals themselves. An up-scaling could also include a wider geographical integration of tickets and use of the same smart card system.

In Lille, the most natural scaling-up would be to actually implement the ticketing system based on contact-less smart cards.

The parking measure in Stockholm could be up-scaled by including also the fees for temporary parking. This new municipal regulation only involves free parking for commercial vehicles with special parking permits and for residents of the inner city area. However, it would be possible to apply free parking for ALL clean vehicles parking in the city. This has been done in other Swedish cities for example Malmö and Gothenburg. The geographical area could of course also expand and include the nearby municipalities as well.

The parking measure in Graz is easy to implement in other cities, if the parking machines support the software. Graz will support followers. To scaling-up the number of low-polluting cars getting registered a large-scale awareness campaign in Graz is needed. During the introduction of the project only one awareness campaign was conducted, which turned out to be not enough. Partnerships with car dealers should be established to give the project a better promotion.

Based on the experiences of the Civitas cities (mainly Graz) further limitations will be introduced in parking in the city-centre of Pécs. After the preparation and official approval of the new transportation strategy (July-September 2005) the parking system will be modified: time limitations will be introduced and the long-term parking facility development of the city of Pécs will be approved. The further limitation of private car access is the first priority of parking space management, in order to reach this new jet polls will be installed and further streets will be closed. In 2-3 years the official regulation on the positive discrimination of clean cars will also be introduced.
11.2 Comparison and conclusion

The measures in WP6 are all possible to up-scale in different ways to achieve larger effects of the measure. Information campaigns and awareness campaigns are tools to use to get larger effect of already existing measures or to use when up-scaling the measures. The measures can also be transferred to other cities after analysing the differences and similarities between the cities.
## 12. Assessment of All Measures

In the table below, the different measures are described on the basis of their implementation, fulfilment of measure objectives and contribution to WP objectives.

<table>
<thead>
<tr>
<th>Measures in WP 6</th>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1 Smart card systems and integrated ticketing</td>
<td>Not implemented</td>
<td>No, due to delayed implementation. Fulfilment expected in 2007 when implemented in full-scale.</td>
<td>No, due to delayed implementation. Contribution in 2007 when implemented in full-scale.</td>
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<tr>
<td>6.2 Smart card systems and integrated ticketing</td>
<td>As planned</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>6.3 Reduced parking fees to promote clean vehicles</td>
<td>As planned</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>6.4 Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>As planned</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>6.5 Establishment of a zone-model parking in the central city area</td>
<td>As planned</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
PART D – Conclusions and Recommendations

13. Barriers and Drivers of the Measure Implementation

13.1 Technical barriers and drivers

Barriers:
- No major technical barriers since no totally new technique was used in the measures.
- Implementing a new high-technology system, as a smart card system, takes several years, but is an interesting way to implement innovative commercial strategies
- Development of smart card systems is done where and when there is an actual need for it. Cities and countries do not wait for the EC to get to an agreement. When a common EC-standard will be presented, there will be several different standards in use within Europe

Drivers:
- No technical drivers are identified.

13.2 Synergies barriers and drivers

Barriers:
- No synergy barriers identified.

Drivers:
- Ticketing is a tool to the service of the commercial relation between operators and customers, capable of coping with complex fare structures, multi-operator environments and optimisation of exploitation conditions in a user friendly manner
- Visiting other cities that already have a smart card system ongoing or are in the middle of procurement is valuable not to fall in any traps. Listening to other transport principals’ positive and negative experience is vital.
- Cooperation with other actors implementing smart card systems give positive synergy effects, as the joint effort by Nordic regional public transport companies and national railways to develop standard for smart cards in Sweden.
- Smart cards make it possible to create databases with travel patterns, which can improve the planning of public transport.
- A smart card systems is a prerequisite for advanced pricing models, for example prices according to travel length or time of day.
- Introducing smart card systems conveys the possibility of future expansion (taxi, parking fees, car sharing etc). The additional service can increase the acceptance among passengers.
- Smart card system is a tool that favours intermodality between different kinds of public transport systems.
• Reduced parking fees for “clean vehicles” and/or increased fees for “normal vehicles” - will force the shift toward “clean vehicles” and higher use of public transports.

• The technical implementation of the measure in Pécs was well-known before its implementation as they adapted the model of Graz. It is recommended to each city in Central East Europe (CEE) to find a similar Western Europe city and analyse their best practices before implementing any kind of transportation / traffic investments / developments.

• Involvement of stakeholders important for success and smoother implementation process, as in the measure in Pécs.

13.3 Political and administrative barriers and drivers

Barriers:

• Lack of acceptance by citizens can make every measure fail
• Buying a new ticket and payment system is very complex and has big economical consequences.
• Lack of one European or national standard can be a barrier and delay the implementation of a smart card system. To get acceptance of a definition within a city might also be time consuming.
• Since integrated ticketing and smart cards often involves many actors, special organisation authorities might be needed to handle the cooperation (as SMIRT in Lille)
• Lack of political support can be devastating for a measure. The politicians in Pécs have strongly supported the implementation of the parking zones. A complex political situation in the city of Stockholm makes it difficult to get wide political acceptance for new measures and often delays the decision-making process. The decision on reduced parking fees for clean vehicles in Stockholm in one example of measures delayed due to lack of wide political support.
• Lack of awareness - In Graz only few vehicles are registered (6.4). A large-scale awareness campaign is planned as well as establishment of partnerships with car dealers.
• To enable the parking discount in Graz, a specific law by the regional government had to be adapted. This took time and should be regulated in advance by cities following Graz’ example.
• The need for political decisions to perform a measure can be a insurmountable barrier. In other cases, like the parking measure in Stockholm it takes much longer time than expected to get the final decision. A decision in city council about qualifying technologies and threshold values for non-polluting vehicles in Graz was needed and took time.
• Reduced parking fees are strong economical incentives for car owners. Generally cheap and efficient measures. Loss of income due to free or reduced fee for clean cars is an economical barrier that might cause political problems. Stockholm have had
great difficulties to estimate the number of clean vehicles that would apply for free parking which has led to a great uncertainty about the amount of “missing income” for the city. The uncertainty was one of the issues causing the delay due to lack of political decision.

- There have been discussions about the legal possibility to introduce free parking for clean vehicles. The city of Gothenburg (Sweden) introduced free parking for clean vehicles years ago. They apply a system where all clean cars, independently if the car is registered in the municipality or not, have access to free parking within the city. This is not legal, according to legal experts in Stockholm. However, it is not likely to be appealed against. Stockholm is not prepared to take it that far. Therefore the city introduced free parking only for local residents’ parking and commercial parking in the city.

- It is of vital importance to have the media on your side, or at least not against your side. The successful implementation in Pécs was partly an effect of the positive picture the media presented, which resulted in high acceptance by both the public and politicians.

- Important to find rational methods for registration of “clean vehicles”.

- In the parking measure in Graz (6.4) it turned out as a barrier, that all potential drivers of low-polluting vehicles have to register their car at the Parking Department. This may be a rather complicated procedure; if there is no declaration about pollution provided by the car producer. Currently all car manufactures have different standards to illustrate this criteria. A common standard concerning this issue will help in the future.

Drivers:
- Desire (political / the public) to improve the environment or the living and working conditions.
- Fare integration can be supported by smart card ticketing.
- Smooth cooperation within the city can speed up implementation and get a better outcome of the implemented measures. In Lille Metropole, the creation of the new organisation SMIRT made the integration of pricing strategies and the planning of the smart card system possible to carry out. In Pécs, the administration worked in close-co-operation with the city company (Pécs Property) to install and operate the parking system successfully. In Graz a new company for parking management was founded. The differentiated pricing system was communicated to relevant departments and politicians.
- The demand of new kinds of tickets was one driver to implement the smart card system in Stockholm (7 day passes, 14 day passes, shopping tickets etc.).
- Safety aspects, to reduce forgery, is a driver to implement smart cards.
- The demand by public transport users for intelligent payment systems and integrated ticketing puts the pressure on the transport organisations and the politicians.
• Before-, during- and after- the implementation period, there will be a need of a lot of information and support, as the new ticketing system induces a change in customer behaviour

• Political commitment can drive a measure and smoothen the implementation. All parties in Pécs have supported the introduction of the parking system. Still discussions on costs of parking and financing of new parking facilities are occasionally ongoing.

12.4 Economical barriers and drivers

_Barrriers:_

• Implementing the smart card system drastically reduces the maintenance cost per equipment in the ticketing system, as no mechanical parts are involved in the system. Experiences from Stockholm, including an expansion of the control and automatic vending base (in particular high number of automatic vending machines), leads to a situation where the decrease in unit maintenance costs is offset by the increase in number of equipment. Field experience in implementing smart card system in other cities has shown a decrease of total maintenance costs.

• To not ruin the moral and political support in Pécs, which would have resulted immediate failure of the action, it was decided that the city would not take out the revenue from the parking system.

• Delayed payments from the EC have been a barrier for the Trendsetter project as a whole.

_Drivers:_

• Introduction of smart card system is an attractive solution for most of the users of public transports and will give rise to new users. The revenues from ticket sales are assumed to rise.

• The parking zones in Pécs will generate revenues to the city. Initially all revenues are needed to support the system

• A driving force for quick implementation of some measures has been the participation in the Trendsetter project. One example is the parking measure in Graz. There are strong doubts if the project would have been realised without the support of the EU-project.
14. Lessons to Consider for Replication and Take-up by Other Cities

Smart card systems and integrated ticketing (6.1)

- Political commitment can drive a measure and smoothen the implementation. The demand of new kinds of tickets was one driver to implement the smart card system in Stockholm (7 day passes, 14 day passes, shopping tickets etc.). Safety aspects to reduce forgery, is a driver to implement smart cards. The smart cards allow the PT operator to build customer databases and databases with statistics on travel patterns. Check-in and check-out increases the quality of the statistics. The potential of the smart card system is a driver when investing in a new smart card system. The demand by public transport users for intelligent payment systems and integrated ticketing puts the pressure on the transport organisations and the politicians. These relate essentially to the necessity of inserting measures in the complete context and coordinating a large and complex variety of stakeholders involved in public passenger transport.

- The smart card system is a very big change for the passengers. The smart card will consist of value in the form of electronic money as well as tickets. The value will not be visible for the passenger without using a device of some kind. The need of available personnel at the time for implementation will therefore be decisive for a positive reception of the system. Information handed over via the website and brochures will also be very important.

- Buying a new ticket and payment system is very complex and has big economical consequences. Before a decision is made of purchase the owner must consider the reasons for purchase and what benefits there are. It is also very important to plan for all the time needed. A conclusion is that it seems to be hard to fulfil the original time plan even though consideration is taken knowing that time always is an issue. Being a buyer also means that the contract must contain security for example for delays caused by the supplier.

- The time period between the decision is taken to implement a smart card system until it is actually implemented in full scale and be very long, even if things work well.

- Use requirements on functionality, not realisation. Be sure to take profit of new smart solutions invented during the project time. Be clear on rules and economy in the new contract. Work with bonuses and fines

- Politicians and staff are more focussed on the time schedule than the customers are, if there is (as in Stockholm) a system that works well today.

- There are successful examples in Europe – use them! One experience from other cities is that it is vital for success to inform and educate the staff initially and the travellers when the system is to be implemented

- Integrate other services on the smart card – taxi, car sharing, parking fees, bonuses etc to make the smart card more attractive.

- Personal integrity must be considered when implementing smart cards
Smart card systems and integrated ticketing in Lille (6.2)

- The co-operation between the various actors is a more important issue than the purely technical aspect of the project.
- Integrate other services on the smart card – taxi, car sharing, parking fees, bonuses etc to make the smart card more attractive.
- Since integrated ticketing and smart cards often involves many actors, special organisation authorities might be needed to handle the cooperation (as SMIRT in Lille)
- High level of service – important that users easily can find a point of sale.

Reduced parking fees to promote clean vehicles (6.3)

- The measure could very well be taken up by other cities. Free parking seems to be a very strong incentive to buy a clean vehicle. However, we have not at this stage been able to evaluate free parking in Stockholm, as it has only been implemented since May 2005. The statement above is mainly based on the increased interest from the public concerning clean vehicles.
- When trying to implement free parking some practical issues must be taken into account. Bear in mind that implementation of free parking for clean vehicles can be a complex political issue and therefore the process can be very slow (as in the case of Stockholm). It is also important to consider how the clean vehicles will be marked and who will process the applications for free parking permits.
- Depending on the definition of “clean vehicle” – reduced parking fees will give different results, such as: More use of renewable fuels and Lower emissions of a specific pollutant component.
- The lack of national definition of clean vehicles/less polluting vehicles can be a barrier. To get acceptance within a city might also be time consuming. The definition is needed to be able to implement fair incentives
- Politicians need to see alternative costs for achieving shift to other transport modes/Clean vehicles
- Changes in the parking legislation might be needed to be able to favour clean or less polluting vehicles.
- Information is needed to get both awareness and acceptance for the implemented measures
- The lack of wide political support delayed the decisions on reduced parking fees.

Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles (6.4)

- Keep technology simple, this means not to start with discussions about technology (software for parking meters, software for counting low emission vehicles) from scratch. A lot of software providers supply reliable systems.
- The implementation of the system must fit into the local law, which defines the parking tariff for low-polluting vehicles. Check very early if the law has to be changed, because this usually takes a lot of time.
- Set up a steering group with all key stakeholders (politicians, technicians…).
  Organize meetings to involve them into the concrete working plan.
- Check the suitable limit for low-polluting vehicles; the limit may vary from city to city.
- Do not miss help from other cities and EU
- Depending on the definition of “clean vehicle” – reduced parking fees will give different results, such as: More use of renewable fuels and Lower emissions of a specific pollutant component.
- New organisations might be needed to be able to work efficiently with the parking issues in a city
- Changes in the parking legislation might be needed to be able to favour clean or less polluting vehicles.
- Information is needed to get both awareness and acceptance for the implemented measures

Establishment of a zone-model parking in the central city area (6.5)
- The most important result of Trendsetter, is that a communication has been started between all stake-holders interested in city transportation and traffic management in the city and for the last years consensual agreements have been made considering the long-term city transportation strategy of Pécs. With the massive support of the media it has been reached, that city traffic is probably the first priority of environment protection, city development/planning. The key lesson learnt is that without providing information and opportunity to discuss these issues it is impossible to reach sustainable results. Limiting parking, closing streets, introducing heavy penalty on cars which access prohibited zones are really unpopular measures, but the consensual political and media support will have positive effects and even the first opponents will support these measures in the long run, as they realize that it serves a common interest.
- New organisations might be needed to be able to work efficiently with the parking issues in a city
15. Recommendations to EC and Other Actors

- Innovative measures are needed to approach more sustainable cities and societies, even though higher level of innovation often are related to larger risks of failure.

- There are immense efforts going on within Europe implementing measures to achieve sustainable transport systems and sustainable societies. There is a large potential in disseminating the best practice, worst practice and lessons learnt from them to other cities. New projects should be forced to learn from earlier experiences.

- Continue supporting successor countries, to make it possible for them to gain as much as possible from other countries/cities. Support of the more experienced cities/countries is then also needed to finance the transfer of knowledge.

- Harmonisation of “type approval” and “registration papers” all over EU. Same type of documents for all cars and more information (about particle filter, fuels, etc.)

- Definition of clean vehicles / less polluting vehicles help local, national and EC institutions to use incentives as free parking, reduced taxes, subsidies etc to help stimulate the clean vehicle market.
## Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
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</thead>
<tbody>
<tr>
<td>WP5 Access Restrictions</td>
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<td>5.1</td>
<td>Widening of the Environmental Zone</td>
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<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
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<td></td>
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<td>5.6</td>
<td>Congestion charging</td>
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<tr>
<td></td>
<td>Strolling zones</td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
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<td></td>
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<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
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<td></td>
<td></td>
<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
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<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
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<td>Smart card systems and integrated ticketing</td>
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<tr>
<td>Parking</td>
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<td>Smart card systems and integrated ticketing</td>
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<td></td>
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<td>Reduced parking fees to promote clean vehicles</td>
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<td></td>
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<td>6.4</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td>Establishment of a zone-model parking in the central city area</td>
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<tr>
<td>WP7 Public Passenger Transport</td>
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<td>Increasing public transport passengers</td>
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<td>PT intermodality</td>
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<td>Intermodal local/regional transport interchanges</td>
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<td>7.4</td>
<td>Seamless linkage of modes</td>
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<td>7.7</td>
<td>Linking different ways of public transport</td>
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<tr>
<td>WP8 New Forms of Vehicle Use</td>
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<td>Awareness rising</td>
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<td>8.2</td>
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<td></td>
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<td>Increasing car occupancy</td>
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<td>WP9 New Concepts for the Distribution of Goods</td>
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<td>Material logistic centre – to optimise freight deliveries at construction site</td>
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<td>9.2</td>
<td>Distribution of goods - Green city logistics</td>
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<td>Logistic centre for Old Town of Stockholm</td>
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<td></td>
<td>Bicycle measures</td>
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<td>10.1 Innovations in bicycle transport</td>
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<tr>
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<td>10.2 Make bicycling attractive (B&amp;R information on the Internet)</td>
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<td>Trip planning</td>
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<td>10.3 Creation of a visitor web for optimal trip planning</td>
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<td>10.5 Marketing/information and quality management</td>
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<td>Awareness of clean transport and safety</td>
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<td>10.6 Awareness for speed reduction and less car use</td>
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<td>10.4 Taxi drivers as information multipliers for clean transport</td>
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<td>WP10 Innovative Soft Measures</td>
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<td>11.2 Traffic monitoring and supervision</td>
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<td>11.3 Dynamic traffic management system</td>
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<td>11.4 Accessible road network (street) data</td>
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<td>WP11 Integration of Transport Management Systems</td>
<td>Improving PT traffic flow</td>
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<td>11.5 More adaptive signal control in a bus priority system</td>
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<td></td>
<td>11.6 More adaptive signal control in a bus priority system</td>
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<td>11.7 High level service bus routes</td>
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<td>11.1 Technical basis for an efficient customer focussed operation and information</td>
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<td>WP12 Clean Public and Private fleets</td>
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<td>12.2 Biogas bus fleets</td>
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<td>12.3 Clean and user friendly bio-diesel bus fleet</td>
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<td>12.4 Clean municipal fleets</td>
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<td>12.7 Bio-diesel taxi fleet and bio diesel service station</td>
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<td>12.13 Increasing clean vehicle use in private company fleets</td>
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<td>12.8 Optimisation of the bio-diesel collection system</td>
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<td>12.9 Analysis of the biogas experience</td>
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<td></td>
<td></td>
<td></td>
<td>12.10 Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 2 – Trendsetter cities

The five Trendsetter cities are described below.

**Graz**

With nearly 230,000 inhabitants, Graz is the second largest city in Austria, the capital of the Styria province and the cultural, economic and university centre of the region. About 80,000 commuters travel to the city of Graz daily. On an average weekday, 47% of commuters travel by car, 19% use public transport, 20% are pedestrians and 14% cycle.

Graz has a historic centre with many pedestrian precincts and much bicycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city area (except major roads) and the first Austrian city to open a mobility centre.

The main problem Graz faces is the rise of car use due to a tendency of people moving to the city outskirts. The increasing traffic as well as the topography and climate in Graz, lead to high air pollution levels in the city. Information technology will be used to make public transport more user-friendly and the services more attractive.

The following measures have been implemented in Graz within Trendsetter

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
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<tr>
<td>Access Restrictions (WP5)</td>
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<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td>Customer-friendly stops for taxi and tram</td>
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<td></td>
<td>Information for passengers</td>
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<td>Awareness</td>
<td>Awareness for speed reduction and less car use</td>
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<td>Integrated Mobility Centre</td>
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<td>New Public and Private Fleets (WP11)</td>
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<td>Dynamic traffic management system</td>
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<td>Heavy vehicles</td>
<td>Clean and user-friendly heavy-duty bus fleet</td>
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<td>Light vehicles</td>
<td>Clean and user-friendly light-duty bus fleet</td>
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<td>New Concepts for the Distribution of Goods</td>
<td>Distribution of goods – Green City Logistics</td>
<td>7.9</td>
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</tbody>
</table>

The map below shows the City of Graz.
Lille

Lille Metropole in France is an urban network of 85 communes with 1.2 million inhabitants. The community is close to the Belgian border and cooperates closely with its counterparts in Belgium. It is a base for distribution and a node for major routes north-south and east-west in Europe.

Lille has built up a strong public transport network. On an average weekday, 150,000 passengers travel by bus, tram, commuter trains or metro. The following measures have been implemented in Lille within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
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<th>Measure description</th>
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<td>Integration of Transport Management Systems (WP11)</td>
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<tr>
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<td>Light vehicles</td>
<td>Clean Municipal Fleets</td>
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<td>Clean Fuel distribution</td>
<td>Analysis of the biogas experience</td>
<td>12.9</td>
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</table>

The map below shows the geographical context of measures in Lille.
Pécs
The City of Pécs with 170,000 inhabitants is a middle-sized cultural, educational, commercial and health centre in Hungary, 40 km from the Croatian border. In the last decade the number of cars and the number of tourists and students have increased rapidly, creating a huge demand for parking spaces and public transport. In November 2000, the early Christian burial chambers in the city centre received UNESCO World Heritage status, providing the municipality with new tasks to protect and preserve the heritage. The following measures have been implemented in Pécs within Trendsetter:

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<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
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<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
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<td>Establishment of a car-free zone in the inner city</td>
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<tr>
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<td>Strolling zones</td>
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</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The map below shows the location of the parking-zones and the access restriction areas in Pécs.
Prague
The City of Prague is the capital of the Czech Republic and the country’s largest city with 1,300,000 inhabitants. On an average weekday, 44% of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 1 160 million passengers per year uses the public transport system in Prague.

Prague has a high concentration of both political and economic administration, industry, trade, education, research and tourism. This requires good traffic management. One of the biggest problems is the very fast increasing number of private cars. It has more than doubled since 1990. A new traffic policy promotes public transport, development of traffic infrastructure and regulation of car traffic, particularly in the city centre.

The following measures have been implemented in Prague within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure nr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Environmental Zones</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
<td>5.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>PT intermodality</td>
<td>Linking different ways of public transport</td>
<td>7.7</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.6</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Prague.
Stockholm

The City of Stockholm is the capital of Sweden and the country’s largest city with 770,000 inhabitants. On an average weekday, over 600,000 passengers travel by public transport in the county of Stockholm. Of all travellers, 46% go by car, 23% use public transport, 29% are pedestrians and cyclists and 2% use other modes.

The biggest traffic problems include an increasing number of vehicles, congestion on many main roads, heavy duty traffic, limited rail track capacity and few cyclists. Moreover, there are problems with the air quality in inner city areas especially due to a high concentration of NOx and particulate matter. Noise levels are also high.

Stockholm is improving its transport system environmentally by substituting conventional vehicles with clean ones and making logistic services more effective. Better public transport and intelligent traffic information techniques are other important fields.

The following measures have been implemented in Stockholm within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Environmental Zones</td>
<td>Widening of the Environmental Zone</td>
<td>5.1</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.1</td>
</tr>
<tr>
<td>Parking</td>
<td>Reduced parking fees to promote clean vehicles</td>
<td>6.3</td>
<td></td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Information to passengers</td>
<td>Increasing public transport passengers</td>
<td>7.1</td>
</tr>
<tr>
<td>New Concept for the Distribution of Goods (WP9)</td>
<td>Material logistic centre – to optimise freight deliveries at construction site</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP10)</td>
<td>Bicycle measures</td>
<td>Make bicycling attractive (BBB information on the Internet)</td>
<td>10.2</td>
</tr>
<tr>
<td>Traffic information</td>
<td>Traffic monitoring and supervision</td>
<td>11.2</td>
<td></td>
</tr>
<tr>
<td>Logistic centre for Old Town of Stockholm</td>
<td>Accessions road network (shared) data</td>
<td>11.4</td>
<td></td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and efficient heavy vehicles</td>
<td>12.1</td>
</tr>
<tr>
<td>Light vehicles</td>
<td>Clean collection with biogas-vehicles</td>
<td>12.6</td>
<td></td>
</tr>
<tr>
<td>Clean municipal fleets</td>
<td>Making Clean Vehicles less expensive</td>
<td>12.11</td>
<td></td>
</tr>
<tr>
<td>Measure fused with 12.11</td>
<td>Increasing clean vehicle use in private company fleets</td>
<td>12.13</td>
<td></td>
</tr>
<tr>
<td>Access restrictions for drivers of clean vehicles</td>
<td>Improving biogas refuelling infrastructure</td>
<td>12.14</td>
<td></td>
</tr>
<tr>
<td>Clean fuel distribution</td>
<td>Improved biogas refuelling infrastructure</td>
<td>12.10</td>
<td></td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Stockholm.
## Appendix 3 – Wordlist

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
</tr>
<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
</tr>
<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>RKF</td>
<td>Resekortsföreningen I Norden</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
<tr>
<td>SL</td>
<td>Stockholm Transport</td>
</tr>
<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l'Integration Reseaux et des Tarifs</td>
</tr>
<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDS</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
The European project Trendsetter involves 50 individual projects, all of which aim to: improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union. Read more about Trendsetter at www.trendsetter-europe.org.
Read more about the Civitas project at www.civitas-initiative.org

June 2006

Trendsetter Report No 2005:7

Trendsetter External Deliverable No 4.3e
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Authors: Maria Ottosson, TFK – Transport Research Institute, www.tfk.se

Language: English

Target groups: EU, politicians, project managers etc.
Summary

The Trendsetter project aims to improve mobility, air quality and quality of life while reducing noise pollution and traffic congestion by promoting innovative projects.

Trendsetter’s overall strategy is to combine advanced mobility management schemes with clean vehicle fleets, which can achieve both short-term energy and emission reductions and long-term optimisation of the public transport and effective urban goods flows. Trendsetter is a large demonstration project focusing both on heavy vehicles and private cars.

This is a report with the aim to present the three projects within work package (WP) 9, their objectives, results and evaluation. Focus on the report is on consolidation of goods. This also indicates that the report contains recommendations for these kinds of projects. The report is structured in different subjects and each project is discussed under all chapters. A reader with a specific interest in a topic or project may easily find this in the table of contents without having to read the entire report.

Three projects take part in WP 9; WP 9.1 “Material logistics centre – to optimise freight deliveries at construction site, Stockholm”, WP 9.2 “Distribution of goods – Green city logistics, Graz” and WP 9.3 “Logistic centre of Old Town of Stockholm” – all about consolidation of goods, but with different objectives, prerequisites and with different approaches to the problem.

Hammarby Sjöstad is a large construction site in Stockholm. The construction period lasts for several years and during this time offices as well as apartments are inhabited. The project aimed to build and operate a Logistics Centre during peak periods to reduce the number of heavy vehicle movements in the area. The project was successful and managed to reduce the number of delivery vehicles to one compared to six during peak periods. The carbon dioxide emissions were reduced by 100 tonnes per year during the operating period which was a 90 % reduction.

In Graz a large department store situated in the narrow city centre, was going to be rebuilt – a five storey parking deck was installed below the store. It was difficult to carry on with normal transports to the shops, which were still open as usual during the construction period, because at the same time construction vehicles and deliveries of construction materials burdened the area. In this situation a consolidation scheme was created and a forwarder was contracted in the project, in order to handle all the deliveries to the department store. This system had been working well during the project period.

The second consolidation project in Stockholm, O-centralen, was involved in Trendsetter later than the others, but this has not been an obstacle. The small company Home 2 You (H2U) took the initiative together with the local Agenda
21 group and the Environment and Health Administration of Stockholm to start a project with consolidation of goods to the Old Town in Stockholm. The area is situated in a separate island and consists of medieval buildings, narrow and steep streets and is a very popular tourist attraction of Stockholm. There are a lot of restaurants and shops in the area and especially for the restaurants a coordination of supplies would reduce the number of vehicle movements in the area effectively. A Logistics Centre was created in a building just outside the Old Town and a biogas vehicle was purchased for the purpose of delivering the goods. The project has had a lot of problems along the way but is now beginning to increase the number of customers as well as the suppliers delivering the goods to the LC rather than directly to the customer. The project will continue after the ending of the Trendsetter project.

The three projects in this work package of Trendsetter have all been very valuable for further development of how to handle the problem with increasing number of heavy vehicles in general and goods distribution vehicles in particular. Consolidation of goods is one good solution to the problem, but it can be handled in a number of different ways. There are also a lot of obstacles to cross before the situation could be solved entirely. In those projects and in this report some of these problems have been dealt with. Good examples of how to succeed and recommendations are presented in chapter 15 and 16. A main conclusion and recommendation from this project is that a logistics centre is more efficient and successful when the area is well defined and when it has evident problems. This together with a well thought through localisation (depending on city structure and objectives) are crucial prerequisites.

Some examples of results, conclusions and recommendations of the Trendsetter WP 9 measurements are presented in Table 1 and Table 2 below.

Table 1 General results and conclusions from WP 9 measures.

<table>
<thead>
<tr>
<th>Results and conclusions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduced emissions of CO2, NOx, PM and reduced energy consumption.</td>
</tr>
<tr>
<td>Improved mobility and less noise in the areas</td>
</tr>
<tr>
<td>Value added services for customers</td>
</tr>
<tr>
<td>More pleasant urban environment</td>
</tr>
<tr>
<td>Geographical redistribution from sensitive areas to less sensitive.</td>
</tr>
<tr>
<td>The suppliers loose their contact with the clients, which make the drivers of the vehicle of the LC very important.</td>
</tr>
<tr>
<td>The total benefit for the cities in the projects is good, as well as for the transport companies who reduce their transports. But, the operators of the LC do not see any benefits – a critical mass needs to be reached first.</td>
</tr>
</tbody>
</table>
Table 2 General recommendations for the WP 9 measurements.

<table>
<thead>
<tr>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>A well defined area with evident problems related to goods deliveries, is an important prerequisite</td>
</tr>
<tr>
<td>The location of the Logistics Centre is crucial (depending on city structure and objectives)</td>
</tr>
<tr>
<td>Make sure that the city is ready to help the contractor meet the administration, the legal issues, politicians etc.</td>
</tr>
<tr>
<td>Deep commitment from at least one large actor who can be the driving force of the project.</td>
</tr>
<tr>
<td>Good marketing of the benefits and the purpose of the project to potential customers of the scheme</td>
</tr>
<tr>
<td>Try to create a full scale project from the beginning, this creates a more focused project group and increases the willingness for investments since there is not a limited time frame. However, if there are regulations that make the implementation difficult, a pilot project may be necessary to prove the positive effects of the scheme.</td>
</tr>
<tr>
<td>Communication with all actors are vital</td>
</tr>
<tr>
<td>Create demand for participating in the project (incentives like value added services, show economical and practical benefits, show good examples)</td>
</tr>
</tbody>
</table>
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Part A – Background
1. Introduction

1.1. Background

Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also put a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2. Trendsetter – a part of the Civitas Initiative

The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009).

The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living ‘Laboratories’ for learning and evaluating
The overall objectives of the Civitas Initiative are:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

Each city implements a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

1.3. **Achievements within Trendsetter**

Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European dimension. Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.
Improving access to public transport

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

Trip planning, traffic control and cycling

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

Access restrictions for reduced traffic

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone. Stockholm has increased compliance within the existing environmental
zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

**Marketing and mobility management**

Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

**Co-transportation of goods**

Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

**Clean vehicles and fuels**

Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

**Incentives and promotion of clean vehicles**

Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.
1.4. **Overview of achieved effects**

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
</tr>
</tbody>
</table>

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure.

Time – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emis-sions</th>
<th>Energy</th>
<th>Mobi-lity</th>
<th>Time</th>
<th>Inves-ment cost</th>
<th>Opera-tional cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased public transport security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convenient and safe intermodality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer-friendly stops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New services for special needs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning trips on the web</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Integrated public transport services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic management</td>
<td>Traffic management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling</td>
<td>Cycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selective access restriction for heavy vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Congestion charging</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing attractive alternatives</td>
<td>Marketing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobility management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved goods distribution</td>
<td>Consolidation of goods *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean vehicles and fuels</td>
<td>Biofuelled vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biofuel production</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5. **Trendsetter cities after Civitas**

The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas I cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1. Evaluation at different levels

The Trendsetter project has been evaluated in different levels; measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:

- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

2.2. Indicator based evaluation

Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dB(A)</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios

When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.
Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.

**Methodology**

The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (-- - 0 + ++).
3. Trendsetter objectives

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

3.1. Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide examples:</td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase mobility:</td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td>Enhance Environment:</td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO2 emissions by 5 %, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td>Save Energy</td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO2, NOx and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfil the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.
The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period. The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.

The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
3.2. **Demonstration objectives**

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. Those not reached are commented below.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
<tr>
<td>buses for operation on bio-diesel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324</td>
</tr>
<tr>
<td>fleets</td>
<td></td>
<td></td>
<td></td>
<td>Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Lille 1</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-</td>
<td>300</td>
<td>3 000</td>
<td>+2 700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>hybrid, ethanol)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>100</td>
<td>3 000</td>
<td>+1 900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>
3.3. Scientific and technical objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

3.4. WP9 objectives

The eight demonstration work packages each have unique main objectives, which derive from the high-level objectives.

The objectives for work package 9 “New concepts for distribution of goods” are:

- Demonstrate measures to increase the efficiency of goods distribution in various environments (construction site, inner city and hospital area).
- Demonstrate how energy consumption, emissions and noise from freight traffic can be reduced in sensitive areas using more efficient logistics and alternative means of transport.
- Provide examples of “Green city logistics”, how it can be implemented and the possible incentives for commercial operators.

WP 9.1 “Consolidation of material to large construction site”, Hammarby Sjöstad, objectives are:

- Decrease the number of small direct deliveries (under 4 loading pallets) to the site with 80% through co-transportation.
- Less traffic congestion in the construction site.
- Improved living conditions at site for new inhabitants.
- Improved working environment.
- Reduce energy use and emissions.

**WP 9.2 “Consolidation of retail goods to shopping mall in reconstruction”, Graz, objectives are:**
- Improved exploitation of freight capacities.
- Reduction of trips and stops.
- Reduce noise from distribution traffic in sensitive urban (and hospital) areas.
- Reduce fuel and energy consumption and emissions of CO2, NOx and particulates.

**WP 9.3 “Consolidation of restaurant supplies in medieval Old Town”, Stockholm, objectives are:**
- Decrease the number of small direct deliveries to restaurants and shops in the Old Town through co-transportation with clean vehicles.
- Less traffic congestion during delivery hours in the Old Town.
- Improved environment for inhabitants, visitors and people working in the area.
- Reduce energy use and emissions estimated energy and emissions savings corresponding to 30 000 km of driving diesel lorries.
4. Guide to the reader

This report is not intended to be read from beginning to end. Readers can select the parts that are interesting for a particular question or situation. The report does not describe each project in separate chapters. Instead it is possible for the reader to follow a specific question or problem for all the projects under each heading. The report is divided into four parts:

Part A – Gives the reader a short introduction to the Trendsetter project in general and the sub projects in WP 9. Here the reader can find which questions are the most relevant in each project and which objectives and problems are the most relevant to address in future prospects. There is also a description of how the projects are measured and evaluated.

Part B – A comparative analysis between the measures in the WP. The results are presented in words and figures with an analysis of the results and a description of how the objectives on different levels are fulfilled. Each header describes all the projects within the same problem area. Except from the indicators this part handles different soft aspects of the projects such as synergies, political issues and possibilities for up-scaling.

Part C – Conclusions and recommendations are presented in this part of the report. Here the reader can find what aspects to consider when planning a project with the objective to consolidate transports in cities. Barriers and drivers are discussed as an important part for synergies, technical aspects, economical aspects and political aspects.

Appendix – The appendix includes a more detailed description of each project in WP 9.

Each measure in Trendsetter WP 9 is described in the report. But, there are also comparisons between the Trendsetter projects and other known similar projects, mainly CIVITAS projects or other EU funded projects.

4.1. Abbreviations etc.

CIVITAS “Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes1.

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1 www.civitas-initiative.org
ECE  Erlach Engineering & Consulting. The services of this sole contractor mainly focus on consulting on logistics and implementation.

GFK  Gatu- och Fastighetskontoret – Real Estate and Traffic Administration, Stockholm

H2U  Home 2 You – Transport company in Stockholm

IT  Information Technology

ITG  International Forwarding and Logistics Company in Austria. An internet based calendar was created. Provides solutions to logistics problems and covers the entire scope of Supply Chain Management.

K&Ö  Kastner & Öhler – Large department store in Graz

KAGES  The biggest hospital holding company in Styria.

LC  Logistics Centre

METEOR  Independent EU project that will compare and assess the results from the CIVITAS projects in a harmonised way.

MF  Miljöförvaltningen – Environment and Health Administration, Stockholm

NGO  Non Governmental Organisations

TELLUS  Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS initiative.

Vkm  Vehicle kilometres

WP  Work Package
5. Overview of WP 9

WP9 – New Concepts for the Distribution of Goods. Leader for this WP is City of Stockholm, the Environmental and Health Administration. There are six partners involved in this WP:

- **MF**: City of Stockholm, Environment and Health Administration. MF is the coordinator of the Trendsetter project and is responsible for political, administrative and financial coordination of the project.

- **GFK**: Stockholm Real Estate and Traffic Administration. GFK is responsible for the land and property owned by the City of Stockholm. Road maintenance and traffic surveillance are also a part of their responsibility as carrying out the city’s traffic policy. GFK provides services to residents as well as industry and commerce and sees to it that Stockholm develops in a way that makes it an attractive place for people to live and work in.

- **ECE**: Erlach Consulting and Engineering. ECE is a sole contractor, mainly active in the Province of Styria. Through different types of logistics projects an important network to other logistics companies was formed. The services of ECE include consulting and implementation mainly in the field of logistics, but also in marketing, accounting and business administration.

- **GRAZ**: Several city departments of Graz take part in the Trendsetter project. The activities are coordinated by the Department for Urban Development.

- **ITG**: Spedition- und Internationale Transport GmbH. The company has a fleet of 120 vehicles and about 15 vans. All vehicles have a Euro 3 standard. ITG is supporting a lot of companies with goods. In the Trendsetter project a special logistics system is used.

- **H2U**: Home 2 You AB. The logistics company H2U operates about 20 vehicles of different sizes. Co-transportation and co-deliveries are the main area for the company. The goods delivered is mostly food for restaurants and private households (E-business).
5.1. **Short overview/description of measures within WP**

There are three measures in Work Package 9:

9.1 Material logistics centre in Hammarby Sjöstad, Stockholm. In this report called “Construction materials”.

9.2 Distribution of goods to a shopping mall (and hospital area), Graz. In this report called “Retail goods”.

9.3 Logistics centre of Old town, Stockholm. In this report called “Restaurant supplies”.

The objectives for Trendsetter WP 9 are to increase efficiency of goods distribution, reduce the energy consumption, reduce emissions and provide examples of “Green city logistics”. Most important is to verify a good environmental performance of the measures in the WP. Of special interest is to investigate the profitability of green city logistics projects. How is it possible to obtain a favourable business concept, reducing traffic and emissions at the same time?

One of the most commonly used terms in this report is “Logistics Centre”. In this context, a logistics centre is a terminal where goods are unloaded, consolidated and reloaded. The goods originate from several transporters and are to be delivered to several customers. The reloading consolidates the goods into one or a few delivery vehicles, see Figure 1.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{logistics_diagram}
\caption{A schematic model of an ordinary distribution system compared to coordinated and consolidated transports via a Logistics Centre.}
\end{figure}

Each project is shortly described below. For a more detailed description, see “Appendix 1 – Description of measures”. 
5.1.1. WP 9.1 “Construction materials”, Hammarby Sjöstad
The objectives for WP 9.1 “Consolidation of material to large construction site”, Hammarby Sjöstad, are:

- Decrease the number of small direct deliveries (fewer than 4 loading pallets) to the site by 80% through co-transportation.
- Less traffic congestion in the construction site.
- Improved living conditions at site for new inhabitants.
- Improved working environment.
- Reduce energy use and emissions of CO2, NOx and particles.

Hammarby Sjöstad is one of the largest constructions sites in Stockholm with a target of 8000 apartments. The site is under construction in a former harbour area in Stockholm and will be finished in the year 2015. The access possibilities for deliveries are restricted, due to both geographical reasons and existing buildings.

A Logistic Centre (LC) was introduced at the entrance of the construction site and received all small deliveries (less than four pallets) and stored the construction materials temporarily. Deliveries were then made with special vehicles to the different construction locations in accordance with the construction time plans. The centre was set up and operated over a three year period. The LC went into operation in 2001 and had its peak in 2002. During 2003 and 2004 the intensity of the construction work has been lower and the LC has now been dismantled and moved into a building nearby to make room for new buildings.

The objectives with establishing the LC would be to reduce the number of direct small deliveries to the site by approximately 80%.

Without the LC, this construction site would receive over 400 uncoordinated deliveries per day, or roughly 700 tonnes of construction materials into the area per day during peak period. At the same time the area should be a good place to live for residents who have already moved in.

5.1.2. WP 9.2 “Retail goods”, Graz
The objectives for WP 9.2 “Consolidation of retail goods to shopping mall in reconstruction”, Graz, are:

- Improved exploitation of freight capacities.
- Reduction of trips and stops.
- Reduce noise from distribution traffic in sensitive urban (and hospital) areas.
- Reduce fuel and energy consumption and emissions of CO2, NOx and particles.
In Graz a project to consolidate retail goods to shops was implemented in Trendsetter. The project aims to consolidate goods and was performed in two stages. Before starting the actual project some specific analyses and research were carried out by the project management company ECE.

The actual pilot project begun in the second stage, where ECE could start the project with two big partners – ITG as forwarder, located with its warehouses at the southern city border, and Kastner & Öhler (K&Ö) as the biggest shopping centre of the city. The project organized the consolidation of daily deliveries to the shop-in-shop system of K&Ö during a phase of construction of a five-level garage beneath the department store. The transports from an external warehouse to the shopping centre were carried out by low emission vehicles. The system has now (after the Trendsetter project period) been installed as a permanent solution.

The project as a whole aims to improve exploitation of freight capacities and to reduce the number of trips and stops – especially within the inner city. This will lead to a reduction of emissions and a better urban environment. Without the consolidation scheme there would have been chaos during the construction period and the deliveries to the shops would not have been very efficient.

5.1.3. WP 9.3 “Restaurant supplies”, Stockholm

The objectives for WP 9.3 “Consolidation of restaurant supplies in medieval Old Town”, Stockholm, are:

- Decrease the number of small direct deliveries to restaurants and shops in the Old Town through co-transportation with clean vehicles.
- Less traffic congestion during delivery hours in the Old Town.
- Improved environment for inhabitants, visitors and people working in the area.
- Reduce energy use and emissions estimated energy and emissions savings corresponding to 30,000 km of driving diesel lorries.

The solution to this problem is that a company, Home 2 You (H2U), offers a delivery service to restaurants in the Old Town. A terminal building just outside the Old Town was purchased for the service. 14 customers are involved in the project. A new biogas delivery van was purchased. Each customer receives one delivery/day instead of six. The target is to increase the number of customers from 14 (2004) to 25. There are approximately 100 restaurants and hotels which require regular deliveries of food in the Old Town. Approximately 85 restaurants create 120,000 deliveries per year.

The LC has emerged from the need of an efficient delivery system within the Old Town in Stockholm. The LC has decided to focus on the restaurants as they, with their big number of deliveries and the relatively low number of suppliers, create the best possibilities for significant improvements.
The project was implemented in January 2004. A marketing campaign and the inauguration of the reconstructed terminal and biogas vehicle were held in June 2004. The operation of the terminal began in January 2005.

5.2. Problems to be solved by the measures

All of the measures in WP 9 have the objective to reduce congestion and emissions by consolidated transports in different ways. But, each project has different problems to solve due to different conditions in area, goods and problems. The sections below describe each measure problem.

5.2.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

The main problem to be solved is the large number of vehicles causing congestion in the area. Decreasing the number of vehicles in the area would reduce congestion, improve the living conditions and the working environment in the area as well as reduce energy use and emissions.

The contractor needs a lot of space for their materials and their material handling. This depends on almost no delivery coordination and a lot of material coming to the area at the wrong time. This material gets damaged and could cause bad indoor climate for their clients. To avoid this LC offered temporary material storage.

5.2.2. WP 9.2 “Retail goods”, Graz

The main problems to be solved by the project are the traffic emissions, the noise and consumption of energy by reducing the number of trips and stops. A reduction of the high number of vehicles of partly loaded trucks going into the city and urban area is necessary.

Another specific problem is the construction of a five-level garage beneath the department store Kastner & Öhler. During the period of construction an alternative solution for the goods deliveries to the shops was needed.

5.2.3. WP 9.3 “Restaurant supplies”, Stockholm

The main problems to be solved are; how to deliver the needed goods to the businesses with a minimum of negative effects on people, streets, buildings and environment.

The streets are narrow and steep. The cars have to share the space with a big number of pedestrians, residents, people working in the area, tourist groups, school classes and other visitors to churches, museums, restaurants and shops in the area. Therefore traffic is only permitted between 6 a.m. and 11 a.m. Theoretically there is no traffic after 11 a.m. other than exempt traffic, e.g. rescue vehicles, taxis etc.
There is also a speed limit in most of the area where the cars must “drive according to pedestrian speed” i.e. around 6-7 kilometres/hour. The knowledge and obedience of the rules are very limited, and in general no police controls are carried out in the area. Regular counts made by local NGO’s and H2U show that about 1 vehicle/minute enters the regulated area. But the traffic also creates other negative effects apart from noise, health problems and danger of collisions. Especially the children’s need for a safe environment has been in focus lately.

Other problems to be solved by the project are environmental and energy issues as well as economic issues. There is a need to reduce the emissions in inner-city areas to be able to improve the living and working environment. There is also a need to try to solve the problems with the economic difficulties for a LC.

5.3. Interaction within WP/CIVITAS

Interactions between measures are important for project success. It is important to discuss actions, presentations of the problems, difficulties and possibilities in order to learn from each other. The projects in WP 9 are similar since they are all handling the problem with consolidation of goods and could therefore use experiences from each other. But, they are also different since the prerequisites are different and the focus is on different things.

An interaction workshop within CIVITAS (TELLUS and TRENDSETTER) was held at Hammarby Sjöstad in 2004 to discuss possibilities for other similar projects. The focus for this seminar was to awaken the building construction companies to the logistical problem at many construction sites. Several Swedish contractors were invited and actively participated in the discussions. This has led to a new Swedish project that will investigate the possibilities to make the logistic process at construction sites more effective. The CIVITAS project TELLUS 9.5 was also under discussion in this workshop to exchange experiences and to create new project ideas.

The Hammarby Sjöstad, Stockholm, project has been presented in at least 50 different seminars. Trips to La Rochelle and London have been undertaken where results and experiences have been shared. A lot of interest exists for this kind of activity.
Part B – Results and Analysis
6. Indicators

Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators will be presented and analysed in 6.1 - 6.2.

6.1. Indicators and results

Table 3 below shows the indicators used for the measures in the evaluation. The table shows both Trendsetter common indicators and WP common indicators.

Table 3 The measures with Trendsetter Common Indicators and WP Common Indicators used in the evaluation (shaded cells are not included as an indicator in that WP).

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>9.1</th>
<th>9.2</th>
<th>9.3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>The construction site in Hammarby Sjöstad, Stockholm(^2)</td>
<td>All supplies to the Kastner &amp; Öhler department store, Graz</td>
<td>All goods deliveries to restaurants in Old Town, Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Before</td>
<td>After</td>
<td>Before</td>
</tr>
<tr>
<td>Energy use</td>
<td>Joule/year</td>
<td>1600 G</td>
<td>170 G</td>
<td>53.81 G</td>
</tr>
<tr>
<td>Emission of fossil CO(_2)</td>
<td>Tonnes/year</td>
<td>119</td>
<td>12.5</td>
<td>2.26</td>
</tr>
<tr>
<td>Emissions of NO(_x)</td>
<td>Tonnes/year</td>
<td>0.729</td>
<td>0.077</td>
<td>0.2</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>kg/year</td>
<td>12.3</td>
<td>1.3</td>
<td>0.6</td>
</tr>
<tr>
<td>Noise levels</td>
<td>dB(A)</td>
<td>55 Db(A) exceeded 360 times/day</td>
<td>55 Db(A) exceeded 260 times/day</td>
<td>78</td>
</tr>
<tr>
<td>No of trips</td>
<td></td>
<td>2008</td>
<td>1135</td>
<td>120 000</td>
</tr>
<tr>
<td></td>
<td>(Total number of goods vehicles moving in demo areas)</td>
<td>Index 2</td>
<td>Index 4</td>
<td></td>
</tr>
<tr>
<td>Living conditions</td>
<td>Noise hours</td>
<td>55Db(A) exceeded 360 times/day</td>
<td>55Db(A) exceeded 260 times/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working environment</td>
<td>Noise hours</td>
<td>55Db(A) exceeded 360 times/day</td>
<td>55Db(A) exceeded 260 times/day</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^2\) 9.1 The indicator values refer to the optimal situation where the logistic centre is used to its full capacity demonstrated during peak situations. The "Before" values refer to a situation without the LC.
<table>
<thead>
<tr>
<th>Indicator</th>
<th>Unit</th>
<th>9.1</th>
<th>9.2</th>
<th>9.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Context</td>
<td></td>
<td>The construction site in Hammarby Sjöstad, Stockholm²</td>
<td>All supplies to the Kastner &amp; Öhler department store, Graz</td>
<td>All goods deliveries to restaurants in Old Town, Stockholm</td>
</tr>
<tr>
<td>Vehicle km (Vkm) by vehicle type (peak/off peak or total)</td>
<td>Vkm per day</td>
<td>64</td>
<td>26</td>
<td>80</td>
</tr>
<tr>
<td>Vehicle load factor</td>
<td>%</td>
<td>~50</td>
<td>85</td>
<td>-</td>
</tr>
<tr>
<td>Queuing time/stop time</td>
<td>Minutes/trip</td>
<td>~60</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Small deliveries</td>
<td>Vehicles/day</td>
<td>219</td>
<td>169</td>
<td></td>
</tr>
<tr>
<td>Vehicle fleet</td>
<td>Vehicles</td>
<td></td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Total distance</td>
<td>Km/trip</td>
<td></td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

### 6.2. Analysis and comparison of results on indicator level

The indicators show the results in figures that are possible to measure in this way. Some of the indicator results are not as easy to measure as others, like the living conditions, working conditions or similar. The results for those two examples are given in noise hours but are in fact a lot more complicated. The analysis should take into consideration other impacts like, traffic safety in the area, possibility to move as usual (especially in a construction site where people are living) etc.

The indicator results give a hint of the project results, but should not be seen as the only outcome. There are a lot of more immeasurable effects that have a bigger impact on continuation or on the actual result for the city/area. See for example chapter 12 “Up-scaling and Transferability” and chapter 13 “Assessment of all measures” for more examples of this.

The calculations for the different projects do not have the same prerequisites. Different models have been used when calculating the emissions and different base line data have been used. This means that the figures cannot be compared between the projects. But, the differences between before and after situation for the projects, as a percentage, are comparable.

### 6.2.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

Since there is no actual situation “before” Trendsetter, only calculations with estimates and assumptions have been made for that scenario (without a LC). For the “After” situation the LC has a computer system that stores data on: number of goods, the receiver and the sender of the goods. Counts have been made in order to get an overview of the total incoming transports to the area. Interviews have...
been made with contractors, drivers and suppliers. Also case studies have been made. The information from the case studies is presented in a Master Thesis/Report\(^3\) and the most important results are presented here. Three scenarios are presented as diagrams: A situation with and without a LC with two different consolidation levels; 2 and 6. Consolidation level 6.0 is the best situation for peak periods and is the being compared in the table above.

Through this project there has been a reduction in the number of trips in the area by 12 500 during peak period (2.5 years = 700 days). This means a mean value in reduction of 20 trips per day during this period. During highest peaks there was a consolidation factor of 8, which means that 100 vehicles went into the LC and was consolidated to about 13 vehicle trips from the LC (8 vehicles into the LC and one consolidated vehicle distributing the goods in the area). The mean value of the consolidation was 6. The mobility index in the area was good, valued as index 4 on a scale of 1-5.

The working and living environment is valued in noise hours. More accurate would be to look at the reduction of exceeded maximum noise levels as times per day. During the highest peak the LC helped reduce the number of times the maximal noise levels (55 dB(A) as a standard limit according to the Swedish National Road Administration\(^4\) ) were exceeded with 100 times per day, compared to a situation without the LC (exceeded 260 times per day with the LC and are calculated to be exceeded 360 times per day without the LC, see Figure 1). The calculations were made with a simulation program from the Environmental and Health Administration in Stockholm and were based on the noise levels of a passing lorry and the number of times vehicles drove by a certain point in the area.

The vehicles in the project drove approximately 26 kilometres per day. The number of vehicle kilometres was reduced with 38 kilometres per day with the LC compared to a situation without the LC. The difference between the different situations can be seen in Figure 1.

Of the total number of vehicles in the area during the project period almost half were private cars (= 111). The total number of delivery vehicles is therefore 169

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\(^4\) www.vv.se
per day, see Figure 2. The reduction of vehicles compared to a situation without the LC was 50 vehicles per day (delivery vehicles).

The reduction of vehicles compared to a situation without the LC was 50 vehicles per day (delivery vehicles). The emissions were reduced during the project peak period according to the objectives of the project and the energy use was reduced with almost 1.5 Tjoule. In total, the project was very successful. According to the calculations for the period when the LC was in place there have been large reductions of both emissions and congestion compared to a situation without a LC. A reduction of almost 90% of the energy use and emissions of carbon dioxide were reached. The prerequisites for the LC were very good – with both a well defined area and an obvious problem with congestion and long queuing times. Those problems could be solved within the project and the result was positive.

6.2.2. WP 9.2 “Retail goods”, Graz

The expected results from the project were a 70% reduction in traffic mileage and a corresponding reduction of emissions and energy. The indicator results above, show that the number of vehicle kilometres was reduced by 56% with a corresponding reduction of emissions and energy use. The noise levels are the same before as after the project (since the number of vehicles is low and the noise mostly consists of ordinary “city noise”). The load factor indicator is not reported, since there was no possible way to measure this in a reliable and accurate way.

It was intended to implement the consolidation of goods through a cooperation of many forwarders and shops. As the target is (almost) achieved with only two large companies, the number of vehicles is low. But, the project will be a core project for the newly founded “city marketing company” (shareholder is the city of Graz) as a showcase for shop owners participating in this supply chain.

In the base-line scenario ITG used 10 – 12 vehicles for deliveries in urban areas and had several storage facilities. During the project and from now on, ITG uses only 5 – 6 vehicles for deliveries of the same quantity of goods. And, they use only one storage facility. The reduction of the vehicle fleet by half shows that
there is a big potential for this system. The cost savings as well as the environmental savings shows that this is a solution that should continue.

The “business-as-usual” scenario would be that nothing had happened at all. There would not have been a successful project if the cooperation between ITG and K&Ö had not worked out as well as it did.

The hospital area is the next piece of the project. The results from Trendsetter should inspire to cooperation. The one remaining question is: “Where should the hospital health care distribution centre be located?”.

6.2.3. WP 9.3 “Restaurant supplies”, Stockholm

The expected outcome from the LC is to increase the number of customers from 14 to 25. By introducing the LC for food deliveries, the transport mileage to those restaurants is expected to decrease by 65%.

The calculations for the LC are based on invoice data from the “O-centralen”. The number of stops and cages are calculated for the period from December 2004 until February 2005. The numbers are then multiplied by 4 to get the yearly result. This is due to the short period of time the LC has been in operation. For assumptions in the calculations, see Table 4.

Table 4 Assumptions for calculations, WP 9.3

<table>
<thead>
<tr>
<th></th>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO₂</td>
<td>0,44 kg/km (diesel vehicle)</td>
<td>0 kg/km (biogas vehicle)</td>
</tr>
<tr>
<td>NOₓ</td>
<td>7,32 g/km (diesel vehicle)</td>
<td>1,2 g/km (biogas vehicle)</td>
</tr>
<tr>
<td>PM</td>
<td>0,226 g/km (diesel vehicle)</td>
<td>0,012 g/km (biogas vehicle)</td>
</tr>
<tr>
<td>Fuel consumption</td>
<td>0,17 l diesel/km</td>
<td>7,2 MJ biogas/km</td>
</tr>
<tr>
<td>Number of deliveries</td>
<td>120 000 /year</td>
<td>117 268 /year (reduction by 9 trips per day)</td>
</tr>
<tr>
<td>Vehicle km</td>
<td>1 km/cage</td>
<td>0,33 km/cage for biogas vehicle, 1 km/cage for other vehicles.</td>
</tr>
</tbody>
</table>

The assumptions and emission factors used are the same as in a report from February 2004 (Rapport till Miljöförvaltningen, Trendsetter-projektet – 9.3)

5 This value is approximately twice as high as a common emission calculation for diesel vehicles. A diesel vehicle in urban traffic with a total weight of 3,5 – 7 tonnes has an NOₓ emission factor of about 3,7 g/km according to NTM (www.ntm.a.se). This value is used, as it was used in an early application for the project.
6 Also this value is approximately twice as high as a common emission calculation for diesel vehicles. This value should be around 0.12 g/km with the same prerequisites as above.
7 Approximately 85 restaurants in the area create those deliveries.
8 With 30 customers of O-centralen.
Logistics Centre of Old Town of Stockholm, Home2You) and used all through the project.

The results show that the outcome of a LC for the Old Town in Stockholm is good. There is a huge potential to reduce the total number of vehicle kilometres, if the LC succeeds in the process of gaining more customers. The living environment in Old Town will be improved if the numbers of vehicle kilometres decrease even more. With the LC, the total number of trips is reduced by 9 trips per day and the number of vehicle kilometres is reduced by 6 km per day.
7. **Fulfilment of objectives**

The measure achievements of WP and Trendsetter objectives are presented in this chapter. The measure objectives have been mostly fulfilled, but not all Trendsetter objectives. The main reason for this is that some of the Trendsetter objectives are not applicable on the measures in WP9.

The findings from the projects clearly show that it is possible to reach good environmental results. It also shows that with this type of projects it is possible to gain a better knowledge about logistics and environmental issues among organisations involved. It is therefore important to continue to show good findings from the projects even after they are finished, as well as trying to continue with similar projects. Good marketing is significant.

### 7.1. Achievement of WP objectives

The achievement of the WP objectives are presented and commented in chapter 7.1.1 to 7.1.3.

#### 7.1.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

Table 5 Fulfilment of objectives for the Material logistics centre, WP 9.1

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Yes/No/Partly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease the number of small direct deliveries (under 4 loading pallets)</td>
<td>P</td>
</tr>
<tr>
<td>to the site with 80% through co-transportation</td>
<td></td>
</tr>
<tr>
<td>Less traffic congestion on construction site</td>
<td>Y</td>
</tr>
<tr>
<td>Improved living conditions at site for new residents</td>
<td>Y</td>
</tr>
<tr>
<td>Improved working environment</td>
<td>Y</td>
</tr>
<tr>
<td>Reduce energy use and emissions</td>
<td>Y</td>
</tr>
</tbody>
</table>

The Logistics centre in Hammarby Sjöstad was successfully implemented. Measure objectives have been mostly fulfilled, see Table 5. Decreasing the number of small direct deliveries by 80% has been fulfilled during peak conditions. The LC has been a well working integrated part of the supply chain. There have been considerable savings of energy and emissions during peak conditions. The users are very satisfied. There has also been considerable reduction in thefts, loss and damaged materials.

Both living and working environment is calculated to have been much better with the LC, than what it had been without it (only calculation since there is no comparison with a situation without the LC). The LC helped reduce the number of vehicles and traffic congestion, which is the main reason for the good results.
7.1.2. **WP 9.2 “Retail goods”, Graz**

Table 6 Fulfilment of objectives for Distribution of goods, WP 9.2

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Yes/No/Partly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved exploitation of freight capacities</td>
<td>Y</td>
</tr>
<tr>
<td>Reduction of trips and stops</td>
<td>Y</td>
</tr>
<tr>
<td>Reduced noise from distribution traffic in sensitive urban and hospital areas</td>
<td>N</td>
</tr>
<tr>
<td>Reduced fuel and energy consumption and emissions of CO2, NOx and particulates.</td>
<td>Y</td>
</tr>
</tbody>
</table>

The measure objectives were fulfilled by using the two companies contracted, see Table 6. The advantage of the location of the ITG warehouse at the interface highway/urban area prohibits additional traffic into the city. The innovative use of the containers reduces the need for packaging of goods. As the hospital company has not yet taken part in this project, a noise and emission reduction has not happened in that area.

7.1.3. **WP 9.3 “Restaurant supplies”, Stockholm**

Table 7 Fulfilment of objectives for Logistic centre of Old town Stockholm, WP 9.3

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Yes/No/Partly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decrease the number of small direct deliveries to restaurants and shops in the Old Town through co-transportation with clean vehicles</td>
<td>Y</td>
</tr>
<tr>
<td>Less traffic congestion during delivery hours in the Old Town</td>
<td>Y</td>
</tr>
<tr>
<td>Improved environment for residents, visitors and people working in the area</td>
<td>Y</td>
</tr>
<tr>
<td>Reduce energy use and emissions; estimated energy and emissions savings corresponding to 30 000 km of driving diesel lorries.</td>
<td>P</td>
</tr>
</tbody>
</table>

See Table 7 for fulfilment of measure objectives. The project has been delayed and suffered several setbacks. The original plan was to use an electric truck for the goods deliveries. Unfortunately this truck was destroyed in a garage fire and a new truck had to be purchased. A biogas-fuelled vehicle was purchased instead of the electric. The delivery time was long and an ordinary diesel truck had to be used in the meantime.

After some time of using the logistics centre it became obvious that the ordinary delivery time frame in the area (i.e. 6 am to 11 am) was not enough. An application for exemption was made. Waiting for the outcome of this application put the LC in a limbo situation. The project could not take any more customers because the capacity for delivering was not sufficient. This made the marketing campaign difficult. With just a few customers it was difficult to achieve environmental and efficiency objectives. It was also too expensive to have an employee in the LC with just two customers. So, during this time the deliveries
were made from the supplier’s warehouse. These deliveries were not consolidated with other customers but the vehicle was fully loaded.

The LC did in January 2005 get permission for exemption of the delivery time frame. The project has reached the goal of the number of customers, and the number of restaurants involved has increased to 30 – 35 (spring 2005), which gives a good potential for the future.

7.2. Contribution to Trendsetter objectives

The contribution from the WP to the Trendsetter objectives (High level, Demonstration and Scientific/Technical) is shown in Table 8. Some objectives are not fulfilled, but are not of interest for one of those measures. Especially the Scientific and technical objectives are connected to certain specific measures.

One of the scientific/high level objectives was “Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm”. The WP 9.3 measure was supposed to use an electric lorry for the distribution scheme (see * in Table 8 below), but this was destroyed in a fire before the project started. The vehicle had been used earlier for other distribution purposes in Stockholm and had worked well for this use, but there has been no contribution to the objective, since the vehicle was not used in the project.

The highest contribution to the High level objectives is from WP 9.1 in Hammarby Sjöstad, since the reduction of emissions and energy use are significant from this project.

Table 8 Contribution from the WP to Trendsetter objectives (Yes/No)

<table>
<thead>
<tr>
<th>Objective level</th>
<th>Objective</th>
<th>9.1</th>
<th>9.2</th>
<th>9.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level</td>
<td>Provide input to European policy making and promote a sustainable transport future in Europe</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>High level</td>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>High level</td>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>N</td>
<td>N</td>
<td>Y</td>
</tr>
<tr>
<td>High level</td>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>High level</td>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>High level</td>
<td>Reduce noise levels in demonstrating cities</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Objective level</td>
<td>Objective</td>
<td>9.1</td>
<td>9.2</td>
<td>9.3</td>
</tr>
<tr>
<td>----------------------</td>
<td>------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>High level – reduction</td>
<td>Reduce annual fossil CO2 emissions</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>High level – reduction</td>
<td>Reduce NOx emissions</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>High level – reduction</td>
<td>Reduce particulate matter</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>High level – reduction</td>
<td>Save energy</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Demonstration objectives</td>
<td>See chapter 7.1 for a detailed description of each demonstrators’ objectives.</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Produce a total amount of 11 million Nm3 biogas by the end of the project.</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>N</td>
<td>N</td>
<td>N*</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Test the use of ICT solutions systems, bus signal systems, traffic control and supervision</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Scientific/Technical objectives</td>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
</tbody>
</table>
8. Technology used

In this chapter, technologies used in the measures are presented. Comments and analysis of the benefits with these technologies are made.

8.1. Overview of technology used within WP

There are no extraordinary new technologies used in WP9 projects. But there are in many ways new areas for how they are used. See Table 9 for an overview of used technology.

Table 9 Used technology within WP 9

<table>
<thead>
<tr>
<th>WP</th>
<th>Used technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>SMS and variable signs at the entrance</td>
</tr>
<tr>
<td>9.1</td>
<td>Web based calendar</td>
</tr>
<tr>
<td>9.2</td>
<td>Route planning system – for transports outside the city.</td>
</tr>
<tr>
<td>9.3</td>
<td>Biogas vehicle</td>
</tr>
<tr>
<td>9.3</td>
<td>Battery powered refrigerating unit for food in the delivery vehicle</td>
</tr>
<tr>
<td>9.3</td>
<td>Good Environmental choice</td>
</tr>
</tbody>
</table>

8.2. Problems and Solutions, new concepts

Problems, new concepts and the issues that could be solved with technical solutions are presented and discussed.

8.2.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

A smart computer system was the tool for distribution of the goods from the LC. As an example of the smart computer system, a web-based calendar was created to prevent traffic congestion. Each contractor who used the same road had their own community in the calendar where they scheduled their direct-deliveries (which were not reloaded at the LC) so a transparency of incoming deliveries was possible among the contractors. This enables all project managers to synchronise their orders and activities to other surrounding construction work.

The LC provided a traffic coordinator who supported the area. In case of congestion, the traffic coordinator had the possibility to send traffic info through SMS to concerned contractors. This SMS also reached variable signs at the entrance of the area. The coordinator also had the possibility to send SMS to contractors’ mobile phones. The aim with this procedure was to avoid serious congestion inside the area and it worked out as well as was expected.

The partners with the largest interest in the information were the ones with a building site at the most difficult position in the area, i.e. at the end of the roads. It was hard to make it work since the partners with easy access did not see the need
of supplying their information to make it easier for the partners with more difficult access.

8.2.2. WP 9.2 “Retail goods”, Graz
Each forwarder in stage 1 of the project, see “Appendix 1 – Description of measures”, has its own IT system, but to consolidate the goods in one supply chain an “application service providers solution” would have been needed. A problem with this solution was that the forwarders did not want to submit the information about their customers via IT, because of security and confidential issues.

In the actual implementation of the project the exchange of data runs without problems between ITG (as forwarder) and K&Ö (as customer). ITG also uses a tracking & tracing system and a route planning system – outside the city. Inside the city the same route is used each day, so there is no need for a special system. The exchange of data between forwarders and small shops runs mainly per phone or fax, partly per e-mail. The change to a special IT system can only be done by an external consultant as the shop owners are not able to spend too much time on logistics. In this case the city could finance a test with active shop owners to change the existing system and connect them with ITG and K&Ö.

In the future a cross-docking system would help concentrate the goods flows. No forwarder is interested in doing this at the moment, since all companies have their own systems. For customers and for the city, it would be of great value to avoid large, heavy vehicles on the small roads of the city. But to do this, a change of law is necessary, to force cross-docking for companies.

8.2.3. WP 9.3 “Restaurant supplies”, Stockholm
The first vehicle that was used was electric. This vehicle was unfortunately destroyed in a fire. No technical investigation was made which means that nobody knows what caused the accident that totally burned down the garage and 17 vehicles. The electric truck was blamed in the general opinion, but it was never proved whether this was true or not.

After that, a biogas-powered vehicle (Sprinter) was ordered from Mercedes. It took a long time before the vehicle was delivered (two months extra), and there were some problems along the way, but the vehicle arrived and is now working as planned. One problem was that the vehicle was delivered with a top that was too small. The problem was solved by a new top for the vehicle.

The refrigerating unit normally used in a delivery truck is run by diesel and causes both noise and emissions. A contact was taken with the Royal Institute of Technology in Stockholm. They are investigating techniques using natural refrigerants connected to batteries instead of the diesel units. They are of course interested in finding users who can test their technology in real life - so collaboration between user and scientist is a result of the project.
The eco labelling organisation in Sweden, Bra Miljöval (Good Environmental Choice), has invited the project to be a part of their development of new criteria for their eco-labelling of freight transports. The biogas vehicle in the project qualified for this labelling. Bra Miljöval is a label for products that achieve high environmental demands, and are handled by Sweden’s largest independent environmental organisation.

A route planning has been developed by the driver of the vehicle in this project, due to his experience of the town accessibility. No computer systems have been used during the project.

8.3. **Comparison and conclusions**

Problems with technology are common in pilot schemes and new projects. It is often a time-consuming process to develop and implement the technology in the projects. A frequent problem is that the equipment becomes more expensive than the original plan. This is not only because of bad planning, but also due to unforeseen events, like for the vehicle in WP 9.3.

The first task is to find and define the problem that can be solved with technical equipment. It is important to define what the expected outcome is. It is not unusual that too many aspects are considered at once. This can cause problems in technology or user-friendliness. Concentration should be on a technology that solves the problem but nothing else, although it is good to have equipment that is compatible with other products in use. A common idea is that you can get credit values for the installation of the technology with a lot of extra functions. These extra functions are rarely used, and it is much better to use a tool that is possible to extend if necessary. A simple solution is often the easiest and cheapest.

The second task is to analyse whether the tool is applicable on the particular project. This could also be time-consuming, since all the aspects above need to be considered. What is the most user-friendly and cheapest solution?

If there are many actors involved there is a third problem, possibly the biggest. Every company has developed their own technical system and this is a fact for transport companies in particular. For bar codes, scanners and organisational programmes, there are not two companies that work in the same way. This can and will cause problems, since it is hard to increase the amount of equipment in use by the companies. This becomes a situation where it is hard to teach how to use the technology. An example of this is in WP 9.2, where it became a problem with exchanging data due to changes in personnel.

Finally, it is important in all larger projects like construction sites to plan the logistics carefully from the beginning. Plans for technology as well as for a logistics centre and definite rules have to be a natural part of the project. The

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logistical problems will appear sooner or later in any large construction site, but if solutions are not implemented from the beginning it will be difficult to try to convince all partners that acts or regulations will help them as well as the whole project.
9. Economic aspects, cost benefit

The cost benefits of pilot schemes are often hard to realise in numbers and figures. This chapter describes what the outcomes are of the measures in WP 9 considering economic aspects and cost benefits.

9.1. Per measure

There are no quantifiable numbers of the exact amount of money saved with each measure. But an economic valuation has been made, see chapter 9.2.1 to 9.2.3. Mostly, the cost benefit originates from less vehicle kilometres and a better use of the vehicles. But there are also costs relating to investments and development.

9.2. Problems and solutions

Problems and solutions for the measures in WP 9, considering economic aspects and cost benefits are discussed below.

9.2.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

Initially, the system was sponsored by The City of Stockholm. At first, the sponsoring consisted of 95% of the LC budget. After a while, when different services became more familiar to the clients (contractors) and they understood that they could save money using the LC’s different services it was possible to increase the prices, and by the end of the project it was almost at breakeven for cost/income. The city contribution was then about 40% of the budget. In a continuation of the project, the city contribution is estimated to be 0%.

The most important service for the project was to reduce the number of trucks in the area. To stimulate this, the co-transportation service prices were very low. The major part of the income came from temporary material storage and extra services (delivery in time, part deliveries, goods delivered by crane into the building). To achieve a good turnover, the LC’s charge for the temporary material storage started after day 4.

LC charged the contractor for all the extra services. Their benefit of the LC , was money saved thanks to less traffic congestion, less damaged goods etc. Unfortunately those benefits are not always clear to the builders. The delivery companies were one of the big winners of this solution, because the contractor did not charge them. There was a contact between the LC and the contractors and each user was invoiced monthly according to the amount used.

The practical operation of the LC was performed by a subcontractor hired and financed by the City of Stockholm. The subcontracting activities included investments in vehicles, stock/office-building and supervision system, running the vehicles and employing the staff. All income from different services was shared between the subcontractor and the city. To start with, the subcontractor received a
large part of the income until the break-even point, when the city received a larger part of the profit.

Executives on all levels were negative about the project from the beginning, but now the service is in demand despite being more expensive. Looking back, there are many situations where the time schedule could not have been held without the LC.

9.2.2. WP 9.2 “Retail goods”, Graz
Initially, such a project requires financial support from public funding to cover the costs for necessary preparations. The cost benefit results are achieved through the reduction of vehicles and trips by full loading. Additional costs which may be caused by the transhipment can be minimised by offering additional value-added-services. The single costs for the change of the supply-chain of small shops should be supported by the city or the city marketing company.

The logistics project will continue after Trendsetter with the shop-in-shop concept in K&Ö. This means that many shops will benefit from the project. The company ITG already makes a profit from the project (March 2005). ECE has made a suggestion to the local government for financing a one year project to show the effects of the logistics project to owners of small shops. The results will hopefully convince some of them to join a project like this. The costs for the shops will be the same, but they may benefit from easier goods handling with just one delivery per day and they will be offered value added services.

9.2.3. WP 9.3 “Restaurant supplies”, Stockholm
The “limbo stage” in the project caused a difficult economic situation and it is hard to draw any final conclusions about the project and its economy. In a long-term view the expectations are that the incomes will correspond to the costs and that the project will be self funded. It takes time to build the project, marketing campaigns and discussions with both customers and suppliers. But, the project is constantly developing.

The customers
For the moment, H2U is working with two customers in the Old Town. They are two of the three biggest restaurant suppliers and have approximately 35 customers in the Old Town. For the project to reach break even and enable it to use the LC as it was intended, it is necessary to have all those three suppliers as customers (there a total of ten suppliers in the area and there is a possibility that more will join the project in time). The third supplier has joined the project for a testing period from May 2005. When all three are fully involved in the project, it will be economically possible to staff the LC during daytime and the real coordination would start. There is an additional restaurant supplier (hygiene products) that is waiting to join the project. Another probable customer is the Royal Palace. They are interested in having their deliveries coordinated to facilitate their own
administration. Deliveries there could be carried out all day, as they are not in the restricted part of the Old Town. There is also an interest from the biggest brewery supplier in the Old Town, and discussions are held at the moment (March 2005).

**Investment costs**

The investment costs have been very high. For a bigger company there would be no problem to buy another truck, but that means one or two more employees and the problem to engage the two trucks after 11 a.m. To expand they would need more customers and today it is difficult to contact new customers. Another vehicle will be purchased when the project has gained more customers.

There have been no subsides from the City of Stockholm and the project is supposed to be self-financing. But, H2U has a general interest in being a part of tomorrow’s logistics and market. There is also an interest in transforming H2U into a sustainable company. This project has given H2U some positive economical effects goodwill, new customers and perhaps some good marketing. The City of Stockholm has redistributed a contribution for the project from Trendsetter, but those investments have mostly covered meetings and writing reports.

### 9.3. Comparison and conclusions

There is a general problem of investment costs in all kinds of projects. Most pilot project schemes have a budget for investments, but that just lasts for the very project and for a very limited period of time. This is the main reason for “unsuccessful” projects. The most common reason for not continuing after the pilot scheme is the lack of economical support and that the project has not been able to be self funded and create a critical mass during the project period.

Examples of this problematic situation are the IDIOMA freight consolidation scheme in the city of Malmö\(^{10}\) and the VIVALDI freight consolidation scheme in the city of Bristol\(^ {11}\). Both projects have/had the objective to consolidate goods transports and are funded by EU and public/private partners in the cities.

The IDIOMA project ended in 2002, but managed to continue after the project ending since they received funding from the City of Malmö to continue for another period of time. The scheme was expanded and it seemed very good. A Master Thesis/Report showed that it would be possible for the project to be self funded. Unfortunately the scheme still had to end in the spring of 2004 because of insufficient funding. This project was run by the municipality.

The Bristol project is still running (spring 2005), but is expected to end in summer 2005 because of insufficient funding. This project is run by the private company Exel.

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\(^{10}\) IDIOMA  
\(^{11}\) [http://www.vivaldiproject.org/pdf/fact_sheet_Freight_Consolidation_Scheme.pdf](http://www.vivaldiproject.org/pdf/fact_sheet_Freight_Consolidation_Scheme.pdf)
A conclusion that can be made from these two projects and the Trendsetter projects is that private company initiatives are more valuable than public initiatives. Both are needed, but the largest part of the interest must be from the private company. If they have a financial possibility or an interest in the question in some other way it is easier to carry on with projects even after the pilot scheme. Hopefully this is the case for both the Bristol project and the Old Town, Stockholm, project.

A project of this kind can not be dependent on one person. Depending on one person can easily cause the project to fail, if this person leaves. At the municipality there has to be a group of people engaged in environmental issues and involved in some way in all on-going projects of this type. This group should also have the authority to decide about economical issues.

It is important with extensive funding from the municipality, EU and other organisations at the start of a project. This makes it possible to form and develop suitable conditions for the remainder of the project and its continuation. It is also important for the municipality to help form the project in other ways, like offering areas for Logistics Centres, premises, regulations, creating incentives and see to that the departments of the municipality act as a good example and use the services offered by the Logistics Centre if possible.
10. **Synergies**

There are often possibilities for synergies when starting real life practise projects, especially if there are many projects of the same type and with the same kind of objectives within the same area or region. The projects create opportunities for other actors.

10.1. **Need for supplementary measures**

There is a need for supplementary measures in this area of consolidation of goods. Since few projects actually manage to survive after the pilot project is finished, it is important to focus on the actual implementation.

In the implementation the most critical part is to manage to reach a critical mass and thereby get the project self funded. To reach this there is a need for an engaged project group or a large actor that strives to develop the project. A good marketing campaign and engagement from the city is a prerequisite for success.

When a project is successful there could be a lot of synergies from this. The engagement in questions of environment and logistics could be put higher on the city agenda. But, it is also important to remember that mistakes and unsuccessful projects also could lead to synergy effects, both positive and negative. It is always useful to learn from own or others’ mistakes.

10.1.1. **WP 9.1 “Construction materials”, Hammarby Sjöstad**

There is a need to visualise hidden costs, for example transports, theft and damaged goods.

While the project was running a case study tried to measure such hidden costs. Unfortunately the target was not reached because no-one really wishes to find out the correct figures. Theft and damaged goods are today an accepted part of the building industry.

The distribution to the LC hides the correct costs. They include extra bonuses but they never show the real costs, which of course include the costs for the bonuses.

10.1.2. **WP 9.2 “Retail goods”, Graz**

There are unfortunately yet no synergies for this project within Trendsetter. There has been some unforeseen problems in setting up the necessary partnerships for the city logistics project. Caused by these difficulties, different opinions arose about the possible success and necessary financing. This slowed down the implementation process of the pilot project and – as a consequence – prevented a bigger scale of realisation.
In the third phase of the project, involving more small shops in the city centre, the change of the system of the daily orderings towards IT use should be supported. This supplementary measure is needed for the project, to demonstrate to shop owners the benefits of a logistics centre.

10.1.3. WP 9.3 “Restaurant supplies”, Stockholm
If the City of Stockholm has a genuine interest in creating a smarter and more sustainable transport system there is one solution that is essential: Regular traffic controls in congested and sensitive areas. This would decrease unnecessary traffic outside limited time frames and in restricted areas and also decrease the environmental problems.

10.2. Comparison and conclusions
One of the main synergy effects of this project and other similar projects is that the media coverage helps citizens etc. to form a better awareness of logistics and environmental issues. Workshops and other activities will also increase the knowledge of logistics and environmental issues among participants in the projects. A possible synergy effect of this is that such issues become more important and up-to-date in the organisations involved and will be put on the agenda for other measures.

For the Old Town, Stockholm, there are also effects like a more pleasant urban environment, a more attractive tourist area and a better access to the area. The traffic safety is also a good effect that was not one of the main reasons for starting the project.

If it is possible to show a good result from one project, it is much easier to implement a similar project with similar prerequisites somewhere else. Again, the project in the Old Town is a good example. There are many similar areas in cities in Europe. Most of them have no solution to the problem with many deliveries and other kind of transports to the area. An additional value with this project is the fact that the consolidation is for food, which is a particular difficult area.

The Hammarby Sjöstad project serves as a good example of construction logistic projects. The construction business has a history of difficulties in logistics with many different suppliers, many deliveries per day and a lot of uncoordinated transports. This project is an excellent example partly for consolidation schemes in general, and partly as state of the art in the construction business. Construction sites operate for a definite period of time and it is therefore important to solve logistics problems in a way that is easy to move or dismantle during/after the project. The value-added services with storage of materials to reduce theft, damage and stolen goods is very appreciated in a construction site. Hopefully this project can be copied into a lot of other construction sites, but it is important to engage the entrepreneurs in the project!
For both Hammarby Sjöstad and the Old Town, there has been a synergy effect with the environmental zone. The worst vehicles have already been sorted out and the vehicles that arrive to the areas are often quite good. Especially for Hammarby Sjöstad this is good, since this area is not within the environmental zone – but most of the vehicles that arrive to the construction site have been passing through the environmental zone or are going to pass through the zone on their route.
11. Political and Administrative aspects

The political and administrative aspects are discussed throughout this chapter.

11.1. Overview of major political and administrative aspects influencing the measures

As showed in Table 10, there are some major political problems that have effect on the measures. A big problem when consolidating goods is the issue of food handling. There are a lot of restrictions when handling food and there are great demands on the premises and vehicles. But, some aspects could be both positive and negative, e.g. change in managment or political government.

Table 10 Overview of major political and administrative aspects influencing the measures.

<table>
<thead>
<tr>
<th>WP</th>
<th>Political aspect</th>
<th>Administrative aspect</th>
<th>Impact of measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1</td>
<td>Agreement with contractor</td>
<td>No problem, a good way to make the administration of potential problems easier</td>
<td></td>
</tr>
<tr>
<td>9.1</td>
<td>Project manager from city</td>
<td>Gave certain rules for the projects that were followed.</td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Change of managers of the potential partners</td>
<td>No problem, positive</td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Change of policy</td>
<td>Problem, decreases the interest for this kind of project for a certain period</td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Lack of money</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Mistrust</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.2</td>
<td>Cost/economy</td>
<td>Cost of preparation should be supported.</td>
<td></td>
</tr>
<tr>
<td>9.3</td>
<td>Food handling</td>
<td>Permit for handling food</td>
<td>Delay of the project and additional costs.</td>
</tr>
<tr>
<td>9.3</td>
<td>Reverse logistics</td>
<td>There are restrictions in coordination of food and empty returns – reduces the possibilities for consolidation.</td>
<td></td>
</tr>
<tr>
<td>9.3</td>
<td>Mixing restaurant and shop deliveries</td>
<td>There are restrictions in coordination of food and empty returns – reduces the possibilities for consolidation.</td>
<td></td>
</tr>
</tbody>
</table>
11.2. Problems and solutions
The problems in WP 9.1 – 9.3 are presented and discussed below.

11.2.1. WP 9.1 “Construction materials”, Hammarby Sjöstad
LC signed agreements with each contractor. The agreements included rules for payment and damage/stolen goods. This was signed to make the process easier for any potential problem that might turn up during the project period.

Executives on all levels were negative from the beginning, but now the service is in demand despite being more expensive. Looking back there has been several comments on that the building schedule could not have been met without the LC.

The project had full support from the Project manager from the City of Stockholm. Certain rules were set up by the manager, e.g. regarding the use of the LC. The political support of the project was maximal.

11.2.2. WP 9.2 “Retail goods”, Graz
One of the main problems that occurred several times during the project procedure was the change of manager and the change of responsible politicians and officials. This caused lack of interest, some mistrust and trouble with the budget for a certain period. The change of manager however turned out to be positive, since the new manager was more engaged in the project.

Forwarding companies normally do not cooperate since they have their own business systems and operational strategies. To solve this problem a new logistics company (the Styrialogistics Company) was founded.

For the actual implementation of the project only one big forwarding company and one big shop company were put together. It turned out positive to work with only two big partners in the early stages, as no more partners were needed. As soon as it will become obvious that the project is successful, it will be easier to attract new partners through promotional activities.

It is helpful to develop such a project step-by-step to a larger scale. If the system is supported by public funding, it may cause trouble with the anti-trust legislation having only one company involved.

As city logistics touch traffic issues as well as business strategies of shop owners – especially of small shops in the inner city – a good cooperation between the responsible politicians both for traffic and for economy should be established. One reason is to help the small shop owners in the city in the competition against the big shopping centres on the outskirts of the city.
11.2.3. WP 9.3 “Restaurant supplies”, Stockholm
The project has met several difficulties in its communication with the political and official leaders of the City of Stockholm. Although they, in general are very positive about the project, there has been very little flexibility in practice.

All activities where foods are involved are strictly regulated, which of course is very important from a hygienic point of view. The foods handled by the LC are very carefully and individually wrapped up.

- One of the ideas was to take clean packaging materials, such as cardboard back from the restaurant, to help them with a problem and avoid empty returns. Unfortunately this is not permitted according to The Environment and Health Administration, Food Safety Authority, and a change is not visible in a near future.

- Some of the shops have the same suppliers as the restaurants and are interested in using the LC. According to The Environment and Health Administration, Food Safety Authority the LC can not mix deliveries to shops and restaurants.

- The LC is just a place for (re)loading the goods, not for storing, but the Environment and Health Administration, Food Safety Authority demand that the LC has the same hygienic standards as activities dealing with food. Therefore they demanded a rebuilding of the premises.

A compromise between different aspects would help this situation. The LC could help reduce the number of vehicles, and with some effort adjust the LC to city standards; the City of Stockholm will gain some profit.

But for the continuation of the project, the LC has a permit to drive in the Old Town until four o’clock. This means that the opportunities for further development of the project with more customers have increased significantly. This permit has been granted until the end of 2005.

11.3. Comparison and conclusions
All of the measures in WP 9 encountered some problems from the authorities. But it is also the politicians that in most cases are responsible for the projects. This means that they are interested in the best result possible for the city. Because of regulations, policies, etc., it is not always easy to find the right way to handle a problem or question. It often takes time to handle administration and political aspects. Most questions or changes in regulations need to be discussed at several meetings.

From a political point of view there is often better to proceed with a pilot project and to implement a time-limited project, than to start off with a full-scale project. This does not require as many decisions as a full-scale implementation. This is a common problem at the end of pilot projects. Except from the economic situation,
a prerequisite for implementation is a political agreement as well as significant changes in regulations. Therefore it is important to start processing the issue of what is desirable to happen after the ending of the pilot project as soon as it begins. Of course there is always the question about results and good practice before deciding about something new. But, there are more things to do before taking a new decision:

- Find out what laws and regulations that restrict the idea (Local traffic restrictions, national road restrictions, competition, purchase negotiations etc.)
- Localise the people involved with regulations and find out the ways/possibilities to change regulations.
- Contact other local actors that could be involved in a future scheme, besides those active in the pilot project. Find out their possibilities and argument for or against the scheme.
- Organise a project group that can conduct a debate about the scheme.
- As much positive marketing as possible and a lot of media exposure. This could attract some attention and perhaps lead to better understanding.

One political and administrative aspect of projects handling food is the permits. It is of great importance to be careful and accurate when handling food. Therefore the Food Safety Authority (in Sweden, or corresponding authority in the country in question) has to control those actions very carefully. Important issues are that the food keeps a stable temperature and that it is not exposed to unhygienic products, etc.

Another important conclusion from the Old Town project is that if the municipalities wish for successful projects of this kind, they need to coordinate the different authorities involved. The real estate authority must communicate and discuss relevant issues with for example the energy and traffic authorities. These aspects seem to be a problem in most cities. Within the city, there are a lot of different authorities, but not any natural forum for discussions on subjects that concern more than one authority.

The anti-trust legislation is a problem for such projects. It is necessary to adapt regulations so that they fit in this type of business, e.g. when changing distribution systems in cities.

One solution to the anti-trust legislation problem is projects where the municipality call sends out a tender for their own transports. Cities often have many deliveries per day, and consolidation could offer a great change with a positive effect on the urban environment. It also sets a good example for other sectors, business and cities. A consolidation scheme for a municipality could be up-scaled to include other types of transport as well, if interest exists from others. Good services and good prices are a competitive advantage and could be created
with the critical mass that many transports generate. Borlänge, Gagnef and Säter municipalities in Sweden have performed this type of solution in a joint project and it has worked out very well for several years and is expanding step-by-step. Schools, hospitals etc. are included in the system and coordinated goods transports create both a better and safer environment. It also creates market advantages for local suppliers, who can reduce their costs when deliveries are taken care of by someone else. The city of Stockholm is planning a similar solution, as are several other Swedish cities.
12. Up-scaling and Transferability

Cooperation between different actors is important for successful projects. For projects that involve a city or a shopping mall etc. it is important that all actors are informed of the solution and the outcome of the project. There are always authorities or management that can influence the result in both a positive and negative way – and they are equally important.

12.1. Potential for up-scaling and transferability

The potential for up-scaling and transferability in each project is presented in chapter 12.1.1 to 12.1.3.

12.1.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

To be able to up-scale the project it is essential to visualise hidden costs, for example transports, theft and damaged goods. These offer the biggest benefits for the contractors, and they need to be aware of these to be willing to pay for the services involved in the LC. Since the LC was dismantled, there have been several comments from contractors now understanding that their schedule could not have held without the logistics centre, and they are now asking for the services again. Such examples need to be shown when starting similar projects somewhere else for marketing purposes.

While the project was running a case study tried to measure these kinds of costs. Unfortunately the target was not reached due to the problem of getting access to data. No one is interested enough in really knowing the answers to such questions. The costs for damaged or stolen goods have become “accepted” in construction projects.

More focus on hidden costs and a higher level of logistic-knowledge to make obvious the possible gains from such a logistics centre. The concept that the LC provides is applicable in almost all other construction-projects. But, the concept can only work if it involves a large number of deliveries and partners.

12.1.2. WP 9.2 “Retail goods”, Graz

The transferability to other cities for this kind of project is large. ECE has started several similar projects in the Baltic States, Croatia and Poland.

As for a next step, the system used by the shopping centre K&Ö could be extended to several shops nearby. This should be supported by technical and financial means in the starting phase, i.e. contracting an external consultant for the change of the logistics procedure.
There is a very big cargo centre in the South of Graz which has a high technical level and an extraordinary high frequency. It would be an option for the future to use this centre for cross-docking and consolidation of goods.

The hospital holding company, KAGES, is still interested in participating in the city logistics project with a health care distribution centre. As for now, they have not yet decided where to locate it.

12.1.3. WP 9.3 “Restaurant supplies”, Stockholm
Up-scaling of the project is possible. More customers and maybe different kinds of goods are a possibility. The project will continue after the Trendsetter project has ended.

Narrow city streets, medieval buildings, a lot of tourist attractions and many restaurants are common in many European cities. The potential for transferability is therefore great for the LC for restaurant supplies project.

12.2. Comparison and conclusions
Consolidation of freight transport can be the solution for a lot of transport issues. With consolidation of goods it is possible to substantially reduce transport. A fact is that, in Sweden, heavy vehicle transports on road have increased by about 50% during the past 12 years (1993 – 2004) according to a statistical survey\(^\text{12}\). During the same period, private cars have increased by just 20%. This is a significant difference! The main reason for the increase in heavy vehicle transport is that the trend moves towards small deliveries in many vehicles – to increase the customer service factor. This is a problem that has to be counteracted, but since it has started it is hard to stop. The trend originates from customer service issues at transport companies and suppliers in order to be able to try to win customers from their competitors. The customers are now used to this degree of customer service and expect their deliveries to arrive the day after order, since that is the common way, whether they need the merchandise that particular day or not. Maybe they could order a couple of days earlier, but since that is not necessary, they don’t.

In Göteborg there is an ongoing project at Norra Älvstranden (Northern river shore) that concerns this issue. The project is WP 10.5 in TELLUS. In this particular project the aim is to reach the customers and convince them to coordinate their orders of office material supplies. A specific day has been chosen and the offices in the area are asked to adjust their office material orders to this day. In this way, the deliveries to the area have been reduced by up to 30%. This is a good start for breaking the trend – and to speak with the end consumer about the problem with goods transport. The end consumer is rarely aware of the transport costs and problems, since the transport is included in the price of the goods.

In mid-size cities there are often problems with congestion in retail areas. There is often limitation in delivery hours (opening hours of the shops, or restrictions on the street, e.g. pedestrian streets). The large transport companies and supplier companies have mostly a daily route that they follow. They have vehicles with quite a good load rate and they have effective routes. But there are also a lot of smaller suppliers, delivery vans, small haulier companies etc. These are the big problems when it comes to congestion and, they should be consolidated into fewer vehicles with better effectiveness and load rate.

A possibility for up-scaling of projects is value added services by the consolidation centre. Hammarby Sjöstad material logistics centre is a perfect example of this. They offered their customers a possibility to store their supplies in the logistics centre, and the contractors on the construction site could avoid damages to their material or theft on the site. In the evaluation of the project many customers highlighted and valued this opportunity. This is also a great opportunity for retailers in cities. They have often a very limited storage possibility (due to high rent for the business area) and this leads to frequent ordering of supplies and deliveries. This could be avoided with storage facilities in a consolidation centre and sequenced deliveries with a consolidated vehicle to the shops.

E-commerce is upcoming and increasing. It is a good possibility for customers to avoid private car trips for shopping, but it also increases the number of heavy vehicle movements. This problem should be addressed and maybe the consolidation centres can be seen as a possible way to help solving the transport problem even here. Siena in Italy has had a project called eDrul with this particular issue. E-commerce is upcoming and increasing. It is a good possibility for customers to avoid private car trips for shopping, but it also increases the number of heavy vehicle movements. This problem should be addressed and maybe the consolidation centres can be seen as a possible way to help solving the transport problem even here. Siena in Italy has had a project called eDrul with this particular issue. E-commerce is upcoming and increasing. It is a good possibility for customers to avoid private car trips for shopping, but it also increases the number of heavy vehicle movements. This problem should be addressed and maybe the consolidation centres can be seen as a possible way to help solving the transport problem even here. Siena in Italy has had a project called eDrul with this particular issue.

Up scaling of projects is a perfect way of continuing with projects after a pilot scheme. The up scaling can be to include another area or another type of goods. The Old Town, Stockholm, project has worked with food deliveries but is trying to up-scale the project to include other types of restaurant supplies. Unfortunately this becomes a problem with permissions from the municipality because of food regulations. But, the project is continuing after the Trendsetter period and therefore this is a good example of the necessity of driving forces for a consolidation project. The business, H2U, has a genuine interest in the issue and believes that this is a good way of marketing the company.

All of these projects in WP 9 have a transferability possibility. They are performed in typically European cities and areas and for common purposes. It should be relatively easy to perform a similar project like any of those with similar prerequisites somewhere else.

13 www.edrul.net
13. **Assessment of all measures**

This chapter contains a short summary of the assessment of all measures in WP 9. There are also some general aspects on the issue.

13.1. **Risks with Trendsetter project**
- Large size and complexity;
- Timing of the implementation process;
- Inconsistency of data across the measures;
- Delays prohibiting the evaluation process;
- Lack of awareness of the importance of the evaluation on different levels.

13.2. **General assessment**
- The total benefit for the cities in the projects is good, as well as for the transport companies who reduce their transports. But, the operators of the LC do not see any benefits – a critical mass needs to be reached first.
- Reduced emissions to air, originated from fewer vehicles and less vehicle kilometres and new, more fuel efficient, vehicles/clean vehicles;
- Increased traffic safety, based on fewer vehicle movements;
- Increased service level, thanks to fewer deliveries with more goods;
- Reduced congestion, based on fewer vehicle movements;
- Reduced noise, based on fewer vehicle movements;
- Investment possibilities in new vehicles are likely to increase with better economy. New vehicles are expected to have a better environmental performance and better traffic security performance;
- The potential is large in theory, but in reality there are other demands in the logistic system that could lower the potential.

13.3. **General problems**
- The power of customer relations: with consolidated transports, the delivery company looses the (valuable) contact with their customer;
- Tradition and values;
- Attitudes towards change;
- Insufficient support and information,
- Dependence on a key person that is the driving force;
- Drivers that perform value added services;
- Special time windows, and orders with short advance planning;
- Variations in delivery frequency for different goods types;
- Cost reduction demands large volumes (critical mass – hard to reach in a pilot project);
- Competition hinder co-operation;
- Suppliers are bound to certain transport companies/distributors;
- Purchase organisations are multi faceted and are controlled by many parameters;
- Deliveries and reception;
- Senders’ loading area;
- Logistics companies/transport companies are already coordinating transports (DHL, Schenker etc.);
- Difficulties with mixed goods.

### 13.4. Neutral aspects

- Laws and restrictions
  - Consolidation or coordination is probably not restricted by competition legislation with the condition that participating operators are procured in competition.
  - Anti-trust legislation creates problems.
  - Incoterms\(^\text{14}\) sufficiently restrict coordinated transport

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\(^{14}\) **Incoterms** 2000 (International Commercial Terms, published by International Chamber of Commerce, ICC) are internationally accepted commercial terms defining the respective roles of the buyer and seller in the arrangement of transportation and other responsibilities and clarify when the ownership of the merchandise takes place. They are used in conjunction with a sales agreement or other method of transacting the sale. www.incoterms.org (2005-10-26)
Part C – Conclusions and Recommendations
14. Barriers and drivers of measure implementation

The number of private cars in traffic has grown by about 20% in the last 12 years. The number of heavy duty vehicles has in the same period of time increased by 50%. A significant difference! This is a driver and an argument for increasing the consolidation of goods and in that way reduces the number of heavy duty vehicles in traffic on the roads and in the cities.

14.1. Barriers and drivers within WP 9

Each project has some barriers and drivers. Some are unique for the project but most of them are general for those kinds of projects.

14.1.1. WP 9.1 “Construction materials”, Hammarby Sjöstad

This project would never have been raised without the efforts of the City of Stockholm. A major economic risk was taken by the city. To succeed a project like this, a strong coordinator is needed to gather the different contractors and set targets together. One of the reasons why this kind of solution is not more common, is that the (building) industry is conservative.

There is no legal barrier in this project since there are no hindering regulations. But, one huge barrier for understanding of the problem of the increasing number of heavy vehicles in distribution traffic is the transport costs. The actual cost for transportation is rarely mentioned in invoices, but is included in the price of the merchandise or product. This can lead to a discontented situation where the customer thinks that the transport is for free. There needs to be more focus on hidden costs.

A higher understanding of logistics and environmental issues would be a good step towards decreasing the barriers for LC projects. The concept that the LC provides is applicable in almost all other construction projects. With the right size (number of deliveries) and with the right geographical and traffic prerequisites there is economy in such a project. The need for economic support is mainly to overcome the conservative attitude and culture within the construction business and get the project started.

One driver in motivating this kind of project and obtain funding is to highlight the opportunity for ending the construction project on time and within the budget.

14.1.2. WP 9.2 “Retail goods”, Graz

There is low knowledge about logistics as most of the shop owners receive their goods free to the door, so they do not know the real transport costs. The suppliers are reluctant to change their system because they might loose money. This is a barrier, since the shop owners do not see any cost reduction with consolidated
transports. With pilot projects, financed for one year by the city of Graz, the effects and benefits for the shops can be showed.

Drivers for this project are the benefits:

- The consolidation of goods achieves a minimising of the number of vehicles and transports in the city – helping to create a better and safer urban environment, and may be used as marketing factors for inner city shops.
- Transports will not be performed during peak hours in the city – this reduces problems especially in pedestrian zones.
- The working environment in shops is better: having just one delivery per day is more convenient.
- The costs are not higher.
- Value added services are possible.

Another driver of the project would be if the municipality would enforce the regulation about time limited transports within the city. There is a regulation for private cars and transportation vehicles before 11 o’clock, but this regulation is not kept and is not controlled seriously either. If it was, the benefits of a consolidation scheme would be more obvious.

14.1.3. WP 9.3 “Restaurant supplies”, Stockholm

The biggest barriers of the project have been:

- The lack of customer demand and involvement
- The lack of overarching knowledge and interest from the different bodies of the town and their lack of flexibility when it comes to testing new technologies and logistics

The biggest driver of the project has been the interest of other groups to the project. Locals, politicians and officials, but also NGOs and the media are convinced that the “LC model” is a model for the future. But, it is also important that the company, H2U, has a genuine interest in consolidation of goods and environmental issues. This is the reason that the project will continue after the Trendsetter project ends. A strong and convinced leading spokesman is needed for a project of this nature.

The Old Town in Stockholm is a typical medieval city centre as can be found in many European cities. If a working system is developed it has a good possibility for implementation in many similar cities in Europe. This could be a driver for other similar projects. There is a need for special solutions for these kind of areas. The main barrier for vehicles is the narrow streets. But to find a solution with a small biogas-fuelled vehicle as in Stockholm is a good solution to the problem
and becomes an additional driver for continuing with the project and makes it easier for other cities to motivate.

Restaurant supplies are a common problem when considering consolidation of goods. There are a lot of barriers when talking about permits and exemptions. A good example of consolidation of food products can lead to other implementations of similar projects.

14.2. Comparison and conclusions

The most important general driver for projects seems to be a person or a group of people who can ensure that all problems are discussed, strive to find solutions and actively work for a successful project. But at the same time, it is important not to be dependent on one single person. If something happens to this person it can be hard to continue with an ongoing project in the same way as before.

Other drivers include finding a delimited problematic area that can be showed and where the problems and the possible results are obvious – this makes it much easier to motivate the start of a project – and also to show successful projects as good examples. The possibility of showing the project as a good example could sometimes be one of the decisive reasons for a municipality to decide to support a consolidation scheme. This could be a good way of marketing the city as “leading” within this specific topic.

The worst barriers are laws and regulations. Some good solutions could be nearly impossible to implement because of old regulations that do not consider environmental issues, or anti-trust legislation. It is often possible to change regulations if the result and profit of the project could be proved. But it is a time consuming process, and changes in political government could create another barrier for the same process. Local politicians have to be convinced about the benefits of the implementation and the results. Here, good examples from other cities play a great role. Also a pilot project could be easier to implement than a full scale scheme. A pilot project often does not demand changes in regulations. Some exceptions can often be made for pilot projects. With a successful pilot project it could be easier to up-scale the project with extended areas etc.

One main problem is lack of customer demand. The people who order supplies do not normally demand environmentally friendly transports or longer delivery times. Such demands originate from the customer service of the suppliers and the transporters. Price of supplies is often similar between competitors, but a quick delivery has been the bait for the customers. In general, customers do not think of this and therefore order supplies without demanding “slow transport”, and the deliveries show up the day after or maybe even the same day. Suppliers are not aware that the customers might not need the supplies so soon. If the transport costs are made more visible and the customers realise that transport actually is connected with a cost, and that they can save both money and the environment by
ordering a “slow transport” or a consolidated transport, it is possible to create a customer demand.

Finally, knowledge about logistics and the environment among customers, suppliers, etc., is poor. Better marketing and media exposure of such issues might increase the awareness and possibly the demands on transports and deliveries.
15. Lessons to consider for replication and take-up by other cities

In this chapter some important experiences are discussed. Barriers, drivers, success factors or worst practice are described below.

General success factors seem to be

- Find and engage a convinced and convincing leader.
- Gather the organisations that are going to be involved in the solution and find out threats and opportunities with/without the solution.
- Define targets together based on possible problems (do not find the solution without defining the problems first).
- Find the right location for the warehouse or logistics centre at the city border or next to the area for consolidation of goods.
- Design the supply chain (branches, areas).
- Offer value-added-services.
- Find financing solutions.
- Start with bigger partners and use them as core partners for smaller companies
- Stick to the decisions by signing agreements in advance.
- Award the partners at the beginning by offering special delivery times, use of tram, logistic supply, ecological trucks etc.
- Clearly delimited geographical area for pilot project. It is easier to motivate consolidation if there are obvious physical delimitations and problems in the area, and if there are clear benefits with consolidation of goods.

General worst practices are

- Change of managers without passing over information about the projects.
- Change of politicians and senior officials without passing over information about the projects.
- Resistance of forwarders to cooperation.

15.1. Technical issues

Food handling creates barriers in consolidation projects. If there is a wish to consolidate food with other types of goods, a number of special permits, regulations and restrictions need to be considered. The vehicles need to be equipped with refrigerators to be able to handle food. In the Old Town project a
new type of environmentally friendly refrigerator was used. This was developed by the Royal Institute of Technology in Stockholm. This technique uses natural refrigerants connected to batteries instead of diesel units.

IT-connections to customers with the same interface are needed to get a good survey of goods, deliveries etc. These connections could be used for notes about when goods are arriving, delays, planning the transports etc. Graz had plans for this technique but did not manage all the way.

The SMS sign used in the Hammarby Sjöstad, Stockholm, was very useful and helped prevent a lot of problems with congestion. This a typical solution that is good for small areas with a lot of transports connected to the same system.

The small biogas vehicle used in the Old Town, Stockholm, is very good for transports in narrow streets. This could be used in many similar areas in Europe.

15.2. Synergies

Synergy effects of the storage function at Hammarby Sjöstad are for example avoiding thefts, destruction of material by weather or other, loss of materials etc. This generates extra value of the service.

If there is an obvious delimited area and there are physical delimitations that hinder the goods transports in an area, it is probable that consolidation of goods will lead to better opportunities for shops etc. to make their entrances more attractive for customers. Tourist attractions will be nicer to visit and may in the long-term lead to an even more attractive area. Other synergies with such areas are that it is much easier for another comparable area to implement similar restrictions, if there is a case of good practice The case of the Old Town in Stockholm could be seen as a typical small old town area, like in many European cities. They are often very attractive for tourists and have narrow, steep and winding streets. If this measure can show a good practice, it is possible for other cities to take after and create similar consolidation schemes.

15.3. Political and Administrative issues

The LC in the Old Town, Stockholm, has emerged in the discussions among local NGOs, politicians, officials and a small/medium sized company. Among them there is a high approval for the project, but it has not emerged from the demand of the actual customers. The actual customers being the restaurants and their suppliers have not been part of the discussions. They are on a low organising level when it comes to find common solutions; they try to find individual solutions to general, logistical problems. They do not organise and market themselves as “Restaurants of the Old Town”. To the restaurants and their suppliers the LC would objectively be good, both economically and when it comes to efficiency. But as long as they believe that today’s deliveries are free of charge and there is no control of the traffic after 11 a.m. it is difficult to achieve a change in structure.
Regular traffic controls to enforce traffic regulations would help the process of showing the benefits of consolidated transports. This has been stated in Old Town, Stockholm, as well as in Graz. Since traffic regulations are not followed in the inner-city there is no obvious need for a higher demand of consolidated transports. The municipalities have to help the project groups and enforce such regulations (time frames etc.).

The city should actively support the contractor in a political way, by facilitating the contact with departments and politicians so that their demands and possible solutions to different problems can be considered. Another arrangement could be that the town has a communication partner for discussions and decisions. Much time is often spent on searching for the right communication partner.

Regulations for handling food should be evaluated and checked. It may be possible to make some adjustments in the regulations or small adjustments to trucks etc. to enable food transports to be coordinated with other types of transports.

Strong, devoted and engaged leaders for the projects are needed to gain success. It could also be a help if a company with a known name and label is driving the marketing campaign. Customers tend to trust established companies with a known competence more than newly formed organisation in new types of services.

15.4. Economic issues

Value-added services offer extra profit for consolidation and logistic centres. The material logistics centre at Hammarby Sjöstad offered their customers a storage function that was highly appreciated. This helps avoiding theft, destruction of material by weather or other, loss of materials etc. A lot of money was saved by the contractors using this facility.

For a small/medium-sized company such as H2U, high economic risks and big investments are difficult. It is also difficult for a small company to cooperate with big political bodies, e.g. the city or its departments and officers. It is difficult for the respective parties to understand each other’s problems. It becomes easier if the city takes the responsibility for the project, calls it their own, initiates a procurement process for the actual contractor and takes all the investment costs. With a city supporting the project economically, e.g. by covering its investment costs or extra costs related to environmental issues, and other expenses, it becomes easier for the small company to continue.

As learnt in Graz: City logistics systems need know-how support from experts and financial support by way of public spending at the starting phase.
16. **Conclusions**
The conclusions from the projects are summarised and listed below:

- Emissions have been relocated geographically from sensitive areas to less sensitive;
- The total number of transports have been reduced;
- Emissions have been reduced by 110 tonnes CO2/year, 671 tonnes NOx/year and 13 kg PM/year;
- Reduced energy consumption by 1460 GJ/year;
- Less noise;
- Less wear and tear in medieval city centres;
- Improved mobility, safer traffic situation, less emissions and less noise in the area gives added value for visitors and citizens and positive effects on restaurants and shops;
- Some areas are suited/less suited for logistic centres. The localisation of the logistics centre is crucial for the benefits of the project (increased vehicle kilometres should be avoided);
- The possibility to establish a LC varies between different customer groups and areas. It is easier with construction materials than with food, which demands special delivery circumstances and permits.
- Added value (HSLC in Stockholm): less theft, increased security, increased traffic safety, less damaged goods, deliveries on time, higher usage time and load factor for each truck;
- The total benefit for the cities involved in Trendsetter has been good. But, the business profitability for the LC of goods consolidation has not been proven in the Trendsetter project. In the long run, however, the systems are likely to be economically self-sustaining, when critical mass of users/customers is reached;
- Less restrictive than access restrictions, but there is an indication that the best performance is reached if implemented together with access restrictions;
- Local authorities need to be the catalyst in many cases. The entrepreneurs are important for success;
- Anti-trust regulations might cause problems and delays;
- Implementation and decision making is time consuming;
- Resistance exists to initiating LC’s (Logistic Centres). The customer does not see the transportation costs, which prevents fair competition between companies;
- Fewer deliveries with larger volumes could create a problem for many shops and small restaurants. Staff being able to spend longer time on each delivery and storage facilities are crucial (but the result of a logistics centre could also create possibilities for storing, like in Hammarby Sjöstad, which makes it easier for the customers).
17. Recommendations to EC and other actors

It is hard to create a LC effectively without the right prerequisites or economical incentives. It is time consuming, and it needs dialogue and good communication to be successful. Fundamental aspects are funding and defined delimitations (in most cases geographical). Projects and full-scale implementation only works when there is obvious political interest, a delimited area, a driving force and a willingness to pay for the project. If those prerequisites disappear, it is not possible to start a consolidation project.

There is no such thing as “one solution” system for implementation of this type of project. Every city is unique and the solution has to be “tailor-made” for each specific situation, although all ideas, lessons, problems and specific solutions could be used as inspiration when starting plans for a new project. The same general idea is often possible to use.

The recommendations are divided into three chapters; EC, Municipalities and other actors.

17.1. EC

Create awareness campaigns to increase the knowledge of logistics and environmental issues, and possible solutions, at city level. Form and follow up clear environmental goals for urban cities with emission problems in Europe.

17.2. Municipalities/Local authorities

When planning a project about the consolidation of goods, it is important to form a project group at an early stage. This group needs to consist of engaged people from different affected organisations. The group, with a convincing spokesman, needs to be the driving force, trying to find problems and solutions and without giving up! Ensure that communication throughout the project works as well as possible and help the contractor meet the issues of administration, legal issues and politicians. Communication between different departments within the city is also important for creating the best conditions. Cooperation between different departments in the city has to be good to be able to increase the positive effects of the project and to create the right prerequisites. Political support for the project is also essential.

A well defined area, with evident problems is an important prerequisite when planning consolidation of goods. It is easier to motivate demands and conditions for consolidation if there are obvious problems that could be solved by the scheme. It is also important to think through the localisation of the Logistics Centre. The localisation of the centre could be right next to the area for consolidation or at the border of the city. Conditions and special prerequisites vary from case to case.
The contractors are important for success. Good examples from large actors could create a demand for participating in the project, and the involvement of at least one strong actor in the project, as a driving force, could help attract additional smaller actors.

The problems need to be identified before the solutions are found. Each city and area has their own prerequisites and the project has to be tailor-made for every unique situation. Different types of goods have different prerequisites. Construction material is relatively easy to handle, but food handling can be quite difficult because of permits for handling that type of goods, special delivery vans and special equipment for the LC. But, it is still important to find out about similar projects in similar areas for guidelines, success factors and worst practice. Some experiences are valuable in order to avoid repeating mistakes. One important factor is legal issues. Some regulations and demands can be hard to implement if there are legal barriers, e.g. anti-trust legislation. Laws and regulations are possible to change if needed to adjust to the situation, but it is a difficult and time consuming process. Clear results and possible benefits must be demonstrated to politicians. A pilot project could be easy to implement for a short period of time, where the project can make an exception from regulations. But, a full-scale implementation, where possible, is much more likely to continue after project funding ends. A project that not is limited in time is more likely to gain investments from more actors, since they can see a possible win-win situation.

Try to create good prerequisites for the pilot project. There has to be substantial funding from the start from the municipality and authorities, to overcome initial resistance from users and inhabitants in the area, and to create engagement. The result of the project will create a better urban environment. Prerequisites could be areas for Logistics Centres, positive incentives, follow-up of traffic regulations etc. Positive incentives could be used at the beginning of the project to increase the benefits of being a part of the scheme. Restrictions could be added further on to increase the effects. Think of the possibility of combining a LC with clean vehicles (transport from logistic centre to customer).

All systems and projects need clear delimitation to be able to identify indicators and measure levels. A base line scenario has to be evaluated. This is important for comparing results in the project. Control and monitoring of the project and implemented measures are important.

It is essential to measure the indirect effects of the project – known effects, synergies etc., but it may be difficult to find funding for this. Depending on the aim and objectives it is of great interest to include data for calculations and measurements of indicators also outside the project’s geographical area. It is also important to remember that the results of the project are just relevant to the project area, but if there are indicators of significance outside the area this could influence the total picture of the results for the city. It is also essential to explain clearly which results are good results. Use percentage when presenting figures and results.
as most people find such comparisons easier to comprehend. Also use relevant comparison data. All base line scenarios are important.

It is difficult to create a LC effectively without the right prerequisites or economic incentives. Fundamental aspects are funding and defined delimitations (in most cases geographical). Projects and full scale implementations only work when there is an obvious political interest, a delimited area, a driving force and a willingness to pay for the project. If those prerequisites disappear, it is not possible to start a consolidation project.

There is no such thing as a self-funded project! There is no known example of a project that has continued after the project period – the main reason for this seems to be lack of funding for the time after the pilot project period. To be “self-funded” the project has to reach a critical mass. But, why has no one managed to do this? Why is it so difficult to gain enough customers for the consolidation of goods? In the long-term perspective it is likely that most actors/customers gain some profit from this; fewer deliveries (no need for extra staff to take handle these), more attractive surroundings, a possibility for the supplier to lower the cost of merchandise thanks to lower transport cost, etc.

There is a difference between public and private funding of projects. Most results show that projects with private finding are the most successful. It is interesting to see how this difference influences the result of the schemes. With private funding or initiative it is more likely that the project will continue after the pilot project or that the scheme will start out as a full scale scheme from the beginning (see example Heathrow Airport).

Costs and profits – who will it affect? This is an important issue – who is the owner of the consolidation terminal? The city or a specific private company? See discussion above for arguments.

Soon, there will be no possibility to “do as we like” about transport and logistics situations. This is because of the climate change and other effects on the environment caused by emissions (both from goods transports, but also from private traffic). There are environmental climate goals\(^\text{15}\) that need to be reached (a national law in Sweden that corresponds to European Union demands), and not just in Sweden, and something has to be done.

It is important to point out that it is unnecessary to consolidate already fully loaded vehicles to an area (if all the goods are going to that specific area). It is both economically and environmentally more efficient to let the vehicle deliver the goods to the area, than to unload and reload the goods on possibly two smaller vehicles.

Finally, it is important with positive marketing of projects and good practice. Good results and even failures that in the end have led to a good result have to be

\(^{15}\) SFS nr: 2001:527 *Förordning om miljökvalitetsnormer för utomhusluf*
highlighted. Awareness campaigns are a possibility to get the public to start asking for specification of the transportation costs as part of the total cost on invoices.

17.3. Other actors

Communication with all actors at all times in all issues is important for a successful project. With a consolidation centre, logistics centre or similar, the suppliers will loose contact with their customers. This contact is often very important for the suppliers and it is therefore important that the drivers of the vehicles for the LC create good contact with the customers that he/she serves.

Home deliveries and E-commerce are increasingly common. How is it possible to integrate this into consolidation centres, and is it possible to integrate pick-ups for home delivery? Also the issue of reverse logistics is more and more discussed. Is it possible for the consolidation vehicles to deal with this kind of goods as well (empty returns)?

To gain more interest in the consolidation issue, the large transport companies like DHL, Schenker and UPS etc. need to be a model for others. It is possible for large companies to initiate consolidation centres for freight distribution together with customers within a specific area. Multi-retailing is a good example for consolidation. Is it possible for a transport company and the owner of a specific area, such as an airport or a shopping mall, to agree on a consolidation scheme? An example is Heathrow Airport, where BAA has a contract with Exel for a retail consolidation centre. There are also a construction consolidation centre which BAA runs together with Mace Ltd and Wilson and James Ltd16.

Value-added services – this is the way to gain some profits from the consolidation centres. This could include storing facilities, packaging/unpackaging of goods, hanging of clothes, price tagging etc. The customers should not have to pay extra for consolidation of goods, but they can pay for the extra services. The costs for transport of goods should be the same as without consolidation. The easiest way to pay for the service is, as before, to the supplier/transport company. The LC will then send an invoice to each supplier/transport company for their transport costs.

There are also other possibilities for added values from a LC. In a construction site the costs for the customer can be cut thanks to less theft of materials, increased security, increased traffic safety, less damaged goods etc. Increased traffic safety is a positive effect even for other areas, since the consolidation helps decrease the number of heavy vehicles in the city centre.

A successful Logistics project could be used in a marketing campaign, which can increase the good will for the company.

16 www.consolidationcentre.com (2005-03-15)
Appendix 1 – Description of measures

The Trendsetter project aims to improve mobility, air quality and quality of life while reducing noise pollution and traffic congestion by promoting innovative management methods, improving logistics for greater energy efficiency, increasing the use of public transport, car sharing and the use of zero and low emission vehicles.

Trendsetter’s overall strategy is to combine advanced mobility management schemes with clean vehicle fleets, which can achieve both short-term energy and emission reductions and long-term optimisation of the public transport and effective urban goods flows. Trendsetter is a large demonstration project focusing both on heavy vehicles and private cars.

In this report, Work Package 9 has been described and evaluated. In Stockholm there is a material logistics centre to optimise freight deliveries at a construction site and a project to introduce a logistics centre for the Old Town. In Graz there is a project for distribution of goods and green city logistics for a shopping centre during a reconstruction of the building. The projects within the WP are briefly described in the report and all results are analysed. In this appendix (chapters 16-18) there is a more detailed description of the projects.
18. **WP 9.1 “Construction materials”, Hammarby Sjöstad**

Hammarby Sjöstad is one of the largest constructions sites in Stockholm with a target of 8,000 new apartments. The construction site is a former harbour area. The access possibilities for deliveries are restricted, due to both geographical reasons and existing buildings. Small delivery companies do not normally coordinate driving or deliveries amongst themselves. This causes unnecessary driving and congestion in the area. If too many different deliveries were allowed to the site, the conditions would be impossible both for the construction workers as well as the residents. Severe congestion and disturbances of the construction plans would be the result of an uncontrolled situation. Without the Logistic Centre, this construction site would receive over 400 deliveries per day or roughly 700 tonnes of construction material into the area per day.

18.1. **Situation before CIVITAS**

A new housing district with 8,000 new apartments and thousands of new office premises was planned in a former harbour area in Stockholm. The project started around 1998 and will go on until approximately 2015. During the construction period there will be limited access to the area, but it still has to maintain a good living and working environment for those residents and workers that are affected during the project period.

There will be peak periods at the construction site and the purpose with the Logistics Centre (LC) is to be able to reduce the number of vehicle movements during those periods. The LC was established just before the first peak period and dismantled and moved after this period. During the peak period (2.5 years) approximately 2,500 new apartments were created. During 2005, a new peak period will appear and a LC will be of interest again.

18.2. **Design of measure**

A Logistics Centre is introduced at the entrance of the construction site that receives all small deliveries (less than four pallets) and stores the construction materials temporarily. Deliveries are then made with special vehicles to the different construction locations in accordance with the construction time plans. The coordination combines the demands of on-time delivery, coordinated deliveries and reduced driving in a way that is most optimal at each moment.

The centre is set up and operated over a three year period. There are 10 people working at the centre. Eight transport vehicles (Euro IV standard) are used for deliveries within the construction site. A web calendar, which enables all project managers to synchronise their orders and activities to other surrounding construction work, is introduced.
Establishing the Logistics Centre will reduce the number of direct small deliveries to the site by approximately 80%. This will lead to a decrease in queuing time, energy savings and reduced emissions.

The LC went into operation in 2001 and had its peak in 2002. During 2003 and 2004 the intensity of the construction work has been lower, and now the LC is being dismantled to give room for new buildings.

### 18.3. Innovative aspects

The construction site is situated in a former harbour area and consists of old houses that are going to be reconstructed or demolished as well as large areas for new building. The access possibilities for deliveries are going to be restricted, due to both geographical reasons and existing buildings. To manage the time plan, living conditions and economic targets for the project, a LC was established with the following services:

- Consolidation of goods deliveries
- Temporary material storage
- Smart traffic guidance system

The consolidation service in a LC is an innovative way of solving the number of transports within a delimited area. All deliveries that contain four pallets or less from all suppliers have to go through the LC. The goods are unloaded with forklifts and registered in the computer system. The goods are moved to a special colour area depending on the receiver. Two times a day, trucks deliver the consolidated goods from all suppliers to their proper designation within the construction site.

Each contractor had their own area in the LC where they could store materials. To ensure that the materials were not be left for too long a period at the LC, all contractors were charged by the LC for goods stored more than four days. If the contractors wanted the materials to be stored for a longer period, they paid a daily fee from the fifth day. The space was divided into areas dedicated to the contractors depending on their construction volumes. Materials stored at the LC were always distributed by the trucks belonging to the LC.

To prevent traffic congestion on the site, an internet based calendar was created for those deliveries which did not pass through the LC. Each contractor that was dependent of the same road had access to the same part of the calendar where they could see incoming trucks. In that way it was possible to have an overview of the total amount of incoming trucks and prevent congestion. In the LC, a traffic coordinator was hired to follow up all registrations, and when the roads were clogged he could send an SMS through his computer to the variable signs at the entrance of the area. He also had the possibility to send an SMS to the contractors’ mobile phones. The aim with this service was to avoid congestion inside the area.
18.4. Actual implementation
The LC was situated in the heart of Hammarby Sjöstad, see Figure 2 below.

![Figure 2 The localisation of the Logistics Centre (LC) at Hammarby Sjöstad](image)

The inside area of the LC was about 3,500 square metres which were protected by alarm systems for the material storage. Outside the premises about 4,000 square metres was available for the LC.

Ten people were employed at the LC. The vehicle fleet consisted of three trucks with a crane, one large heavy vehicle with a long crane, three forklifts and a pick-up vehicle.

The LC offered three different services: consolidation of goods for small deliveries to the area, temporary material storage to avoid damaged and stolen goods at the construction site and a smart guidance system.

During the first four months of the project a group was put together representing different users (contractors, City of Stockholm etc.). The LC was under operation during 2.5 years (month 4 to 22 of the Trendsetter project) and was dismantled during December 2003 and moved to another building to await the next peak period.

18.5. Results and further plan
The results of the project are very good. The objectives were fulfilled and the project was operated without any major problems. A huge interest has been seen for the project, and the management of the project has presented it at in at least 50
seminars. Experiences have been shared with for example London and La Rochelle for similar projects.

It is important in large construction projects to plan the logistics carefully from the beginning. Plans for technology as well as a logistics centre and definite rules have to be a natural part of the project. The logistical problems will appear sooner or later in any large construction site, but if solutions are not implemented from the beginning it will be difficult trying to convince all partners that some acts or regulations will help them as well as the whole project.

Looking back at the project there is a better acceptance for the project from the contractors than before. Some contractors that showed scepticism in the beginning now see the advantages; the possibilities to keep up with time plans etc., and are demanding these services despite a higher cost.

The LC is going into operation again during the next peak period, but without funding from the City of Stockholm.
19. WP 9.2 “Retail goods”, Graz

The project aims to improve exploitation of freight capacities and to reduce the number of trips and stops in order to achieve a reduction of emissions and a better urban environment.

A large department store in Graz (Kastner & Öhler) was going to be reconstructed. A five storey parking deck was being built below the building. During the construction period (2003) the shops were open as usual. This led to some logistical problems with a lot of transports: both construction vehicles and materials and normal deliveries to the department store. The Trendsetter project came into consideration with perfect timing, and a logistical solution was worked out.

A hospital area in the city was supposed to take part in the project, but changes in the management, lack of interest within a certain period, problems of funding, etc., made this impossible. The hospital is now in the process of discussions again and there is a possibility that they may take part of the project in the future.

19.1. Situation before CIVITAS

Before CIVITAS there were a lot of transports going to and from the department store, but the construction period made it nearly impossible for this to continue as usual. There is very limited cooperation amongst logistics companies. Deliveries to the city centre are often performed with large elderly vehicles, which have frequently free capacity. Older vehicles are often moved to city distribution routes when they are too old for longer transports. Attempts to establish city logistics in the whole city centre had failed. Due to large construction works, the in-house shops at the department store K&Ö were worried about the logistics system of the department store.

The biggest hospital organisation of Graz, KAGES, handles a lot of logistic matters for several sites within and outside the city. One of the problems is that hospital departments order medical materials only at the moment that they are needed. No one cares about coordination between departments or the different sites. There is a great necessity to save trips and vehicles.

The climate situation makes Graz very sensitive to air pollution. This makes it necessary to highly value any kind of measure that counters the trend of more emissions and to come up with good examples of best practice.

19.2. Design of measure

The preparation work for the measure contained research about logistic chains on the basis of relevant freight amounts and specific supply patterns. This was done by collecting data, interlinking them with trade, logistics services, freight companies, commerce and industry.
A project group developed value-added services to offer at the Logistics centre. They included stock management, home transport service, deposit service, return of packages, etc. A business and marketing plan was established for calculating cost savings and quality improvements.

A company of forwarders was founded by signing special agreements to provide the planned services.

The target groups for these services were identified as shops, but also hospitals. Low emission vehicles with high loading capacity, supported by IT-structures, value-added services, transhipment in one logistics centre and supply-chain-management were pointed out as factors of success.

**19.3. Innovative aspects**

The innovative aspect of the project is that this kind of scheme has never been implemented in the city of Graz before. The value-added services and the establishment of the business and marketing plan are additional innovative options.

The containers used for consolidation and delivery of goods were a of a special design for this measure and were well adapted for the situation.

**19.4. Actual implementation**

The actual project was split up into two stages. It started with research about storage, and the use of ecological vehicles or other intermodal transports (trams) to reduce the number of trips into the city and urban area.

In the first step of implementation the project management company (ECE) established the platform company Styrialog with the main goal to consolidate the existing flow of the goods of the actual shareholders. These partners were: forwarding companies (DHL, Jöbstl Holding, Jöbstl KG, Wenzel Logistik GmbH), railway company (LTE), logistics consultant (Econsult) and project management for this project (ECE). After founding the platform company a syndicate agreement had to be established to guarantee the confidentiality of information about customers of each partner. This company still exists but has not been involved in the Trendsetter project.

Now, the system that works actually consists of two partners only: the shopping centre K&Ó and the logistics company ITG. During the construction of a garage beneath the centre all incoming goods (retail goods such as clothes, toys, appliances, etc.) to the department store were delivered to the ITG terminal outside the city (10 kilometres away). One or two trucks delivered the goods in containers to the department store. A crane lifted them into the building since there was no possibility for vehicle entrance.
This service was in operation during 2003. The construction work ended in 2004, but the logistics service is being continued because it is regarded as successful by the warehouse management. Now the vehicles can enter the building at the ground floor.

The missing basic data for the Trendsetter project about the real cargo traffic into the city were collected by the Institute of Traffic Engineering of the Technical University of Graz for Herren-, Spor-, Schmied-, Stempfer-, Stabenberg-, Hans Sachs-, Albrechtgasse and Franziskanerplatz and Färber – and Glockenspielplatz. This is used for the calculations of emissions etc. in the project evaluation.

An agreement with KAGES – the biggest hospital holding company in Styria – was sought for consolidation of goods at the hospital Graz-West. This part of the project has not yet been realised, but is still an option for the future.

19.5. Results and further plan

This cooperation is already quite successful and will step-by-step be expanded to shops around this location. Also the hospital is interested in a possible continuation of the project and discussions are still ongoing. The objectives of the project were fulfilled and the general results are positive.

A one year supplementary measure has been suggested from ECE to the local government to help show the benefits of the consolidation scheme to the shops. The measure would include ten shops, and the cost for the city of Graz would be €40,000. Negotiations about this proposal have also been launched with the newly founded city marketing company.

The project will hopefully continue and will be implemented in other cities after the Trendsetter period.
The Old Town of Stockholm is situated on a separate island, see Figure 3. This is where Stockholm started out as a city. The city structure is medieval with small and narrow streets, with the Royal Castle in the northern part. Most of the Old Town is pedestrian, with goods delivery hours restricted to the morning. No entry is allowed after 11 am for distribution vehicles. The buildings date back to the 16th century and this is the most popular area for tourists to visit. It is also one of the oldest medieval town centres in Europe. Deliveries to the Old Town are complicated. Therefore, a logistic solution to make goods deliveries more effective is needed.

20.1. Situation before CIVITAS

During delivery hours traffic congestion occurs in the narrow streets. It is impossible for delivery trucks to pass one another in the one-way alleys. There are approximately 100 restaurants and hotels in the area which require regular and frequent deliveries of food since they are located in small unsuitable buildings with very little space for storage. The deliveries cause pollution that erodes the beautifully decorated buildings and vibrations that shake and destroy the sensitive area. The noise is also a problem. About 3,000 people live here in about 450 buildings. About 9,000 people work here in offices, shops, restaurants, museums, and schools, The Parliament, the Cathedral, other churches and the Royal Castle.

The restaurants in the area experience difficulties when receiving as many as six deliveries per day. They welcome a system with fewer deliveries, but are not always willing to pay extra for this.
Figure 4 The Old Town in Stockholm is situated on a separate island, the streets are narrow and there are a lot of people moving in the area.

Small delivery companies do not normally coordinate their driving or their deliveries with each other, which causes unnecessary driving and congestion in the area. Today, the Old Town receive approximately 120,000 deliveries/year to the restaurants and hotels and 25,000 deliveries/year to the shops.

The structure of the business in the Old Town is dominated by tourism and knowledge based business, see Table 11. The Royal Castle, churches, museums are other businesses in the area. The total production of the businesses in the area is calculated to about SEK10 billion with a goods supplier requirement for a total buying value of SEK500 billion.
There are two types of suppliers: Suppliers with their own distribution solution (own or third part) or transporters which distribute for others (ex. Posten, Schenker, DHL).

Many local people and organisations are deeply involved in the discussions about the district, about its history and its future. One of the main problems is the traffic and the number of cars. The issue of private cars has always been tricky. It is difficult to reach a consensus when some consider that driving a private car is a basic, democratic right and others want to make the area pedestrian only. Therefore the issue of goods transportation has been more neutral and it has been easier to discuss different strategies. In the last 7-8 years there has been a consensus among those locals that a solution would be to find premises close to the district, to unload the goods there and then pack them logistically smart and deliver them with small, clean vehicles. The problems have been to find the right premises and a company willing to do it.

### 20.2. Design of measure

The driving forces in this process have been some of the local NGO: s (Agenda 21, parent groups etc) that have contacted local boards and politicians and asked them to develop a consolidation project. Since 2001, Home 2 You (H2U) has been the company willing to go into business. Together with local forces they have found a premise close to the district, refurbished them and bought a clean vehicle.
(biogas). A paper analysing the actual number of deliveries, the value of the goods, the structure of the suppliers, etc., was produced in 2003 by Gradient AB.

The stakeholders are the Local Agenda 21-group, the Environment and Health Administration of Stockholm, and H2U. All the financing has come exclusively from H2U except for a contribution from Trendsetter to cover measurements, meetings and reports. A lot of local political bodies and officials have expressed approval and admiration of the project. Local organisations are very pleased; to them the LC has become a symbol for the possibility to make a change.

The main target group, the restaurants, has expressed neither approval nor disapproval. Their main suppliers are interested in the project and two of them have joined. A third supplier joined the project for a testing period from May 2005. Other customers, like the Royal Castle, have expressed an interest in joining the project in the future, according to their own timetable.

The City of Stockholm, through its Executive Office, is today making plans and procurement for a central, or many central, logistic centres. The City has expressed interest in the LC as an example particularly for local solutions in the city.

### 20.3. Innovative aspects

There has not been any consolidation of restaurant supplies in this area before, and establishing a Logistics Centre for this reason is an innovative aspect.

Other innovative aspects include trying to finding methods of consolidating other types of goods, for example returned goods. In the pilot project a new technology for refrigeration in delivery vehicle has been used, which was developed by KTH (Royal Institute of Technology, Stockholm).

### 20.4. Actual implementation

Since summer 2002, discussions have been going on regarding the establishment of a logistics centre for the coordination of goods in the Old Town of Stockholm. Discussions have been between Home2You and politicians as well as with people living or working in the area. The biggest problems have been:

- Finding a building near the Old Town suitable for the purpose
- Get a grip on the industry, businesses and customer/supplier structure in the area.
- Finding a concept to offer the businesses in the area

During summer 2003, Home2You found and took over a building at Söder Mälarstrand 23 that suits the business. A Logistics Centre has been set up here, close to the Old Town, and the delivery company Home2You offers services to the restaurants and hotels in the area. At the same time an electric vehicle was
bought and a survey of the business structure in the area was made. A driver was hired in early 2004, with the only purpose to deliver goods from this terminal. The area of the premises is about 55 m² and they were adapted to the services and planned activities by installing a refrigeration plant.

The LC coordinates and provides co-transport of goods within the Old Town. The coordination combines demands of on-time delivery and coordinated deliveries, and reduces driving in the way that is most optimal at each moment. In summer 2004, 14 customers used the LC for consolidation of goods to their restaurants. In November, the number of customers had increased to between 30 and 35, which gives the project a good potential for the future.

The logistics centre must be improved with:

- The possibility to keep food cold.
- Marketing to get more businesses to direct their deliveries through the LC. The main categories for marketing are restaurants, hotels, shops and the Royal Castle.
- Permanent staff between 6 a.m. and 3 p.m..
- More customers.

Establishing the LC will reduce the number of direct small deliveries to the Old Town by 17%.

New measures started in January 2004. A marketing campaign and the inauguration of the reconstructed terminal and clean (biogas) vehicle were held in mid-June, see schematic picture of the vehicle in Figure 5. The operation of the terminal began in June, but introducing the LC to the customers takes time. They have to discuss the advantages and disadvantages; higher or lower costs, better or worse marketing possibilities, rival company analysis, etc. They have to process this within their own organisations, which always takes time.
An application for exemption from the regulation that stops driving in the area after 11 a.m. was made in July 2004. Permission was sought to drive in the area between 11 a.m. and 4 p.m. The reason was that it is difficult to manage all the customers before 11 a.m. Another reason for the application for exemption was the interest from the biggest brewery supplier in the Old Town. Their trucks are famous for breaking all rules; getting lost in small alleys, driving too fast and delivering around the clock. In contact with H2U they expressed an interest to use the LC if “they can deliver after 11 a.m.” as most of their customers open after 11.

The application was accepted in January 2005 and the LC vehicle has permission to drive in the area until 4 p.m. The exemption from the regulation is valid until 31 December 2005.

20.5. Results and further plan

The results of the project have turned out very positive and with the ability to drive in the area for a longer period every day; the possibilities for the LC have increased. With a good marketing campaign and showing good results there is a great possibility for the LC to engage more customers and suppliers in the area. This will decrease the number of transports in the area effectively. For the restaurants, a good marketing opportunity could be to put up a sign on the front door explaining that they contribute to a better urban environment by only using the LC for their deliveries.

The project will continue after the Trendsetter period is over.
Appendix 2 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

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<td>Congestion charging</td>
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<tr>
<td></td>
<td>Strolling zones</td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
<td>Graz</td>
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<td></td>
<td></td>
<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
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<td></td>
<td></td>
<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
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</tr>
<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
<td>6.1</td>
<td>Smart card systems and integrated ticketing</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
<td>Lille</td>
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<td></td>
<td>Parking</td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
<td>Stockholm</td>
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<td></td>
<td>6.4</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>Graz</td>
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<td></td>
<td></td>
<td>6.5</td>
<td>Establishment of a zone-model parking in the central city area</td>
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</tr>
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<td>WP7 Public Passenger Transport</td>
<td>Information to passengers</td>
<td>7.1</td>
<td>Increasing public transport passengers</td>
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<td></td>
<td>7.2</td>
<td>Public transport safety</td>
<td>Lille</td>
</tr>
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<td></td>
<td>Public transport safety</td>
<td>7.5</td>
<td>Customer friendly stops for bus and tram</td>
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<td>PT intermodality</td>
<td>7.3</td>
<td>Intermodal local/regional transport interchanges</td>
<td>Lille</td>
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<td>7.4</td>
<td>Seamless linkage of modes</td>
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<td></td>
<td>7.6</td>
<td>Park and Ride facilities</td>
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<td>7.7</td>
<td>Linking different ways of public transport</td>
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<td>WP8 New Forms of Vehicle Use</td>
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<td>Car pooling/sharing</td>
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<td>Company mobility plan in the administration fleet</td>
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<td></td>
<td>8.3</td>
<td>Increasing car occupancy</td>
<td>Graz</td>
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<td></td>
<td>Awareness rising</td>
<td>8.4</td>
<td>Site level Mobility Management</td>
<td>Graz</td>
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<td></td>
<td></td>
<td>8.5</td>
<td>Urban Mobility Plan</td>
<td>Lille</td>
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<td>WP9 New Concepts for the Distribution of Goods</td>
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<td>9.1</td>
<td>Material logistic centre – to optimise freight deliveries at construction site</td>
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<td>9.2</td>
<td>Distribution of goods - Green city logistics</td>
<td>Graz</td>
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<td>9.3</td>
<td>Logistic centre for Old Town of Stockholm</td>
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<td>WP 10 Innovative Soft Measures</td>
<td>Bicycle measures</td>
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<td>Innovations in bicycle transport</td>
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<td>Make bicycling attractive (B&amp;R information on the Internet)</td>
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<td>Trip planning</td>
<td>10.3</td>
<td>Creation of a visitor web for optimal trip planning</td>
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<td></td>
<td>10.5</td>
<td>Marketing/information and quality management</td>
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<td></td>
<td>Awareness of clean transport and safety</td>
<td>10.6</td>
<td>Awareness for speed reduction and less car use</td>
<td>Graz</td>
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<td></td>
<td></td>
<td>10.4</td>
<td>Taxi drivers as information multipliers for clean transport</td>
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<td>WP11 Integration of Transport Management Systems</td>
<td>Traffic information</td>
<td>11.2</td>
<td>Traffic monitoring and supervision</td>
<td>Stockholm</td>
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<td></td>
<td>11.3</td>
<td>Dynamic traffic management system</td>
<td>Graz</td>
</tr>
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<td>Improving PT traffic flow</td>
<td>11.4</td>
<td>Accessible road network (street) data</td>
<td>Stockholm</td>
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<td></td>
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<td>11.5</td>
<td>More adaptive signal control in a bus priority system</td>
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<td></td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
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<td>11.7</td>
<td>High level service bus routes</td>
<td>Lille</td>
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<td></td>
<td>11.1</td>
<td>Technical basis for an efficient customer focussed operation and information</td>
<td>Graz</td>
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<td>WP12 Clean Public and Private fleets</td>
<td>Heavy vehicles</td>
<td>12.1</td>
<td>Clean and efficient heavy vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2</td>
<td>Biogas bus fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>Graz</td>
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<tr>
<td></td>
<td></td>
<td>12.6</td>
<td>Waste collection with biogas-vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>12.4</td>
<td>Clean municipal fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.5</td>
<td>Clean municipal fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7</td>
<td>Bio-diesel taxi fleet and bio diesel service station</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.11</td>
<td>Making Clean Vehicles less expensive</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.13</td>
<td>Increasing clean vehicle use in private company fleets</td>
<td>Stockholm</td>
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<tr>
<td></td>
<td></td>
<td>12.14</td>
<td>Web-portal for drivers of clean vehicles</td>
<td>Stockholm</td>
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<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>12.8</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 3 – Trendsetter cities

The five Trendsetter cities are described below.

**Graz**

With nearly 230,000 inhabitants, Graz is the second largest city in Austria, the capital of the Styria province and the cultural, economic and university centre of the region. About 80,000 commuters travel to the city of Graz daily. On an average weekday, 47% of commuters travel by car, 19% use public transport, 20% are pedestrians and 14% cycle.

Graz has a historic centre with many pedestrian precincts and much bicycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city area (except major roads) and the first Austrian city to open a mobility centre.

The main problem Graz faces is the rise of car use due to a tendency of people moving to the city outskirts. The increasing traffic as well as the topography and climate in Graz, lead to high air pollution levels in the city. Information technology will be used to make public transport more user-friendly and the services more attractive.

The following measures have been implemented in Graz within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Strolling zones</td>
<td>Implementation of strolling zones</td>
<td>5.3</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP5)</td>
<td>Parking</td>
<td>Integrated parking strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>5.4</td>
</tr>
<tr>
<td>Public Passenger Transport (WP5)</td>
<td>Information to passengers</td>
<td>Customer friendly stops for bus and tram</td>
<td>7.5</td>
</tr>
<tr>
<td>Infrastructure (WP6)</td>
<td>New services and services for special customer groups</td>
<td>9.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bike friendly stops</td>
<td>9.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bike friendly stops</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP 10)</td>
<td>Bicycle measures</td>
<td>Innovations in bicycle transport</td>
<td>10.1</td>
</tr>
<tr>
<td></td>
<td>Trip planning</td>
<td>Innovative information and quality management</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>Awareness of clean transport and safety</td>
<td>Awareness for speed reduction and less car use</td>
<td>10.3</td>
</tr>
<tr>
<td></td>
<td>New drivers for information and clean transport</td>
<td>New drivers for information and clean transport</td>
<td>10.4</td>
</tr>
<tr>
<td></td>
<td>Innovation of clean transport</td>
<td>Innovative new transport</td>
<td>10.5</td>
</tr>
<tr>
<td></td>
<td>Innovation of clean transport</td>
<td>Innovative new transport</td>
<td>10.6</td>
</tr>
<tr>
<td></td>
<td>Awareness of clean transport and trip planning</td>
<td>Innovative new transport</td>
<td>10.7</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Traffic information</td>
<td>Dynamic traffic management system</td>
<td>11.1</td>
</tr>
<tr>
<td></td>
<td>PT traffic flow</td>
<td>Technical basis for an efficient customer focused operation and information</td>
<td>11.2</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>12.1</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Bio-diesel taxi fleet and bio-diesel service station</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>12.3</td>
</tr>
</tbody>
</table>

The map below shows the City of Graz.
Lille

Lille Metropole in France is an urban network of 85 communes with 1.2 million inhabitants. The community is close to the Belgian border and cooperates closely with its counterparts in Belgium. It is a base for distribution and a node for major routes north-south and east-west in Europe.

Lille has built up a strong public transport network. On an average weekday, 150,000 passengers travel by bus, tram, commuter trains or metro. The following measures have been implemented in Lille within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of measures</th>
<th>Measure description</th>
<th>Measure N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated pricing strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Public Transport safety</td>
<td>Public Transport Safety</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>Public Transport intermodality</td>
<td>Intermodal local/regional transport interchanges</td>
<td>7.3</td>
</tr>
<tr>
<td>New forms of vehicle use (WP8)</td>
<td>Car pooling/sharing</td>
<td>Company Mobility Plan in the administration fleet</td>
<td>8.2</td>
</tr>
<tr>
<td></td>
<td>Awareness raising</td>
<td>Urban Mobility Plan</td>
<td>8.5</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving Public Transport traffic flow</td>
<td>High Level Service Bus Routes</td>
<td>11.7</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Biogas Bus Fleets</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Clean Municipal Fleets</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>Clean Fuel distribution</td>
<td>Analysis of the biogas experience</td>
<td>12.9</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Lille.
Pécs

The City of Pécs with 170,000 inhabitants is a middle-sized cultural, educational, commercial and health centre in Hungary, 40 km from the Croatian border. In the last decade the number of cars and the number of tourists and students have increased rapidly, creating a huge demand for parking spaces and public transport. In November 2000, the early Christian burial chambers in the city centre received UNESCO World Heritage status, providing the municipality with new tasks to protect and preserve the heritage.

The following measures have been implemented in Pécs within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Strolling zones</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>5.4</td>
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<tr>
<td>Strolling zones</td>
<td></td>
<td>Preparation of a new traffic and transport strategy</td>
<td>5.5</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The map below shows the location of the parking-zones and the access restriction areas in Pécs.
Prague

The City of Prague is the capital of the Czech Republic and the country’s largest city with 1,300,000 inhabitants. On an average weekday, 44% of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 1 160 million passengers per year uses the public transport system in Prague.

Prague has a high concentration of both political and economic administration, industry, trade, education, research and tourism. This requires good traffic management. One of the biggest problems is the very fast increasing number of private cars. It has more than doubled since 1990. A new traffic policy promotes public transport, development of traffic infrastructure and regulation of car traffic, particularly in the city centre.

The following measures have been implemented in Prague within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure nr</th>
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<td>Access Restrictions (WP5)</td>
<td>Environmental Zones</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
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</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>PT Intermodality</td>
<td>Linking different ways of public transport</td>
<td>7.7</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.6</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Prague.
Stockholm

The City of Stockholm is the capital of Sweden and the country’s largest city with 770,000 inhabitants. On an average weekday, over 600,000 passengers travel by public transport in the county of Stockholm. Of all travellers, 46% go by car, 23% use public transport, 29% are pedestrians and cyclists and 2% use other modes.

The biggest traffic problems include an increasing number of vehicles, congestion on many main roads, heavy duty traffic, limited rail track capacity and few cyclists. Moreover, there are problems with the air quality in inner city areas especially due to a high concentration of NOx and particulate matter. Noise levels are also high.

Stockholm is improving its transport system environmentally by substituting conventional vehicles with clean ones and making logistic services more effective. Better public transport and intelligent traffic information techniques are other important fields.

The following measures have been implemented in Stockholm within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure Description</th>
<th>Measure No</th>
</tr>
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<tbody>
<tr>
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<td>Widening of the Environmental Zone</td>
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<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.1</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Reduced parking fees to promote clean vehicles</td>
<td>6.3</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Information to passengers</td>
<td>Increasing public transport passengers</td>
<td>7.1</td>
</tr>
<tr>
<td>New Concepts for the Distribution of Goods (WP9)</td>
<td>Material logistic centre – to optimise freight deliveries at construction site</td>
<td>9.1</td>
<td></td>
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<tr>
<td></td>
<td>Logistic centre for Old Town of Stockholm</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Innovative Soft Measures (WP10)</td>
<td>Bicycle measures</td>
<td>Make bicycling attractive (BMR information on the Internet)</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>Traffic information</td>
<td>Create a visitor web for optimal trip planning</td>
<td>10.4</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Traffic information</td>
<td>Traffic monitoring and supervision</td>
<td>11.2</td>
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<td>Accessible road network (street data)</td>
<td>Access a road network (street data)</td>
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<td>Improving PT Traffic Flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.5</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and efficient heavy vehicles</td>
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<td></td>
<td>Waste collection with biogas-vehicles</td>
<td>Waste collection with biogas-vehicles</td>
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<td></td>
<td>Light vehicles</td>
<td>Clean municipal fleets</td>
<td>12.9</td>
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<td></td>
<td>Making Clean Vehicles less expensive</td>
<td>Making Clean Vehicles less expensive</td>
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<td>Measure fused with 12.11</td>
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<td>Increasing clean vehicle use in private company fleets</td>
<td>Increasing clean vehicle use in private company fleets</td>
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<td>Clean fuel distribution</td>
<td>Improved biogas refuelling infrastructure</td>
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</tbody>
</table>

The map below shows the geographical context of measures in Stockholm.
The European project Trendsetter involves 50 individual projects, all of which aim to improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union. Read more about Trendsetter at www.trendsetter-europe.org.

Read more about the Civitas project at www.civitas-initiative.org
Evaluation Report – New Forms of Vehicle Use (WP8)

June 2006

Trendsetter Report No 2005:6

Trendsetter External Deliverable No 4.3d
Contract No: NNE-2001-00323

Contractors
1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
7. Swedish National Road Administration, Stockholm Region
8. Stockholm Real Estate and Traffic Administration
9. Public Transport Company of Graz
10. Taxi Group 878 Cityfunk Ltd
11. Styrian Transport Association, STVG Ltd
12. Erlach Consulting & Engineering
13. Province of Styria
14. Austrian Mobility Research
15. City of Pécs
16. Pécs Municipal Operations and Property Management Company
17. Syndicat Mixte des Transports
18. Statoil Detaljhandel AB
19. AGA Gas AB
20. Home 2 You AB

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PART A – Report Summary

Measures:
WP 8 has the title: "New forms of vehicle use and contains the following measures:
8.1. New Services and services for special customer groups (Graz, StVG, FGM-AMOR)
8.2. Company mobility plan for the administration fleet (Lille Metropole)
8.3. Increasing car occupancy (Graz, Styria)
8.4. Site level Mobility Management (Graz, FGM-AMOR)
8.5. Urban Mobility Plan (Lille Metropole)

Objectives:
• achieve a reduction in single car use
• increase use of sustainable modes
• demonstrate cost effectiveness of soft measures

Potential for upscaling
8.1. Night bus system was a big success 800 passengers per night
8.2/8.5 Mobility management in the city administration is a good example for companies and other institutions
8.3. HOV-lane to early to tell, park and pool place seems successful – evaluation results unconclusive
8.4. Mobility management generally successful, could systematically be spread to all companies, events and schools
8.4. It is good to combine mobility management with the extension of paid parking or limited access zones
8.5 Urban mobility plan might be useful as a planning tool (no concrete measures implemented

Barriers for Up-scaling & Transferability
• Finances (especially mobility management: schools, events, companies are often not ready or unable to fund)
• Non-visibility of mobility management makes it a hard sell
• No systematic approach to cover all schools, institutions, companies, events for mobility management
• Mobility management: who is responsible is unclear
• Limited space (HOV-lane)
• Unclear legal situation (HOV-lane)
- Non-user friendly and fragmented taxi on-demand-services do not get many customers
- High incentives for using the car when commuting

Drivers
- At a certain point, all parties were pro night-bus – it could be implemented within 2 weeks
- Continuous political support was essential
- Quickscan methodology provided easy access to companies and schools
- Initiative of the city administration can convince companies to take part in mobility management
- Extension of parking management made mobility management an option for companies
- Funding of EC

Lessons to Consider
- With political will, a lot can be implemented very fast (see night bus)
- Quicksans seem to be a useful tool in mobility management
- Mobility management could be upscaled to a systematic system for the whole city – problems is funding and support.
- Initiative to start with mobility management in the city administration is helpful as this gives a good example for other companies
- School mobility management helps to raise awareness among parents and teachers

Recommendations to EC
- HOV-legislation is not well developed in Austria, EC could initiate harmonisation
- Provide more exchange between CIVITAS projects
- Extend possibilities for horizontal exchange (maybe a workshop?)
- Provide special WS for new EU Countries (mobility management is less well known there)
- An information database with details on night bus systems and on demand services might be useful
- Legislation like in Italy (mobility plans are compulsory for companies over 300 employees) might be interesting
PART B – Common Trendsetter introduction

1. Introduction

1.1 Background
Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 Trendsetter – a part of the Civitas Initiative
The CIVITAS Initiative (CIty-VITAility-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;
– CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
– Cities are in the heart of local public private partnerships
– Political commitment is a basic requirement
– Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:
− to promote and implement sustainable, clean and (energy) efficient urban transport measures
− to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
− to build up critical mass and markets for innovation

Each city implement a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

1.3 Achievements within Trendsetter

Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European dimension. Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

Improving access to public transport

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.
Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

**Trip planning, traffic control and cycling**

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

**Access restrictions for reduced traffic**

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone.

Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

**Marketing and mobility management**

Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.
**Co-transportation of goods**

Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

**Clean vehicles and fuels**

Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

**Incentives and promotion of clean vehicles**

Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.

1.4 **Overview of achieved effects**

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
</tr>
</tbody>
</table>

**Costs** are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure. **Time** – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emissions</th>
<th>Energy</th>
<th>Mobility</th>
<th>Time</th>
<th>Investment cost</th>
<th>Operational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Increased public transport security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convenient and safe intermodality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Customer-friendly stops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>New services for special needs</td>
<td>–</td>
<td>–</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quality management</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planning trips on the web</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traffic management</td>
<td>Integrated public transport services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cycling</td>
<td>Cycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selective access restriction for heavy vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marketing attractive alternatives</td>
<td>Marketing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobility management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved goods distribution</td>
<td>Consolidation of goods *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean vehicles and fuels</td>
<td>Biofuelled vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biofuel production</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 Trendsetter cities after Civitas

The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas 1 cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (Bioethanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1 Evaluation at different levels

The Trendsetter project has been evaluated in different levels; measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:

- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

2.2 Indicator based evaluation

Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOₓ</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dB(A)</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios

When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.

Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using
ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.

**Methodology**

The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (--- - 0 + ++).
3. Trendsetter objectives

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

3.1 Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide examples:</td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase mobility:</td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td>Enhance Environment:</td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO2 emissions by 5 %, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td>Save Energy</td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO2, NOx and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfill the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfillment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.

The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period.

The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not
possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.

The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
### 3.2 Demonstration objectives

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. The objectives that are not reached are commented below the table.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
<tr>
<td>operation on bio-diesel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid,</td>
<td>300</td>
<td>3000</td>
<td>+2700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>ethanol)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1100</td>
<td>3000</td>
<td>+1900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>

### 3.3 Scientific and technical objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.
### Scientific and technical objectives

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm³ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Each demonstration objective and the fulfilment of it is described below

**Produce a total amount of 11 million Nm³ biogas by the end of the project.**

In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm³, but biogas vehicles have consumed only 4.26 million Nm³. The rest has been used for heating and electricity production or just flared.

Before Trendsetter, the local biogas production in Lille was 0.12 Nm³ biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3.6 million Nm³ per year.

This objective is not applicable for the other three cities.

**Reduce the commercial cost of biogas fuel by 20% in demonstrating cities**

The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.

In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).

This objective is not applicable for the other three cities.

**Implement a complete biogas technology chain in Stockholm and Lille, from production to end use**

In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plats will be ready.

This objective is not applicable for the other three cities.
Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now.

The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.

- A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of fossil CO2, emissions of NOx and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

- A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.

- In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the website has been successful in reaching potential buyers and to have a reliable and relevant content.
− In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

**Evaluate the effectiveness and political acceptability of environmental zones**

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

− An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

− The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

− Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.

− In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

**Develop integrated city mobility plans integrating environmental protection, traffic and public health policies**

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2.200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.

The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4. Overview of work package

4.1 WP Objectives

- Achieve a reduction in solo car use and an increase of the sustainable modes with well tuned packages of soft & hardware measures, demand side measures (company based), supply side measures (PT company) and regulation measures (City), for example urban mobility plans
- Increase of use of sustainable modes by disabled & elderly as well as by young people
- Demonstrate the cost-effectiveness of such measures

4.2 Short overview/description of measures within WP

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 8</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>New services and services for special customer groups (8.1)</td>
<td>8.1 New services and services for special customer groups</td>
<td>Graz</td>
</tr>
<tr>
<td>Car pooling/sharing</td>
<td>8.2 Company mobility plan in the administration fleet</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td>8.3 Increasing car occupancy</td>
<td>Graz</td>
</tr>
<tr>
<td>Awareness rising</td>
<td>8.4 Site level Mobility Management</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>8.5 Urban Mobility Plan</td>
<td>Lille</td>
</tr>
</tbody>
</table>

**New services and services for special customer groups (8.1)**
- In Graz, different on demand (taxi) systems exist, which were replaced by night buses, running on Friday and Saturday nights.
- Together with a home for disabled and elderly, a taxi line was established in order to connect it to the final stop of a tramline.
- Two new bus lines into the Hinterland have been created (78 and 80 to Seiersberg/Feldkirchen).

**Company mobility plan in the administration fleet (8.2)**
A company mobility plan (Plan de deplacements de Entreprise – PDE) for the administration of Lille Metropole (LMCU) was made:
The mobility plan aimed at:
- improvement of the pedestrian and bicycle routes to the city hall,
- the development of car sharing,
- support of car pooling
- usage of clean vehicles
- financial support for transport season tickets (50% paid by LMCU)

**Increasing car occupancy (8.3)**
- An HOV lane was established at an access road into the city centre of Graz. The lane has been assigned the status of a bus line with the exception of usage by taxis and vehicles with 3 or more passengers.
• A park & pool facility was established in the North of the city for commuters that gather for car pooling for outbound traffic.

**Site level Mobility Management (8.4)**

8.4 applied soft measures, i.e. mobility management, to sites such as companies, event locations and schools.

**Companies**

Among the measures for companies are:

- Days of individual mobility (trip) consulting
- Mobility information package for newcomer in companies
- Parking management
- Cycling campaigns

**Events**

The city of Graz has several locations for events – one of which is the new city hall used for fairs and big concerts. It is the major concern of the event organisers to handle transport in a smooth way. Hence, a study was made to analyse the potential for a modal shift and the most efficient turning points for action.

**Mobility Management for schools**

Children as the future generation are effected in two ways by motorised transport:

1) the suffer from pollution most and are at risk by car drivers, when they walk or cycle (e.g. to school)
2) they get used to a certain modal choice and are likely to prefer the car in case they don't learn that alternatives are attractive and feasible. Hence, in Graz, mobility management measures were implemented at 4 schools consisting of:

- car pooling within the school classes (to this end, an electronic system was set up to facilitate the foundation of car pools)
- analysis of the school neighbourhood with respect to traffic safety
- collecting "green miles" while walking or biking to school
- car free month
- painting the streets, measuring speed, etc

**Urban Mobility Plan (8.5)**

Within TRENDSETTER parts of Lille’s Urban Mobility Plan were made more concrete. A so-called “micro urban mobility plan” for the city district of Weppes was set up. No measures were implemented.

**4.3 Problems to be solved by the measures**

- Bad PT service in times or areas of low demand (night/suburbs) (8.1)
- Low usage of on demand taxi (8.1)
- Accessibility for special target groups: disables and elderly (8.1)
• Implementation of the first Company Mobility Plan in the Metropolis, serving as an example to other organisations and companies (8.2)
• Congestion and delayed employees (8.2, 8.3 and 8.5)
• Increase car occupancy for connections outside of the city to areas with poor PT (8.3)
• Commuters have a very low car occupancy (8.3).
• Change the predominance of car usage for visitors to events (8.4)
• Set the basis for later sustainable mobility choice (8.4 schools)
• Change current mobility behaviour (8.4 companies and schools)
• Influence parents and teachers via the children (8.4)

4.4 Interaction within WP/Civitas
There have been several exchange meetings within TRENDSETTER or CIVITAS:

• one workshop with other CIVITAS projects to cross check the implementation of similar measures and discuss some preliminary results
• initial WS for all measures, June 2002
• one TRENDSETTER workshop with WP leaders to discuss some preliminary results and gain insights for conclusions
• one WP 8 workshops with measure leaders to discuss first conclusions
• one discussion round within the TRENDSETTER steering committee to discuss final results, conclusions and recommendations
• Civitas Forum in Rotterdam
PART C – Results and Analysis

5. Indicators
Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators will be presented and analysed in 4.1–4.2.

5.1 Indicators and results
Below is a table containing the measures and which Trendsetter Common Indicators (in Italics) and WP common Indicators they use in the Evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
<th>8.1</th>
<th>8.2</th>
<th>8.3</th>
<th>8.4</th>
<th>8.5</th>
<th>CCCI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
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<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOₓ</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Noise level</td>
<td>dB (A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>No. of trip</td>
<td>No or Qualitative 5-degree scale</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time per mode</td>
<td>Minutes or Qualitative 5-degree scale</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mobility/Society</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
<td>X</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Vehicle occupancy</td>
<td>Persons/vehicle</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Degree of correct HOV-lane use</td>
<td>Cars, passengers, violations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>Transport</td>
<td>Page imprint on web site</td>
<td>Imprints</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Vkm (saved by modal split)</td>
<td>Km</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Modal split</td>
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<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>Occupancy of park&amp;pool lots</td>
<td>No. of cars</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Society</td>
<td>Awareness level</td>
<td>%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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</tr>
<tr>
<td>Environment</td>
<td>Fossil energy savings</td>
<td>Mjoule</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Energy</td>
<td>CO level</td>
<td>Ppm</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

* Civitas Common Core Indicators
High level objectives quantitative results

<table>
<thead>
<tr>
<th>High level objectives</th>
<th>8.1</th>
<th>8.2</th>
<th>8.3</th>
<th>8.4</th>
<th>8.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce annual fossil CO₂ emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year.</td>
<td>330 tonnes CO₂/year</td>
<td>Negligible (not measured)</td>
<td>Negligible (effect not measurable)</td>
<td>26 tonnes CO₂/year</td>
<td>None (only planning)</td>
</tr>
<tr>
<td>Reduce NOₓ emissions by 900 tonnes/year</td>
<td>1,31 tonnes NOₓ/year</td>
<td>Negligible</td>
<td>Negligible</td>
<td>0,1 tonnes NOₓ/year</td>
<td>None</td>
</tr>
<tr>
<td>Reduce particulate matter by at least 1800 tonnes/year</td>
<td>0,094 tonnes PM/year</td>
<td>Negligible</td>
<td>Negligible</td>
<td>0 PM/year</td>
<td>None</td>
</tr>
<tr>
<td>Save over 850 TJ (= 20 300 TOE) energy per year</td>
<td>7,89 TJ/Year</td>
<td>Negligible</td>
<td>Negligible</td>
<td>0,62 TJ/Year</td>
<td>None</td>
</tr>
</tbody>
</table>

Results

New services and services for special customer groups (8.1)

Night Buses

The graph shows the numbers of the passengers for every week of the year (yellow in 2003 and blue in 2004). In the middle of the year 2004, there is a decline in the number of passengers in comparison to 2003 (yellow bars). It could be, that this is due to the fact, that a huge disco-landscape with clubbing opened in a suburb, which provides an own shuttlebus would be interesting to receive figures. But it is also attributable to the non-existing marketing for the night buses in 2004 (What is meant?) Part of the incoming
money of the night buses should have been used for marketing, but there is a negotiation going on about the definition of incoming money – and the night bus runs a deficit without the direct support from the municipality. Only if this issue is resolved, budget will be free for marketing. The city recommends followers to provide a separate budget to avoid similar problems in the future.

Most of the passengers use the night bus regularly.

Concluding from the type of ticket used, 2/3 of the users are regular PT customers.

15% of the passengers of the night buses would like to have an extended night bus system, that also runs during the week. In case that the usage would cost extra, ¼ of the passengers would stop using the night bus. 1/3 of the passengers would like to have one additional bus at 3:30, making PT a 24 h bus service as normal service starts from 4:30
again. 82% of the users say, they are (very) satisfied with the service. The mark given is an average 1.7 (on a scale of 1 excellent to 5 very poor).

Comparing the night bus users with the former on demand taxi users, the survey shows, that the majority didn’t know the on demand taxi or didn’t use it. However, 16% switched from using the on demand taxi to using the night bus. (the following graph refers to the on demand taxis)

![Graph showing the transition from taxi to bus](image)

The fear that the night buses would only result in a different spread of the users over the buses, didn’t come true: the late regular bus courses do not have less passengers - instead, the night buses must have attracted people that formerly used private cars, walked or took the bike. This has not been evaluated. It could be the case that the taxis have lost customers, although the taxi drivers did not complain about that yet. A survey among PT users covered questions about the night and found that 71% of the questioned PT users, that used the night bus, had used taxis before the night bus was introduced. This points to a shift from taxi to PT. On the other hand, 83% of the car drivers among the interviewees had never used the night buses. Concluding, the potential shift from individual car usage to the night buses could still be big. This potential might be limited due to an overrepresentation of young passengers in the night buses (more than 55% are younger than 20, only 10% are older than 30).

It is more or less impossible to measure to what degree PT-ticket sale in general has increased due to the introduction of the night bus. However, a survey among PT users revealed a very positive effect on the general image of PT:

- 87% of regular PT users and 57% of the irregular users who usually go by car or motorbike consider the night buses as important for a positive image of public transport.
- 63% of regular PT users and 27% of the irregular users who usually go by car or motorbike say that the night buses make the usage of public transport more attractive for them.
Taxi line Krottendorf (extension of PT service from the end stop of the tramline by taxi)

Insert a sentence on what has been implemented (or include it in the heading)
The taxi line was well accepted, as the following graph shows. It is not known, why there was a sudden reduction in customers from March 2003 onwards. The elderly home explained, that it took up more and more immobile patients, but this wouldn't explain the sudden break.

![Graph showing passenger numbers]

The amount of passengers almost equals those of a normal busline! It is not yet known, whether the new system starting again in 2005 will receive as many customers.

Due to the good experiences with this taxi line, the reformation of the PT network in Graz considers the replacement of buslines with low usage by taxi lines.

New hinterland bus lines beyond the city border, lines 78/80

A survey among PT users was done at the tram end stop, where the new buslines 78 and 80 depart. 84% of the interviewees knew about the two lines. 68 % said, that the buslines contributed to that PT had become more attractive for them. Compared to other measures, this is the highest percentage given/ the highest contribution of a measure to raise the attractiveness of PT. 47% of the interviewees had already used the buses and 68% were satisfied with the service - the average mark given was a 2.1 (on a scale from 1 excellent to 5 very poor). 98% of the interviewees found such connecting lines important for a positive image of the PT provider, with a given importance of 1.3 (on a scale of 1 very important to 5 irrelevant).

There is a high density in the respective residential areas, that are now connected by the buslines 78 and 80, but no PT had served that area. So, this has resulted in a big improvement of accessibility

Company mobility plan in the administration fleet (8.2)

Some car sharing cars have been introduced, and all staff members of LMCU are member of the system, however, hardly anybody uses the shared cars.

About 20 car-pooling groups have formed

23 company bicycles and 4 company electric scooters are in use.
244 persons make use of the public transport support provided by LMCU.

*Increasing car occupancy (8.3)*

About 30 car poolers make use of the carpool facility north of Graz. The very short HOV-lane is hardly in use, as currently there is hardly any congestion at the spot. Therefore no counts were made, as this situation is evident. It is expected, that when the new shopping centre and P+R facility will be ready (in 2006), there will be more congestion and only then the use of the HOV-lane will grow to significant levels.

*Site level Mobility Mangement (8.4)*

**Companies**

Mobility management in companies was implemented in two large companies, GKK and UCB. Single car use was decreased due to the implementation of various mobility management measures and energy consumption was reduced.

The implementation of mobility management has helped to generate less single car use in favour of more sustainable modes of transport.

**Business as usual scenario:**

Mobility management in GKK and UCB would not have been conducted without TRENDSETTER. With the TRENDSETTER project additional funding, the city was willing to take the risk to try out these measures. So single car would have increased instead of the use of more sustainable modes.

It was intended to implement mobility management in 25-40 small and medium sized companies, this aim was not reached. But nevertheless mobility management in two large companies was carried out, which turned to a big success. These two companies are seen as pilot projects for introducing mobility management in companies in a larger scale.
Events

The modal split at the events of the city hall¹ (located about 2km from the city centre well connected with a major tram line) was as follows:

With a car occupancy of almost 2.3, the normal average is surpassed. It is striking, that only 83% of all car drivers even considered a different mode than the car, but it is a reflection of modal choice being a strong habit. At least, 15% had considered to take PT, but chose the car as they wouldn't know how to get back, or because they found the car more convenient with respect to comfort and time planning.

Looking at the 17% PT users, 77% of those are not captives (they usually have access to a car). Their reasons to chose PT for their travel show a predominance of lack of parking or costs for parking (33%) and 15% mentioned alcohol consumption (open question, multiple answers). Interestingly, more than 7% chose PT for reasons of convenience with respect to comfort and timing.

After the event, the majority of the visitors leaves to go home right away (64%), the others evenly split up into going by car or by PT into the city. Even of the car drivers, 6% switch to PT in order to get into the city centre and back to the parking lot.

Over 80% are satisfied with the car accessibility of the city hall. 36% would be willing to pay extra for a parking lot (on average 4.4 Euro).

The following graphs illustrated satisfaction with accessibility by modes:

¹ "City hall" is a translation of "Stadthalle" – this is an event location for up to 10.000 people in Graz. It is NOT the place where the city government resides – this is called the "Rathaus" which can also be translated as "city hall". We found no suitable differentiating translation for Stadthalle
NB 1 = good, 5 = bad. This shows that pedestrian accessibility is assessed worst, whereas car and PT accessibility is assessed well, however, the differences are quite minor – all modes are quite well connected.

The following graph shows the previous experience of the visitors with some of the offered measures, and their usage and satisfaction (% relate always to the total amount of the interviewees). It shows, that the various measures in order to facilitate access are often not known by the visitors, and their usage is - accordingly - even lower. It is clear that the communication (marketing) on these measures needs a lot of improvement.
Seeing also the importance of pretrip information about the measures for the visitors, a potential for achieving a more sustainable modal share can be recognised for the integrated PT and event ticket and in general for the web site and the access map, which are both hardly known.

**Schools**

Almost 500 pupils participated in the schoolaction to collect green miles. By coincidence, there was a control group available, which reveals the following changes in modal split:
The investigated schools already differ quite strongly in their baseline. However, the changes observed support the hypothesis, that the school mobility management activities had a positive impact on the modal split: it reduced car usage mainly in favour of PT usage.

Urban Mobility Plan (8.5)
A micro urban mobility plan was made for the city-district of Weppes, however, none of it has been implemented, therefore no evaluation is possible.

5.2 Analysis and comparison of results on indicator level

Indicators by Comparison – striking Results - some Highlights:

| New services and services for special customer groups (8.1) |
| Sample: 77 PT-Users/Mariatrost |
| 8.1 Night buses | Awareness | Usage | Satisfaction | Increase PT attractiveness |
| | 69% | 46% | 1,7 | 52% |
| Sample: 86 PT-Users/Puntigam |
| 8.1 78/80 | 84% | 47% | 2,1 | 68% |

NB Satisfaction scale 1 = very good, 5 = bad

- A direct comparison concerning the indicators awareness, usage, satisfaction and increase PT attractiveness is not possible due to the different samples. The table above shows that the interviewees in both samples are aware of the measure, nearly 50% of both samples have used them, they are satisfied (satisfaction on a scale of 1 excellent to 5 very poor) and for more than 50% of the interviewees the attractiveness of public transport increased with the measure.
• 71% of the questioned PT users, that used the night bus, had used taxis before the night bus was introduced.

**Site level Mobility Management (8.4)**

• In two large companies single car use was decreased due to the implementation of various mobility management measures and energy consumption was reduced. This resulted in a reduction of about 76 tonnes of CO2 per year and about 12kg of particulate matter per year. Exact modal split figures see preceding chapter.

• The reasons for non captives to choose PT for their travel to an event in the city hall show a predominance of lack of parking or costs for parking (33%), 15% mentioned alcohol consumption (open question, multiple answers). Interestingly, more than 7% chose PT for reasons of convenience with respect to comfort and timing.

• The school mobility management activities had a positive impact on the modal split: it reduced car usage mainly in favour of PT usage.
6. Fulfilment of Objectives

6.1 Achievement of WP objectives

- Achieve a reduction in solo car use and an increase of the sustainable modes with well tuned packages of soft & hardware measures, demand side measures (company based), supply side measures (PT company) and regulation measures (City), for example urban mobility plans
  8.1: The night bus system, the new taxi line and the hinterland lines are a success
  8.2: The mobility management at LMCU has contributed in reducing emissions and energy use – however to a very small extent.
  8.3: As the HOV-lane is hardly used yet, impacts are negligible, but will probably be significant from 2006 onwards.
  8.4: All mobility management measures have been successful
  8.5: Micro urban mobility plan has been written

- Increase of use of sustainable modes by disabled & elderly as well as by young people
  8.1: The night bus system, the new taxi line and the hinterland lines are a success
  8.2: Mobility management measures have small impact.
  8.3, 8.5: Not applicable
  8.4: All mobility management measures have been successful

- Demonstrate the cost-effectiveness of such measures
  Has not been evaluated. Mobility management measures (8.4) are generally cost effective

6.2 Contribution to Trendsetter objectives

Trendsetter's objectives are to ameliorate urban air quality and noise levels, and congestion while supporting exceptional mobility and urban quality of life. Specifically, objectives are to:

Provide examples

- Provide input to European policy making and promote a sustainable transport future in Europe
- Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets. (8.2, 8.5)
- Promote the use of public transport and other alternatives to private cars (8.1, 8.2, 8.4, 8.5)

Enhance Environment

- Reduce annual fossil CO₂ emissions by 5% in demonstrating cities, approximately 75000 tonnes per year. (430 tonnes/year (only Graz))
- Reduce NOₓ emissions by 900 tonnes/year and particulate matter by at least 1800 tonnes/year (1,6 tonnes/year (only Graz))
- Reduce noise levels in demonstrating cities (not measured, impact negligible)
• Save over 850 TJ (~ 20 300 TOE) energy per year (12/year (only Graz))
• New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleet (not applicable)
• 4 Improved intermodal links (plans in 8.5)
• Approximately 1100 P&R parking places in 4 P&R facilities (not applicable – however planned in 8.5)
• Develop integrated city mobility plans integrating environmental protection, traffic and public health policies (implemented in 8.4 and partly planned in 8.5)
7. Used Technology

7.1 Overview of used technology within WP

It was only possible to implement the HOV lane by implementing a buslane which is also allowed for taxi and HOVs (8.3).

There was no innovative technology used in 8.1, 8.3, 8.4 and 8.5
8. Economical Aspects, Cost Benefit

8.1 Per measure

8.1: The emphasis of the night bus was on easy access, therefore ordinary tickets can be used on the night bus – there were no special tickets. The costs of the PT provider were financed largely by the city. Negotiations on a redistribution of the costs between PT provider and city are planned.

8.4: The core of mobility management are "soft" measures (e.g. information or coordination of existing user services), which enhance the effectiveness of "hard" measures of traffic planning (e.g. new tram lines, new roads and new bike tracks). Mobility management tools (in comparison to "hard" measures) do not necessarily require large investments measured against their high potential to change mobility behavior.

8.4 Company: Instead of offering a whole company mobility plan to the companies, a so called "Quick Scan" was developed by FGM-AMOR: it allows to get a quick overview about accessibility, parking facilities (bike/car) and parking management schemes, surrounding transport environment and about the mobility behavior of employees as well as the individual company's policy with respect to transport and their resources (personnel, infrastructure, funding etc). Acceptance on the company side is much higher than for a full-scale mobility plan, because initial costs and time effort are much lower.

8.5: Stabilising a methodology for the local implementation of the urban mobility plan saves important discussions and problems in terms of adoption by local population and by the decision makers.

8.2 Comparison and conclusions

Mobility management was applied in a very systematic way in Graz (8.4), whereas the results in Lille (8.2) were unsatisfactory. This is probably due to the fact, that experience with mobility management in Graz and Austria is much longer (ten years), whereas in Lille and France it is still a rather new concept.
9. Synergies

9.1 Need for supplementary measures

8.1: The forced control of tickets through the obligation to enter through the front door of the night buses creates a secure system – only once, there has been a severe problem with a drunk passenger. In addition, it is beneficial, that all buses leave at the same time from the same stop. Therefore the stop is quite crowded and the passengers feel safe.

8.3: As for now, the HOV-lane is only 350m long, the new signs indicating "bus lane - exception: cars with 3 or more passengers and taxi" is not sufficient to trigger a generally higher car occupancy. Dissemination activities and more HOV-lanes will be necessary.

8.4: Companies: Mobility management in companies is getting successful when special framework conditions are occurring – in other words, when there is a real problem: e.g. parking space for employees is restricted, short term parking zone is implemented in the company surroundings or when a former parking area is needed for a new company site.

Events:
The best measures do not succeed without promotion - early in advance. It is amazing, how little known the integrated PT and event ticket is, and even less the accessibility map. Advance information should actively be brought to the visitors. This requires awareness raising with the organisers of the event, as they usually are not willing to take responsibility for transport issues.

Schools:
Mobility management activities in schools could be accompanied by actions such as the bike training (see measure 10.1).

8.5: When a city wide mobility plan is implemented, it is recommendable to install a micro mobility plan in order to bring awareness and measures down to the local level. It intertwines site development, company extensions etc. with transportation issues.
10. Political and Administrative Aspects

10.1 Overview of major political and administrative aspects influencing the measures

Night buses (8.1)
It is interesting, that the system could be realised within 2 weeks after the official agreement. Reasons for that were:
- all politicians of all parties wanted to implement it before the elections
- the plans were well prepared by the city administration
- lessons learned from other European examples could be utilised to tailor the own system to the local framework conditions (personal contact and internet)

Krottendorf taxi line (8.1)
The taxi line for the elderly home was implemented upon the pushing of a local (district) politician. It was one of his favorite projects, which fostered its implementation.

HOV lane (8.3)
As the HOV lane was implemented as an additional buslane, the measure was never questioned. The only (marginal) difficulties were questions of the police, how to punish drivers, who use the HOV lane.

For the city, it was a good strategy to never raise a political or public discussion which might have put into question the implementation of an HOV lane. As it was implemented as a model, there was no resistance at all.

It was extremely valuable for the city of Graz, that an Austrian showcase existed already in Linz. This helped to convince stakeholders - and especially the police - that the HOV lane can be implemented in a legally accepted way.

Companies (8.4)
As Graz has a severe PM10 problem, surpassing the new WHO-levels emission levels on more than 50 days per year, a steering group was established and worked out several measures to face PM 10 problem. All measures were listed and a cost benefit analyse was conducted, where mobility management in companies was highly ranked.

Companies often seem to have the opinion, that optimum commuting has to be guaranteed by the city. They usually don't themselves feel responsible for their employees with respect to their commute. Similarly, for school mobility management, the role and responsibilities of teachers, directors, parents or even the department for education at the local, regional or national government are not clear. Therefore, either the city or region has to take the initiative and pay for it or market it, or the companies must be forced to do this by law.
Events (8.4)

A working group had been planned representing the following groups:

The event organisers, the city planners, the police, the fire brigade, the local PT provider. This group met only once. Although these coordinative activities are appreciated by all sides, such a round table never took place anymore.

8.5 The involvement of the citizens in developing the local mobility plan brings the plan to the local level and its requirements, which will support the success of the urban mobility plan.
11. Up-scaling and Transferability

11.1 Potential for up-scaling and transferability to other cities

8.1 The night buses cover the whole city area, but might be further extended towards the suburbs if requested. However, the interest of the surrounding communities to cofinance this doesn’t seem too big.

The taxi line is considered not as an upscaling but as a replacement for inefficient PT lines.

8.2 The initiative taken by LMCU made it possible to convince a certain number of communities or companies to implement a similar step.

8.3 Other streets with existing buslanes were checked, whether they could also get HOV lanes: however, the disadvantage for PT surpassed the advantages for cars.

Some other roads were checked but would require a reconstruction, which is expensive and not always possible due to spatial constraints.

8.4 All measures which have been implemented can easily be transferred to other companies working in similar areas. Furthermore, mobility management in companies is not restricted to a certain company size in terms of employees. The approach of information, awareness-raising measures and testing new behaviour can also be transferred to other trip purposes such as shopping etc.

Mobility management at schools should be a standard.

Events

Events offer potential for mobility management. Emphasis must be put on proper organisation – bringing everyone to the table, define clear responsibilities – and proper communication or mobility solutions: their information on for example accessibility, combined tickets etc. should be integrated in the general marketing of the event.

8.5 Micro urban mobility plans might also be made for other city regions, however, as no implementation has happened, it would be better to see the effects of the implementation.
12. **Assessment of All Measures**

Below is a list of the measures, with comments of their implementation (e.g. implemented as planned/partly implemented/not implemented) and fulfilment of measure objectives and contribution to WP objectives.

<table>
<thead>
<tr>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.1 New services and services for special customer groups</td>
<td>Partly</td>
<td>Yes</td>
</tr>
<tr>
<td>8.2 Company mobility plan in the administration fleet</td>
<td>Partly</td>
<td>Partly</td>
</tr>
<tr>
<td>8.3 Increasing car occupancy</td>
<td>Partly</td>
<td>Partly</td>
</tr>
<tr>
<td>8.4 Site level Mobility Management</td>
<td>Partly</td>
<td>Partly</td>
</tr>
<tr>
<td>8.5 Urban Mobility Plan</td>
<td>Partly</td>
<td>Partly</td>
</tr>
</tbody>
</table>
PART D – Conclusions and Recommendations

13. Barriers and Drivers of the Measure Implementation

New services and services for special customer groups (8.1)

Night buses
It is interesting, that the system could be realised within 2 weeks after the official agreement. Reasons for that were:

- all politicians of all parties wanted to implement it before the elections
- the plans were well prepared by the city administration
- all parties cooperated well and employees worked with a lot of personal engagement
- lessons learned from other European examples could be utilised to tailor the own system to the local framework conditions (personal contact and internet)
- a lot of work was contracted outside to speed up the process
- planning was not too difficult, as existing lines and bus stops could be used

Taxi Line
The taxi line was an idea of a local politician of one district of the city. There are other examples of districts in Graz, where the local politicians act completely against PT and in favour of the car. Here it is almost impossible to implement things in a cooperative way, some of them just need to be imposed.

Company mobility plan in the administration fleet (8.2)
The initiative taken by LMCU made it possible to convince a certain number of communities or companies to implement a similar step.

A briefing of the trade unions representative of the world of work on the PDE is on envisaged April 1 2005.

Increasing car occupancy (8.3)
Driver: the good example of Linz, which showed that it is feasible to implement an HOV lane under the given legal frameworks

Synergies: to have a new bus lane
Barrier: the responsibility/ownership of the road, the impossibility to make existing bus lanes available for HOVs without negative consequences for PT, restricted space for new lanes.

Site level Mobility Management (8.4)
Companies are usually not willing to invest in transport, as they take accessibility for the obligation of the public. Only in case of severe pressure or when they see a high benefit (e.g. image) for themselves, they are ready to implement mobility management AND contribute to the costs.
Events
Barriers for sustainable access to the event centre are often in the heads of the organiser. It is taken for granted, that parking is provided for free.

Options other than the car are not really considered. The owners fear that in case of requirements with respect to accessibility, the renters would choose another location. Asking the visitors, they seem to be much more conscious about the problem. It might therefore be a good strategy to start with the presentation of the visitors' opinion in order to convince the stakeholders.

Schools
The biggest problem in realising school mobility management are usually the teachers, who have many excuses to still take their own car, even if the whole class of 30 pupils manages to walk or cycle to school.

Urban Mobility Plan (8.5)
An urban mobility plan is essentially driven by political and administrative authorities.

A particular motivation is required to reach the expected efficiency, and this shall be transmitted from the higher regional levels to the more local levels of political and administrative decision.
14. Lessons to Consider for Replication and Take-up by Other Cities

In general:
Communication, information and marketing is important for success
Time is needed to create new habits

New services and services for special customer groups (8.1): Night buses
Smaller buses can be replaced by articulated buses.
Only new buses should be used to avoid as much noise as possible during the night.
Preserve budget for communication and marketing

Increasing car occupancy (8.3):
Selling an HOV lane is easier, if a big advantage for PT is created. Opening PT lanes for HOVs might be an option for other cities to cope with the existing legal frameworks, however, disadvantages for PT should not be created (cars to slow down PT).
An HOV-Lane helps to increase car occupancy
It is cost effective
It is possible to start in small scale – no major investments are needed
HOV lanes are efficient, but it takes time if implemented by organisation not owning the roads initially. Limited space can be a barrier.
Introduction of short HOV-Lanes might be the first step to raise awareness amongst politicians and general public to introduce HOV-Lanes in a larger scale.

Site level Mobility Management (8.4):

Companies
Mobility management in companies is not restricted to a certain company size in terms of employees.
Initiatives of the city administration can convince companies to take part in mobility management
Mobility management for companies seems not that easy to implement as most companies do not care about mobility issues of the employees
Free parking at work reduces the incentives to bike to work

Schools
Mobility management for schools helps to raise awareness among parents and teachers
Mobility management for schools –and companies should be established step wise to ensure the most efficient output. Hence a first step might be an analyse of the frame work conditions of the concerned school and company.
Events
Mobility management for events helps to avoid car usage at large events and reduces congestion

All mobility management measures
Mobility management measures (in i.e. schools, events, companies) are often hard to finance

The target groups of mobility management in companies and schools, the commuters and pupils, are relatively easy to approach. They have the same destination (their employer/school), they have similar time schedules to start and finish and they can be informed and motivated by using communication channels in their workplace/schools. These are characteristics that increase the chance of success of mobility management in companies and schools.

Mobility management works best in concertation with pull measures such as a new paid parking scheme. If there is no dedicated contact person on site, it is extremely hard to implement anything to enhance the sustainable modes.

Mobility management can also be upscaled in general for events and schools.
15. Recommendations to EC and Other Actors

How EC and other actors (national) might help when implementing measures.

New services and services for special customer groups (8.1): Night buses
Night buses are a useful tool to serve public transport needs on Friday and Saturday nights in medium size cities like Graz (240,000 inhabitants).

Increasing car occupancy (8.3)
In Austria, there is no specific traffic legislation on HOV-lane – so there are no rules on fines etc. A directive or similar to create standardises legislation on HOV-lanes could help to establish this on a European scale.

High financial incentives for commuters, which are commuting to their work by car, constrain the ambitions of mobility management. Do not set up car user friendly frame work conditions, which support car usage of commuters.

Site level Mobility Management (8.4)

Companies
Companies, which are surpassing a certain size, should be forced to install a mobility coordinator. Moreover success stories, like mobility management, have to be distributed to “follower“cities, that they are able to avoid the same mistakes.

Schools
In many schools, the schedules comprise singular items of the area of transport. However, this is often car focused. It would help that alternative modes are integrated into the normal teaching contents, and that they are mediated in a didactically interesting and profound way.

Children are a very good "excuse" to convince adults (parents, teachers, police) that alternatives to the car exist.

Events
Events offer potential for mobility management. Emphasis must be put on proper organisation – bringing everyone to the table, define clear responsibilities – and proper communication or mobility solutions: their information on for example accessibility, combined tickets etc. should be integrated in the general marketing of the event.
# Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.1</td>
<td>Widening of the Environmental Zone</td>
<td>Stockholm</td>
</tr>
<tr>
<td>WP5 Access Restrictions</td>
<td></td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
<td>Prague</td>
</tr>
<tr>
<td>WP5 Access Restrictions</td>
<td></td>
<td>5.6</td>
<td>Congestion charging</td>
<td>Stockholm</td>
</tr>
<tr>
<td>WP5 Access Restrictions</td>
<td>Strolling zones</td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
<td>Graz</td>
</tr>
<tr>
<td>WP5 Access Restrictions</td>
<td></td>
<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
</tr>
<tr>
<td>WP5 Access Restrictions</td>
<td></td>
<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
<td>Pecs</td>
</tr>
<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
<td>6.1</td>
<td>Smart card systems and integrated ticketing</td>
<td>Stockholm</td>
</tr>
<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td></td>
<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
<td>Lille</td>
</tr>
<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Parking</td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
<td>Stockholm</td>
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<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td></td>
<td>6.5</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>Pecs</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>Information to passengers</td>
<td>7.1</td>
<td>Increasing public transport passengers</td>
<td>Stockholm</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
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<td>7.5</td>
<td>Customer friendly stops for bus and tram</td>
<td>Graz</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>Public transport safety</td>
<td>7.2</td>
<td>Public transport safety</td>
<td>Lille</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>PT intermodality</td>
<td>7.3</td>
<td>Intermodal local/regional transport interchanges</td>
<td>Lille</td>
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<tr>
<td>WP7 Public Passenger Transport</td>
<td></td>
<td>7.4</td>
<td>Seamless linkage of modes</td>
<td>Graz</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td></td>
<td>7.6</td>
<td>Park and Ride facilities</td>
<td>Lille</td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td></td>
<td>7.7</td>
<td>Linking different ways of public transport</td>
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<tr>
<td>WP8 New Forms of Vehicle Use</td>
<td></td>
<td>8.1</td>
<td>New services and services for special customer groups</td>
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<tr>
<td>WP8 New Forms of Vehicle Use</td>
<td>Car pooling/sharing</td>
<td>8.2</td>
<td>Company mobility plan in the administration fleet</td>
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<tr>
<td>WP8 New Forms of Vehicle Use</td>
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<td>8.3</td>
<td>Increasing car occupancy</td>
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<td>WP8 New Forms of Vehicle Use</td>
<td>Awareness rising</td>
<td>8.4</td>
<td>Site level Mobility Management</td>
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<tr>
<td>WP8 New Forms of Vehicle Use</td>
<td></td>
<td>8.5</td>
<td>Urban Mobility Plan</td>
<td>Lille</td>
</tr>
<tr>
<td>WP9 New Concepts for the Distribution of Goods</td>
<td></td>
<td>9.1</td>
<td>Material logistic centre – to optimise freight deliveries at construction site</td>
<td>Stockholm</td>
</tr>
<tr>
<td>WP9 New Concepts for the Distribution of Goods</td>
<td></td>
<td>9.2</td>
<td>Distribution of goods - Green city logistics</td>
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</tr>
<tr>
<td>WP9 New Concepts for the Distribution of Goods</td>
<td></td>
<td>9.3</td>
<td>Logistic centre for Old Town of Stockholm</td>
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</tr>
<tr>
<td>Work Package</td>
<td>Subgroups</td>
<td>No</td>
<td>Measure</td>
<td>City</td>
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<tr>
<td>--------------------------------------------------</td>
<td>----------------------------</td>
<td>------</td>
<td>-------------------------------------------------------------------------</td>
<td>-------------</td>
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<td>WP 10 Innovative Soft Measures</td>
<td>Bicycle measures</td>
<td>10.1</td>
<td>Innovations in bicycle transport</td>
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<tr>
<td></td>
<td></td>
<td>10.2</td>
<td>Make bicycling attractive (B&amp;R information on the Internet)</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Trip planning</td>
<td>10.3</td>
<td>Creation of a visitor web for optimal trip planning</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10.5</td>
<td>Marketing/information and quality management</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>Awareness of clean</td>
<td>10.6</td>
<td>Awareness for speed reduction and less car use</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>transport and safety</td>
<td>10.4</td>
<td>Taxi drivers as information multipliers for clean transport</td>
<td>Graz</td>
</tr>
<tr>
<td>WP 11 Integration of Transport Management Systems</td>
<td>Traffic information</td>
<td>11.2</td>
<td>Traffic monitoring and supervision</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.3</td>
<td>Dynamic traffic management system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.4</td>
<td>Accessible road network (street) data</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Improving PT traffic flow</td>
<td>11.5</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.7</td>
<td>High level service bus routes</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.1</td>
<td>Technical basis for an efficient customer focussed operation and</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>WP 12 Clean Public and Private fleets</td>
<td>12.1</td>
<td>Clean and efficient heavy vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Heavy vehicles</td>
<td>12.2</td>
<td>Biogas bus fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.3</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>12.4</td>
<td>Clean municipal fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.5</td>
<td>Clean municipal fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7</td>
<td>Bio-diesel taxi fleet and bio diesel service station</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.11</td>
<td>Making Clean Vehicles less expensive</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>12.13</td>
<td>Increasing clean vehicle use in private company fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.14</td>
<td>Web-portal for drivers of clean vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.8</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 2 – Trendsetter cities

The five Trendsetter cities are described below.

Graz

With nearly 230,000 inhabitants, Graz is the second largest city in Austria, the capital of the Styria province and the cultural, economic and university centre of the region. About 80,000 commuters travel to the city of Graz daily. On an average weekday, 47% of commuters travel by car, 19% use public transport, 20% are pedestrians and 14% cycle.

Graz has a historic centre with many pedestrian precincts and much bicycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city area (except major roads) and the first Austrian city to open a mobility centre.

The main problem Graz faces is the rise of car use due to a tendency of people moving to the city outskirts. The increasing traffic as well as the topography and climate in Graz, lead to high air pollution levels in the city. Information technology will be used to make public transport more user-friendly and the services more attractive.

The following measures have been implemented in Graz within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restriction (WP5)</td>
<td>Strolling zones</td>
<td>Implementation of strolling zones</td>
<td>5.3</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
<td>5.4</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Information to passengers</td>
<td>Customer friendly stops for bus and tram</td>
<td>5.5</td>
</tr>
<tr>
<td>New Forms of Vehicle Use (WP8)</td>
<td>Car share</td>
<td>New services and services for special customer groups</td>
<td>5.6</td>
</tr>
<tr>
<td>New Concepts for the Distribution of Goods (WP9)</td>
<td>Distribution of goods – Clean by Logistics</td>
<td>Distribution of goods – Clean by Logistics</td>
<td>5.7</td>
</tr>
<tr>
<td>Innovative Soft Measures (WP10)</td>
<td>Cycle measures</td>
<td>Innovations in bicycle transport</td>
<td>5.8</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Traffic planning</td>
<td>Methodology and quality management</td>
<td>5.9</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP 12)</td>
<td>Heavy vehicles</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>5.10</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Bio-diesel taxi fleet and bio-diesel service station</td>
<td>5.11</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>Information of the bio-diesel collection system</td>
<td>5.12</td>
</tr>
</tbody>
</table>

The map below shows the City of Graz.
Lille

Lille Metropole in France is an urban network of 85 communes with 1.2 million inhabitants. The community is close to the Belgian border and cooperates closely with its counterparts in Belgium. It is a base for distribution and a node for major routes north-south and east-west in Europe.

Lille has built up a strong public transport network. On an average weekday, 150,000 passengers travel by bus, tram, commuter trains or metro. The following measures have been implemented in Lille within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of measures</th>
<th>Measure description</th>
<th>Measure Nº</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrated pricing strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Public Transport safety</td>
<td>Public Transport Safety</td>
<td>7.2</td>
</tr>
<tr>
<td></td>
<td>Public Transport intermodality</td>
<td>Intermodal local/regional transport interchanges</td>
<td>7.3</td>
</tr>
<tr>
<td>New forms of vehicle use (WP8)</td>
<td>Car pooling/sharing</td>
<td>Company Mobility Plan in the administration fleet</td>
<td>8.2</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving Public Transport traffic flow</td>
<td>High Level Service Bus Routes</td>
<td>11.7</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Biogas Bus Fleets</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>Clean Municipal Fleets</td>
<td>12.5</td>
</tr>
<tr>
<td></td>
<td>Clean Fuel distribution</td>
<td>Analysis of the biogas experience</td>
<td>12.9</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Lille.
**Pécs**

The City of Pécs with 170,000 inhabitants is a middle-sized cultural, educational, commercial and health centre in Hungary, 40 km from the Croatian border. In the last decade the number of cars and the number of tourists and students have increased rapidly, creating a huge demand for parking spaces and public transport. In November 2000, the early Christian burial chambers in the city centre received UNESCO World Heritage status, providing the municipality with new tasks to protect and preserve the heritage.

The following measures have been implemented in Pécs within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Strolling zones</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>5.4</td>
</tr>
<tr>
<td>Strolling zones</td>
<td>Preparation of a new traffic and transport strategy</td>
<td>5.5</td>
<td></td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The map below shows the location of the parking-zones and the access restriction areas in Pécs.
Prague

The City of Prague is the capital of the Czech Republic and the country’s largest city with 1,300,000 inhabitants. On an average weekday, 44% of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 160 million passengers per year uses the public transport system in Prague.

Prague has a high concentration of both political and economic administration, industry, trade, education, research and tourism. This requires good traffic management. One of the biggest problems is the very fast increasing number of private cars. It has more than doubled since 1990. A new traffic policy promotes public transport, development of traffic infrastructure and regulation of car traffic, particularly in the city centre.

The following measures have been implemented in Prague within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure nr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Environmental Zones</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
<td>5.2</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>PT intermodality</td>
<td>Linking different ways of public transport</td>
<td>7.7</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.6</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Prague.
**Stockholm**

The City of Stockholm is the capital of Sweden and the country’s largest city with 770,000 inhabitants. On an average weekday, over 600,000 passengers travel by public transport in the county of Stockholm. Of all travellers, 46% go by car, 23% use public transport, 29% are pedestrians and cyclists and 2% use other modes.

The biggest traffic problems include an increasing number of vehicles, congestion on many main roads, heavy duty traffic, limited rail track capacity and few cyclists. Moreover, there are problems with the air quality in inner city areas especially due to a high concentration of NOx and particulate matter. Noise levels are also high.

Stockholm is improving its transport system environmentally by substituting conventional vehicles with clean ones and making logistic services more effective. Better public transport and intelligent traffic information techniques are other important fields.

The following measures have been implemented in Stockholm within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WPS)</td>
<td>Environmental Zones</td>
<td>Ordering of the Environmental Zone</td>
<td>5.1</td>
</tr>
<tr>
<td>Integrated Pricing Strategies (WPS)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.1</td>
</tr>
<tr>
<td>Public Passenger Transport (WPP)</td>
<td>Parking</td>
<td>Reduced parking fees to promote clean vehicles</td>
<td>8.3</td>
</tr>
<tr>
<td>New Concepts for the Distribution of Goods (WPS)</td>
<td>Information to passengers</td>
<td>Increasing public transport passengers</td>
<td>7.1</td>
</tr>
<tr>
<td>Innovative Soft Measures (WP10)</td>
<td>Bicycle measures</td>
<td>Logistic centre for Old Town of Stockholm</td>
<td>0.2</td>
</tr>
<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Trip planning</td>
<td>Creation of a visitor web for optimal trip planning</td>
<td>0.3</td>
</tr>
<tr>
<td>Clean Public and Private fleets (WP12)</td>
<td>Traffic information</td>
<td>Accessible road network (street) data</td>
<td>11.4</td>
</tr>
<tr>
<td>Clean Public and Private fleets (WP12)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.5</td>
</tr>
<tr>
<td>Clean Public and Private fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Clean and efficient heavy vehicles</td>
<td>12.1</td>
</tr>
<tr>
<td>Clean Public and Private fleets (WP12)</td>
<td>Light vehicles</td>
<td>Clean municipal fleets</td>
<td>12.4</td>
</tr>
<tr>
<td>Clean Public and Private fleets (WP12)</td>
<td>Waste collection with biogas-vehicles</td>
<td>Making Clean Vehicles less expensive</td>
<td>12.11</td>
</tr>
<tr>
<td>Clean Public and Private fleets (WP12)</td>
<td>Clean fuel distribution</td>
<td>Improved biogas refuelling infrastructure</td>
<td>12.14</td>
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</table>

The map below shows the geographical context of measures in Stockholm.
## Appendix 3 – Wordlist

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
</tr>
<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
</tr>
<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>RKF</td>
<td>Resekortsföreningen I Norden -</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
<tr>
<td>SL</td>
<td>Stockholm Transport</td>
</tr>
<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l’Integration Reseaux et des Tarifs</td>
</tr>
<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDSETTER</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
The European project Trendsetter involves 50 individual projects, all of which aim to improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union. Read more about Trendsetter at www.trendsetter-europe.org. Read more about the Civitas project at www.civitas-initiative.org
Contract No: NNE-2001-00323

Contractors
1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
7. Swedish National Road Administration, Stockholm Region
8. Stockholm Real Estate and Traffic Administration
9. Public Transport Company of Graz
10. Taxi Group 878 Cityfunk Ltd
11. Styrian Transport Association, STVG Ltd
12. Erlach Consulting & Engineering
13. Province of Styria
14. Austrian Mobility Research
15. City of Pécs
16. Pécs Municipal Operations and Property Management Company
17. Syndicat Mixte des Transports
18. Statoil Detaljhandel AB
19. AGA Gas AB
20. Home 2 You AB

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PART A – Report Summary

This report details the implementation and the evaluation of the demonstration work undertaken in WP7 of Trendsetter, in relation to Public Passenger Transport.

It presents the activities in the perspective of 3 among the 5 cities involved in Trendsetter: Stockholm, a capital cities of the European Union and Lille and Graz, two regional capitals of different size.

It details the work done, the various facets related to the operational activities and the achievements.

It analyses the results, the potential impact locally, at project level and at European Union level. It also pays an important attention to the potential for replication in other sites, of same or different size.

It makes recommendations to the various types of stakeholders involved, on technical as well as on economical, political and administrative issues.

It finally gives specific input to the European Commission on important matters to be addressed at this level.

Public passenger transport in Trendsetter

Trendsetter’s overall strategy is to combine advanced mobility management schemes with clean vehicle fleets, which can achieve both short-term energy and emissions reductions and long term shifts to more public transport and effective urban goods flows. Trendsetter is a large demonstration project focusing both on heavy vehicles (buses, lorries and vans) and on private cars. The project comprises 53 demonstration projects and some associated projects in 5 cities with 20 partners. The project includes 8 work packages in two major fields: Better transport mobility management and Fleets of clean, cost-effective and energy-efficient vehicles. These two major fields each include public, commercial and private transport. Trendsetter methods build upon a mix of policy based measures and technology that combine the following work paths:

- Stimulate the use of public transport through packages of measures including new pricing strategies, bus priority systems, innovative information technologies, improved intermodal interchanges and transport demand systems
- Improve efficiency in urban freight transports through logistics and information
- Achieve a higher market penetration for clean, renewably fuelled busses, lorries, vans and cars by co-ordinated procurements to reduce prices, improved infrastructure and other measures.
- Promote alternatives to private cars through new services and innovative measures
- Encourage policy changes towards more sustainable urban transport systems

Public passenger transport has therefore an important role in the implementation of specific objectives:

- Improve the PT travellers / passengers information
- Ameliorate the PT security
- Strength the PT intermodality
- Encourage the PT attractiveness
- Save energy and emissions through increase use of PT

The measures in this WP are grouped after its main purpose:
<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information to passengers</td>
<td>Measure 7.1 Increasing public transport passengers</td>
</tr>
<tr>
<td>Public transport safety</td>
<td>Measure 7.2 Public transport security</td>
</tr>
<tr>
<td>PT intermodality</td>
<td>Measure 7.3 Intermodal local/regional transport interchanges</td>
</tr>
<tr>
<td></td>
<td>Measure 7.4 Seamless linkage of modes</td>
</tr>
<tr>
<td></td>
<td>Measure 7.6 Park and Ride facilities</td>
</tr>
<tr>
<td></td>
<td>Measure 7.7 Linking different ways of public transport</td>
</tr>
</tbody>
</table>
Main topics addressed by WP7 – Public passenger transport

Information to passengers

2 measures have been implemented to address the objective of developing methods and processes to improve information to passengers (other measures in the WP and in Trendsetter also address this issue, although not as directly and not with the same priorities):

Measure 7.1 Increasing public transport passengers
   This measure was implemented in Stockholm, Sweden.
   Results from activities counting passengers showed that the daily passengers did not increase as expected compared to the increase of the population in the County. Passenger surveys made SL become aware of what services the passengers did not appreciate or found to be bad handled. The passengers had remarks mainly on the following services:
   - Traffic disturbance information
   - Punctuality
   - Cleanliness

   To increase the number of passengers was the goal and the methods chosen was to make the passengers satisfied while using the public transport and to reach out to people that rarely or never use the public transport.

   The measure was successful in implementing the methods, but failed to reach the quantitative goals set initially. However, the results are promising and replicable.

Measure 7.5 Customer friendly stops for bus and tram
   This measure was implemented in Graz, Austria.
   The measure was set to give adequate information at bus and tram stops in order to make the access to PT easier and more friendly.

   It was successfully implemented and brought promising results, replicable and expandable.

The two measures showed the importance of keeping the passenger well informed on the public passenger transport service, highlighting two issues: information on the service itself and information on how to react to changes or incidents.

The results give two complementary approaches that can be easily replicated in other environments, taking into account local specificities.
Public transport safety

This issue was mainly addressed by one measure:

Measure 7.2 Public transport security

This measure was implemented in Lille, France.

The main problems to be solved by the measure relate to the necessity of improve attractiveness of Public Transport through a higher feeling of security and safety and to the effective implementation of measures leading to such higher security and safety.

These need to be organised through a strict cooperation between the transport, police and court authorities in order to be efficient.

The measure was successful in implementing a cooperation between the transport operator, the police and the justice, in order to allow rapid and coherent decisions related to the security and the safety in public passenger transport.

Despite the high investment (ca. 40 M€), it led to significant savings in managing the security at Lille metropolis level.

The increase of feeling of security and the improved confidence in public transport are instrumental to attract passenger to the various PT modes.
PT Intermodality

This issue was addressed by four measures:

Measure 7.3 Intermodal local/regional transport interchanges
This measure was implemented in Lille, France.

It was set up to cope with the excessive presence of private car, unbalanced split of use of road infrastructure among the various mobility modes.

The measure represents very heavy investments involving several communes and a high number of stakeholders of different areas: administration, transport, construction, environment, urban development, …

It demonstrates two examples of process to implement such heavy infrastructure and to implement it within the adequate urban reorganisation.

Measure 7.4 Seamless linkage of modes
This measure was implemented in Graz, Austria. It was set up to cope with:
- Shortage of parking facilities in inner city
- Traffic congestion in city
- Cope with amounts of “wild P&R”
- Better exploitation of existing PT lines and increase in customers
- Better linkage of regional buses and city buses and tram
- Better linkage of outer city districts

The implementation of Park & Ride lots and the reorganisation of bus lines, also including new ones, allowed to reorganise the situation and improve the service of public passenger transport.

This measure was instrumental in increasing the attractiveness and the quality of the PT services in Graz, and is an excellent example of a constructive reorganisation of services to the profit of both the customer and the PT operation.
Measure 7.6 Park and Ride facilities
This measure was implemented in Lille, France. It was set up to:

- reduce the omnipresence of the car
- reduce pollution and the noise
- increase the use of Collective Transport,
- use clean gas buses, accessible to the Reduced Mobility People (retractable slope)
- make more easily and more quickly accessible the town centre or main urban poles
- offer a better comfort and less stress in travel
- make more comfortable and more secure the car and the 2 wheels parking places connected with collective transport.

The implementation of 5 new Park & Ride lots was a very high success, exceeding by far the initial plans and strongly contributing to the attractiveness of PT in Lille and to the increase of passengers.

The process required very strong political willingness and high coherence of the actions from all stakeholders.

Measure 7.7 Linking different ways of public transport
This measure was implemented in Prague, Czech Republic.

Its objective was the provision of basic transport services within a specific area for specific group of users (i.e. patients of medical centres, including children and people with reduced mobility) as well as for other users travelling to this destination.

This measure was a perfect example on how to cope with specific constraints with a view on the passenger requirements and on the particular constraints of narrow streets in the area of service.

The process implemented allow to reach a full success and to envisage other customised services.
Main conclusions
The measures of WP7 reached their objectives (at least partially and most of the cases totally) and can be used as basis for examples and for replication to other cities.

On a general basis, the work in this workpackage supports some important general results of Trendsetter:
   o Infrastructure and the corresponding constraints (long term planning, heavy investments, multiplicity of stakeholders) are a key issue for Sustainable Urban Transport Plans (SUTP’s) and can only be triggered and accompanied by “short” projects such as Trendsetter
   o Sustainable urban transport requires complex decision-making and integration in the general urban management. When the decision making is adequate, efficiency is highest
   o Communication, explanation, didactics, etc. are at the heart of adoption processes by users: using successful examples as such developed in Trendsetter to gain adhesion from citizens is very effective
   o Soft measures are an essential accompanying element for mobility management

The various measures insist on the fact that any innovation must be sold, using economic arguments but also other important arguments.

Political issues to be considered for replication essentially relate with the 2 major aspects:
   o Political willingness to push a measure to well argumented and evaluated objectives
   o Prior validation of the complete legal framework to facilitate the decision making of a large and complex variety of stakeholders.

Costs and investments have to be evaluated at least at the whole public transport operation level, and better at the level of the whole urban community, be it the city, the metropolis or even the region.
Also what can initially be perceived as a cost can become a source of global savings when integrated in the total environment of application.

Economical analysis shall include related elements such as:
   o land
   o construction
   o fiscal
   o employment
   o environment
   o …

Main economical issues to be considered for replication essentially relate to:
In depth analysis of costs need to take into account the global economic impact, beyond the sole public passenger transport level. This sometimes show clearly that there is a higher cost NOT to implement a measure.

Land is often an issue in urban environments, in terms of price, property, management etc.

Main recommendations to the EC can be summarized in 3 aspects:

- Funding: subsidies and financial support can be sometimes the spark to allow decisions to be made. It also sometimes allow demonstrations which are instrumental in the deployment decisions. However, it is clear that decisions cannot be made on the basis of subsidies only.
- The support from EC is giving authority and credibility to coherent programmes, facilitating the consensus and the decision making.
- The image of collective programmes is normally high and positive.
PART B – Common Trendsetter introduction

1. Introduction

1.1 Background
Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 Trendsetter – a part of the Civitas Initiative
The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;

− CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
− Cities are in the heart of local public private partnerships
− Political commitment is a basic requirement
− Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:

− to promote and implement sustainable, clean and (energy) efficient urban transport measures
− to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
− to build up critical mass and markets for innovation

Each city implement a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

The five Trendsetter cities are briefly described in appendix 1.

1.3 Achievements within Trendsetter

Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European dimension. Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

Improving access to public transport

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of
multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

**Trip planning, traffic control and cycling**

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

**Access restrictions for reduced traffic**

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone. Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

**Marketing and mobility management**

Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

**Co-transportation of goods**

Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another
handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

**Clean vehicles and fuels**

Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

**Incentives and promotion of clean vehicles**

Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.

1.4 **Overview of achieved effects**

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
</tr>
</tbody>
</table>

**Costs** are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure.

**Time** – implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emis-&lt;br&gt;sions</th>
<th>Energy</th>
<th>Mobili-&lt;br&gt;ty</th>
<th>Time</th>
<th>Invest-&lt;br&gt;ment cost</th>
<th>Oper-&lt;br&gt;ational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td>✤✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Increased public transport security</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Convenient and safe intermodality</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Customer-friendly stops</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
<td>✤✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>New services for special needs</td>
<td>–</td>
<td>–</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Quality management</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Planning trips on the web</td>
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<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Integrated public transport services</td>
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<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Traffic management</td>
<td>Traffic management</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Cycling</td>
<td>Cycling</td>
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<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Selective access restriction for heavy vehicles</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Congestion charging</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Marketing attractive alternatives</td>
<td>Marketing</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Mobility management</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Improved goods distribution</td>
<td>Consolidation of goods *</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td>Clean vehicles and fuels</td>
<td>Biofuelled vehicles</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
<tr>
<td></td>
<td>Biofuel production</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
<td>✤</td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 Trendsetter cities after Civitas
The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas 1 cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1 Evaluation at different levels
The Trendsetter project has been evaluated in different levels; measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:
- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure

The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

2.2 Indicator based evaluation
Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dBA(A)</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios
When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.

Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.
**Methodology**

The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (<!-- - 0 + ++).
3. **Trendsetter objectives**

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

### 3.1 Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provide examples:</strong></td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Increase mobility:</strong></td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Enhance Environment:</strong></td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO2 emissions by 5 %, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Save Energy</strong></td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO2, NOx and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfill the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.

The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period.

The reduction of NOx emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.
The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
### 3.2 Demonstration objectives

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. Those not reached are commented below.

<table>
<thead>
<tr>
<th>Demonstration objective</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
<tr>
<td>operation on bio-diesel</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lille 84</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td>300</td>
<td>3 000</td>
<td>+2 700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1100</td>
<td>3 000</td>
<td>+1 900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>
3.3 Scientific and technical objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Each demonstration objective and the fulfilment of it is described below

**Produce a total amount of 11 million Nm$^3$ biogas by the end of the project.**

In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm$^3$, but biogas vehicles have consumed only 4.26 million Nm$^3$. The rest has been used for heating and electricity production or just flared.

Before Trendsetter, the local biogas production in Lille was 0.12 Nm$^3$ biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3.6 million Nm$^3$ per year.

This objective is not applicable for the other three cities.

**Reduce the commercial cost of biogas fuel by 20% in demonstrating cities**

The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.

In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).

This objective is not applicable for the other three cities.

**Implement a complete biogas technology chain in Stockholm and Lille, from production to end use**

In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plats will be ready.
This objective is not applicable for the other three cities.

**Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm**

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now.

The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

**Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision**

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

**Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.**

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.

- A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of fossil CO2, emissions of NOx and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

- A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.

- In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the
website has been successful in reaching potential buyers and to have a reliable and relevant content.

− In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

**Evaluate the effectiveness and political acceptability of environmental zones**

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

− An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

− The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

− Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.

− In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

**Develop integrated city mobility plans integrating environmental protection, traffic and public health policies**

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2.200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.

The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4. Overview of WP

The objectives of WP 7 are:

- Improve the PT travellers / passengers information
- Ameliorate the PT security
- Strength the PT intermodality
- Enforce the PT attractiveness
- Save energy and emissions through increase use of PT

4.1 Short overview/description of measures within WP

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 7</th>
<th>Site</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information to passengers</td>
<td>7.1 Increasing public transport passengers</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>7.5 Customer friendly stops for bus and tram</td>
<td>Graz</td>
</tr>
<tr>
<td>Public transport safety</td>
<td>7.2 Public transport security</td>
<td>Lille</td>
</tr>
<tr>
<td>PT intermodality</td>
<td>7.3 Intermodal local/regional transport interchanges</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td>7.4 Seamless linkage of modes</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td>7.6 Park and Ride facilities</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td>7.7 Linking different ways of public transport</td>
<td>Prague</td>
</tr>
</tbody>
</table>

Each measure is shortly described below:

**Measure 7.1 Increasing public transport passengers**

To reach the goal with 100 000 new passengers several projects was started and some of them became part of TRENDSETTER:

- Traffic Disturbance Information
- Travel Guarantee
- Incentives to the contractors
- Quality and quantity surveys
- Direct Marketing

**Traffic Disturbance Information**

During the year of 2002 results from different surveys among passengers and the contractor showed where there were a lack area. The deficiencies were to be found in areas as structure, leadership, education, organisation and technique. A package of measures was issued. The measures were implemented in the form of a project in 6 different traffic areas within the County of Stockholm. Measures taken were against behaviours, processes and routines. The technique part was transferred to another project that had the task to implement electronic signs with real-time information at bus stops, train and underground stations.

Within the project the contractors personnel has been educated in how and when disruption information shall be communicated. They have published a brochure containing information what words to use in what situations. A unitary presentation that will not confuse the recipients (passengers).

The project ends in the beginning of 2005 and is transferred to SLs ordinary operations. There will be a final statement available in March 2005.

**Travel Guarantee**
During the year 2002, SL started the project that would guarantee the passengers to be confident in the fact that SL should see to that they could travel within the County without any unnecessary delays. That was done by the promise if the traffic was delayed 20 minutes or more SL would compensate the cost for a taxi trip. All means of Transport was in due course incorporated in the Guarantee. Another development during year 2004 was that all passengers should be able to take advantage of the guarantee which made SL sign contract with companies that offered transport for disables with handicap that makes it impossible to go by an ordinary car. All in all, the guarantee has a cost-level of approximately 4 millions SEK per year. This may sound expensive but compared to marketing campaigns that reaches a lot of people and gives them a positive view of SL, then it is almost nothing. Surveys done by passengers that received payment has confirmed the paradox which indicates that after using the guarantee they are more satisfied than had they not experienced a delay at all. A failure handed well can indeed be turned into a success!

The Travel Guarantee ended as a project in year 2004 and is now a part of SLs ordinary operations. It is an object for constant review and development.

Incentives to the contractors

During year 2002, SL started the project Agreement with Incentives. With passenger surveys as a base SL created incentives for example regarding punctuality, suspended traffic, cleanliness, revenue, satisfied customer and passengers’ apprehension of the service.

The incentives were meant to persuade the contractors to increase their efforts. To secure the quality of the service, stimulate improved quality and to increase the number of users in public transport. The incentives are made so that the contractor gets a bonus if he reaches a certain level of improvement, i.e. better than expected/agreed and a penalty for non-compliance, i.e. worse than expected/agreed. Whether or not the contractors achieve the agreed level is inspected by so called Mystery Shoppers (anonymous inspectors acting like passengers).

Only 2 of the incentives have been general in the Agreements; punctuality and suspended traffic. The rest have been tried with different contractors in different areas.

Incentives are no longer a project but a part of SLs constant development regarding Agreement.

Quality and quantity surveys

The purpose of the quality surveys is to measure the passengers’ opinion regarding experienced quality while using the public transport as number of satisfied passengers. The survey is not direct to take steps but to give an indication of where and how the passengers feel a lack of quality. Any steps demanded to improve the service have to be thoroughly discussed and studied.

The surveys are carried out twice a year by letting the passengers receive an enquiry on board the vehicle. At least 400 interviews are accomplished per contractor area. All passengers at the age of 15 or older are being asked/interviewed.

The results, number of satisfied passengers, can be accounted for all transport and divided in contractor area or means of transport. The contractors receives the result to have a possibility to improve in the areas they do not reach the agreed level. At the same time the quality surveys are measured, the quantity of passengers are counted as well.

Direct Marketing

During 2003 SL started a project aiming to find a type of marketing research concentrated upon direct marketing to reach out to various selected groups. The intention is to offer the passenger a method of transport that they may not have realised existed. The different groups chosen were:

New habitants in selected areas

Habitants that recently moved in to a specific housing area has received information and a try-out-ticket. The information was given in a brochure together with a VIP phone number to SL’s Customer Service. The brochure holds information on how, when and where they can use the public transport as well as buy a ticket. During the year 2004, 2 400 persons recently moved in to one of 13 selected areas received the package. The campaign was very successful and it is now a part of SL’s ordinary operations. The goal is to reach all the 180 000 people moving in or within the County each year.

Co-operation with larger companies

Contact is made to several companies within the County, to ask if SL could offer them something they might not thought about earlier. That could be offer a certain type of non-personal ticket that could be stored for example in the reception and handed out whenever someone needed to go for a trip. In that case they could reduce costs for taxi or a company car. SL can also offer a system where we distribute for example a 4-month
season ticket and the employer then reduces the employees salary with the ticket value on a monthly basis. The employees then do not have to pay such great amount of money in one hand. The companies chosen must fit in to SL’s policy for whom we like to be partners with. They have to be known, for example of their environmental considerations.

Stockholm Transport will demonstrate the effects on number of passengers when a system of travel guarantee for passengers on all transport modes within the system is introduced. The effects will be followed up by passenger surveys. Together with expanded information on disruptions in the traffic and direct marketing towards different target groups, it will help Stockholm Transport to reach the goal on 100000 new costumers per day.

**Measure 7.2 Public transport security**

The measure is based on decisions taken in the Local Safety Plan from 1998. These are essentially following three directions:

- Rapid intervention in case of problems. This is managed through the localisation of intervention fleet via GPS and localisation of bus fleet, together with an increased human presence in the metro and in the buses.
- Cooperation between the PT, police and court, through better communication and common actions when appropriate.
- Evaluation and follow-up of the impact of these actions and corresponding feed-back and improvements.

The total safety plan is involving a 40 M€ budget.

Innovative aspects of this measure include:

- Technical facilities for all branches of public transport that can handle information, supervision and co-ordination efficient.
- Bus localisation service.
- GPS-radio contact system for emergency cases.

**Measure 7.3 Intermodal local/regional transport interchanges**

This measure is innovative for the Lille metropolis as it creates a pole offering a true alternative for the use of the private car on the canton of Armentières. This project must also make it possible to orient via Armentières, all the inhabitants of the area of Armentières and Western Flanders towards Lille, a major offer in terms of rail (the densest rail network after Paris). The project must consequently allow the development of economic, social and cultural perspectives.

The project aims at the development of intermodality through following elements:

- Reinforcement of the bus attractiveness: the offer must be consolidated with the purchase of a hundred additional buses before 2006. This new offer will make it possible to better structure the service on the territory of the community. In the dense zones such as Armentières the startup of high level of service bus lines is also envisaged. During the renovation of the bus fleet, the priority will be given to the vehicles accessible to reduced mobility people and functioning with "clean" fuel.
- The valorization of transport in exclusive right of way: TER (express regional transport, the regional train offer)

Further to the future doubling of the subway, it is envisaged an increase in capacity of the TER trains and a frequency increased at the peak hours on three lines from Lille towards Armentières, La Bassée and Seclin. Improvements will be also made to the transborder railway offer towards Courtrai and Tournai, the whole of the basin of the Western Flanders (Belgium sector of Ypres) will be thus connected via Armentières and the TER network to the high-speed trains departing from Lille.
• the organization and continuity between collective and individual transport by the refitting of existing relay parks or by the creation of new sites
• continuation of tariff integration and multimodal information in order to make the offer more coherent and more readable: to use only one single ticket within the metropolis, to propose tariffs for the short trips.

Innovative aspects of this measure include in particular:
• Improved linkages of different public transport means
• Improved intermodality between PT / cars, two-wheels and walking
• Co-ordinated timetable between public urban/interurban/regional transport means
Measure 7.4 Seamless linkage of modes

It is estimated, that around 5000 cars are parked daily in Graz close to PT stops by commuters from the surroundings that switch to PT for inner city transport. In Mariatrost, the situation was promising to implement an official P&R lot, as it is served by an attractive PT connection into the city centre and lies at an access road for many commuters into Graz. Originally a garage with more than 500 lots was planned, the current solution provides space for more than 60 cars. This small scale solution became necessary after resistance of the local residents and a political decision. It is seen as a first test, and in case it is successful, might be further extended.

In the beginning, the acceptance was not so high, however, after parking has become more difficult in the inner city by extending the "Blaue Zone" (zone with short duration parking only), the lot is full. An outbound P&R lot in Weinzöttel has been built in order to cope with the amount of cars just parked in the meadows. It provides almost 150 spaces and is used to about 50%. However, signing is not yet completed, so that a further increase is expected.

At the PT stop of Andritz a better linkage between (local and regional) buses and trams was created by reconstructing the whole tram (end-)station. Platforms were created close to each other. The plans for the buses were reconsidered such as to prevent them to have waiting times at the station. This allows for more buses to serve passengers within a given time interval.

Pedestrian access to and within those stations has been facilitated, and waiting areas are clearly separated from the tracks and stops.

New tangential buslines were implemented, which allow travelling between outside city districts without having to take a detour through the city centre.

Guaranteed connections have been created at important stops, where passenger change between lines or modes (see also RBL, 11.1).

Additional (roofed) Bike and Ride Facilities have been created, see also measure 10.1

The measure creates interchanges that are attractive and functional. Originally, the guidance system for travellers should have been supported by new technologies, e.g. electronic information, but due to changes in the plans for the traffic management system, this had to be cancelled (see 11.3).

Measure 7.5 Customer friendly stops for bus and tram

In Graz, there are 800 stops for bus and tram, most of which are not yet user-friendly. Within CIVITAS, accessibility to PT modes should be enhanced, with the mobility and vision impaired people as a main target group.

A catalogue of existing stops and their equipment was set up. The most important stops (at end of lines, important interlinkages between PT lines or other modes, closer to city centre and stops with inbound connections) were selected to get rebuilt.

Userfriendliness is defined as:

- Broad waiting area not conflicting with pedestrians
- Area to raise attention for visually impaired that shows front door; in case of crossings, also the exit onto the street is marked with that - Graz is a showcase in the in the German-speaking part.
- Even entering into buses and trams
- Equipment with curbstones, which allow buses to stop only with a gap of few centimeters from the sidewalk (special curbstones, that guide the bus without steering closest to the sidewalk, which don't harm the tires - first trial in Austria).
- Safe pedestrian crossings to get to the stop
- Walkable / friendly environment

Originally, it was planned to equip all stops with maps of the neighborhood, but due to personnel shortage this was skipped.

In cases of stops at crossings and the necessity, the whole crossings were rebuilt in parallel with the stops.
New stops are usually also equipped with a bike rack for B&R. Each year, 10 waiting shelters are built at new stops - they are free of charge, as the advertising agency gives them for free and in turns uses them for ads.

Some... stops are equipped with RBL, the real-time information system. However, as the city expects a technology which relies on mobile phone usage, probably not more than ¼ of all stops will be equipped with that system. All new stops get ductworks, so as to facilitate a later equipment with real-time information systems (Stelen).

Meetings with representatives of the disabled were held and different solutions discussed. They favoured systems to enter buses of tram WITH drivers support instead of automated systems - as the latter ones often don't work in the colder seasons and often require wheelchair users to get down onto the road.

There are no maps or overviews about stops, which are already equipped in a user-friendly way. The city assumes, that the individual disabled receives a training anyways in how to get around the city. The same is the reason for the decision not to provide area maps in braille: the blind need to learn and get used to a certain area, usually they don't travel somewhere without this training. Keeping these type of maps up-to-date is extremely expensive, esp. for transport nodes. The interest groups also did not find this too important. An own section on the web site was installed at the PT provider for mobility impaired people, and a hotline provides pretrip information per phone.

The design concept combines best available techniques to realise a quantum leap in quality of public transport-stops. The increased quality has two dimensions. Firstly, visually impaired and disabled are guaranteed easy access to the travel means possible. Secondly, the new information system will be able to continuously give all relevant information to the passenger waiting at the stop. The real time information system can also be used to announce construction activities, special events, ticket offers and information, etc.

**Measure 7.6 Park and Ride facilities**

The measure deals with the following issues:

**Land issues:**
Requirement to transfer the land property from the grounds to the project management to allow the realization of construction work.

**Public markets:**
Establishment of the public tendering.

**Guarding:**
Study of a type of fence "anti-nomads" and of a system of barrier adapted with specific space for the guard.

**Garage with bicycles:**
When the carpark relay is being in correspondence with a heavy mode (subway, tram, regional train) installation of a specific space for bicycles.

For the five carparks which are already designed, two are concerned:

- carpark Saint Lomme - Saint Philibert (subway)
- carpark Citadine Porte de Valenciennes in Lille (subway)

**Safety:**
Installation of adequate lighting and a video monitoring connected to the guard room of the site.

In the case of a correspondence with the subway, this video monitoring was connected to the central post office monitoring the exploitation in order to ensure a constant surveillance.

Innovative aspects lie in the development of convenient car and bicycle parks (signalling, lighting, surveillance service)
Measure 7.7 Linking different ways of public transport

The aim of this measure was to introduce a regular bus line to satisfy basic transport demands within Karlov area with an emphasis on persons with reduced mobility, sick persons or persons with various handicaps. This locality houses a number of medical centres and facilities of General Teaching Hospital. Local street network makes this area inaccessible for normal buses used in standard PT. As a result, no basic transport services had been practically available within this area until the introduction of the new city-bus line. Patients, visitors as well as employees of medical centres had to walk from distant public transport stations (stops).

The initial stage of the project implementation included preparation of possible routing of the new line, facilitating integration of important intermodal interchanges, i.e. Karlovo Square (intermodal interchanges between Metro line B, 11 tram lines and 1 bus line) and I.P.Pavlova (intermodal interchanges between Metro line C and 7 tram lines) and providing transport services within the entire area concerned by means of appropriately located bus stops with an emphasis on easy accessibility of medical centres. The proposal included several options which were consulted with relevant municipal authorities and representatives of General Teaching Hospital. Following such discussions an optimum option was chosen meeting requirements of specifically designed transport services and at the same time being in line with operational and technical conditions for regular bus service. With regard to specific physical configuration of the relevant area with majority of narrow streets it was quite obvious that it would be necessary to use easily accessible, small-sized vehicles (so called “midi-buses”) for the new line. Existing offer of vehicles was subject to a public tender and low-floor Karosa-Ikarus E 91 bus with a platform was chosen for the line.

The actual implementation of the bus line was preceded by several local surveys and other discussions in order to specify location of stops, traffic signs etc. A decision was taken to furnish stops with atypical lighted stop posts with the aim to emphasize the specific nature of this new line. Information campaign was launched in daily press, in the magazine published by the Municipal District Authority of Prague 2 accompanied by an extensive leaflet campaign.

After meeting all requirements and obtaining a valid licence DP Prague started to operate the new line on 18 April 2003.

The most innovative aspect lies in the mission and specific purpose of the new bus line which provides basic transport services to a formerly neglected (in terms of public transport) part of the city centre, and that with an emphasis on sick and handicapped clients, including children – patients of local health centres. Another novelty involves introduction of a new type of vehicle within the rolling stock of Prague Public Transit company – i.e. a low-floor midi-bus with a platform for paraplegics.
4.2 Problems to be solved by the measures

Measure 7.1 Increasing public transport passengers

Results from activities counting passengers showed that the daily passengers did not increase as expected compared to the increase of the population in the County. Passenger surveys made SL become aware of what services the passengers did not appreciate or found to be bad handled. The passengers had remarks mainly on the following services:

- Traffic disturbance information
- Punctuality
- Cleanliness

To increase the number of passengers was the goal and the methods chosen was to make the passengers satisfied while using the public transport and to reach out to people that rarely or never use the public transport.

Therefore main objectives pursued by this measure were:

- Increase the number of public transport passengers in Stockholm with 15% until 2004 (100 00 new costumers per day)
- Increase the length of the public transport travels
- Increase the intermodality between the different public transport modes and between the private cars/public transport
- Reduce energy use and emissions

Measure 7.2 Public transport security

The main problems to be solved by the measure relate to the necessity of improve attractiveness of Public Transport through a higher feeling of security and safety and to the effective implementation of measures leading to such higher security and safety.

These need to be organised through a strict cooperation between the transport, police and court authorities in order to be efficient.

Therefore the main objectives pursued were:

- Improve security in Public Transport (PT)
- Ameliorated the public opinion of public transport security & safety
- Improve attractiveness of PT

Measure 7.3 Intermodal local/regional transport interchanges

Lille Metropolis needed to cope with excessive presence of private car, unbalanced split of use of road infrastructure among the various mobility modes.

Therefore the main objectives pursued in this measure were:

- Improve intermodality between all means of transport
- To limit the growth of the use of the private car and even to push it away from the city.
- To double the use of collective transport from here 2015
Measure 7.4 Seamless linkage of modes
Main issues in Graz relate to:

- Shortage of parking facilities in inner city
- Traffic congestion in city
- Cope with amounts of "wild P&R"
- Better exploitation of existing PT lines and increase in customers
- Better linkage of regional buses and city buses and tram
- Better linkage of outer city districts

Therefore the main objectives pursued in this measure were:

- Improve intermodality between transport means
- Improve information of travellers on intermodality
- Improve PT attractiveness and therefore increase the number of travellers
- Better linkage of regional buses and city buses and tram
- Better linkage of outer city districts

Measure 7.5 Customer friendly stops for bus and tram
In the view of improving infrastructure for pt-users and increasing level of satisfaction, PT suffered bad image due to not attractive old PT - stops, which were equipped without shelter and no adaptation for handicapped. So far no real time information about departure of the next bus or tram was provided, this measure tackles this issue as well.

The objectives of the measure are therefore concentrating on improving information to travellers at more accessible bus stops through innovative tools contributing to the modernisation of the PT image and in particular:

- To reduce problems of disabled persons in using pt
- To increase passengers information about the current situation of PT
- To establish a higher standard of comfort at bus and tram- stops
**Measure 7.6 Park and Ride facilities**

Main issues to be addressed in Lille Metropolis included:

- To reduce the omnipresence of the car
- To reduce pollution and the noise
- To increase the use of Collective Transport,
- To use clean gas buses, accessible to the Reduced Mobility People (retractable slope)
- To make more easily and more quickly accessible the town centre or main urban poles
- To offer a better comfort and less stress in travel
- To make more comfortable and more secure the car and the 2 wheels parking places connected with collective transport.

Therefore the main objectives pursued in this measure were to improve intermodality with P&R facilities in Lille.

**Measure 7.7 Linking different ways of public transport**

Main issues to be addressed included the provision of basic transport services within the above mentioned area for specific group of users (i.e. patients of medical centres, including children and people with reduced mobility) as well as for other users travelling to this destination.

Therefore the measure focussed on the accessibility of medical facilities in the city centre for target groups of citizens (i.e. patients of medical centres, including children and people with reduced mobility) by means of low-floor midi-buses as an integral part of Prague Integrated Transport system.

**4.3 Interaction within WP/Civitas**

No particular interaction with the other CIVITAS projects took place in this Workpackage, except through the general coordination efforts of Meteor.
PART C – Results and Analysis

5. Indicators

Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators are presented and analysed in the various measures.

**Measure 7.1 Increasing public transport passengers**

To measure the amount of passengers’ surveys has been conducted manually by counting the passengers entering the transport system. The counting is performed under different times of the day to calculate the entering passengers all together or divided in peak time and off peak.

To reach the Trendsetter goal with reducing the emissions SL decided that it could be possible by increasing the amount of passengers by having a changeover from cars to public transport.

The main indicator for this project was to measure the number of passengers and their satisfaction using public transport. A comparison between 1998 and 2004 should show the increase of 100 000 new passengers and moreover an increase of 15 % passenger satisfaction. The goal was not reached. SL has achieved 60 000 new passengers and the satisfaction per cent increased with 4 %.

The reasons for not reaching the goal are several:

- The population in the County has not increased as predicted
- The contractor responsible for the Commuter trains did not prepare themselves properly when they took over the operation in year 2000. A lack of personnel forced them to cancel several departures which of course effected the passengers opinion of the public transport. It also made several passengers to choose the car instead of taking a chance that the train may arrive.

Other indicators and the results of them are:

- Level of satisfaction in information on new PT. The Smart Card System is delayed due to internal problems at the Suppliers. It is also delayed due to an optimistic time schedule for preparations before and carrying out the procurement itself. Therefore no survey will be done until the year 2007 when the new System will be in operation.
- Number of satisfied citizens of the County of Sthlm should increase 4 % from 1998 to 2004. The increase has been –5 % mainly due to the problems with the contractor operating the Commuter trains but also to a rate hike in the beginning of year 2004.
- The number of trips per year is measured once a year and the figures are showing that there is a decrease of approximately 0.8% in year 2004 compared to 2003.

At the end of 2004 SL can see a clear trend. The number of passengers is increasing and so is their opinion of the service.

If no actions had been taken at all to increase the number of passengers and their satisfaction SL would probably have to face even more dismal figures. The troubles with the Commuter train contractor would have been there together with the rate hike. That goes for less people than expected moving in to the County and a higher unemployment as well which of course affects the number of passengers. As the trend seems to have changed in a positive direction SL will make every effort to keep on the work with meeting the passengers’ wishes. The surveys, marketing campaigns, travel guarantee and disruption information will most certainly help SL to reach the goal and maybe even go beyond it!
Measure 7.2 Public transport security

Measurement of the security and safety level and of its perception by the public is a regular action by the Public Transport operator Transpole.

1. The feeling of security on the network:
   - This feeling is clearly rising on the bus (+7,4pts) and moderately rising on the tram (+3,5pts).
     It is on the other hand falling slightly in the subway (-2,8pts).
   - The total feeling of safety remains high (83,4%) in spite of a light fall (-2,6pts).
   - 94,4% of the customers feel more or as much safe as compared to a few monthsago (stable).
   - The feeling of security on the network raises during the day, the evening and the weekend.

2. Solutions which become part of the customers habits
   - 87,2% of the customers see many agents in uniform on the network (-5pts).
   - Whereas the customers consider the prevention increasingly important, they plebiscite less than in May 2004 the increase in the presence of the personnel to improve environment and safety.
   - The reinforcement of the cameras in the stations and stops is widely wished, which is undoubtedly related to the information conveyed by the media (vandals and authors of aggressions found thanks to the recordings).
   - The customers always perceive the efforts carried out to improve their safety but are accustomed also more and more to the solutions set up. Thus, 82% of the users perceive the efforts carried out against 89% in May 2004.

3. Solutions always perceived like effective:
   - Nearly 9 customers out of 10 judge the efforts carried out overall effective.
   - The role of the agents is overall well included/understood by the customers:
     - 1/3 of them quote information, 27% the monitoring and 19% the prevention (which they judge in addition more and more important).
   - The presence of the agents is essential on the network since 19% of the customers needed to make a contact with them during their last displacement including 80% to have information.
   - 97% of these customers found an agent and in 93% of the cases, he answered the expectancies of the customer.
Measure 7.3 Intermodal local/regional transport interchanges

At present, the transport interchange of Armentières is in the last phase of definition of the work, the engineering and design department delivered its program for April 2005. The first drafts received a favourable opinion from the authorities within the framework of the public survey carried out of June 15 to July 16, 2004 (obligatory stage in the French regulation, which imposes a transparency and a dialogue with the concerned populations). For the pole of Don Sainghin the public investigation will be launched in a few months. The negotiations of land acquisitions with the SNCF and RFF are ongoing. Meetings between the various building owners take place in order to coordinate the constraints of every party (Water authorities, water treatment, Telecom, Fire Brigades, Urban renewal, …). As the interchanges are not yet built, measurements will not be produced. The indicators will be based on the planning process in relation to travel time, intermodal delays, traffic evolutions, reduction of noise levels, comfort of use level, general satisfaction of the users, reduction of private car traffic, etc.

Measure 7.4 Seamless linkage of modes

Measurements are based on Counts of parked cars and PT passengers’ surveys.

P&R
Counts, survey of PT users at the stop with the P&R facility
As some cars were parked in the meadows or alongside of the street before the P&R lot was built, it is not clear, whether the P&R lot actually contributed to more P&R users.
A survey among PT users who entered the tram at the end stop in Mariatrost found, that 87% of the interviewees knew about the P&R lot. 60% indicated, that PT had become more attractive with the new P&R lot, 45% had already used the lot before. 60% of these previous users said, that P&R was a reason for them to really use PT more often than before! Satisfaction among the users ranked well with 1.7 (on a scale from 1 very satisfied to 5 dissatisfied) - 81% of the users said they were satisfied. P&R was considered important for the image of a PT operator (2.1 on a scale of 1 very important to 5 irrelevant). In that assessment, B&R was considered less important for the image (only 3 on average, but this was an independent sample).

New stops facilitating interchanges
Merely rebuilding the end stop in Andritz without replanning the bus lines and their schedules, would not have fostered a better linkage between modes: there would simply not have been enough space for different bus lines, as the former few lines previously had long waiting times during breaks at Andritz and blocked the stops.
59% of the PT passengers, which use the new user friendly stop in Andritz state, that PT has become more attractive through the reconstruction. Most positive remarks refer to a better overview and division of space, 57% however complain about the lack of green areas.
The following table summarises the evaluation in this area:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sample</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>P&amp;R</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awareness P&amp;R: knowledge of the measure</td>
<td>n=77 PT User</td>
<td>87%</td>
</tr>
<tr>
<td>Acceptance P&amp;R: usage of the measure</td>
<td>n=77 PT User</td>
<td>45%</td>
</tr>
<tr>
<td>Acceptance P&amp;R: increase attractiveness of PT</td>
<td>n=77 PT User</td>
<td>60% of all interviewees indicated, that the new P&amp;R lot increases the attractiveness of PT</td>
</tr>
<tr>
<td>Quality of service P&amp;R: satisfaction with the measure</td>
<td>n=77 PT User</td>
<td>81% of the P&amp;R users are satisfied average: 1.7(1=very satisfied; 5= not satisfied)</td>
</tr>
<tr>
<td>Image: Important for a positive Image of PT</td>
<td>n=77 PT User</td>
<td>all PT users: average: 2.1 (1=very important; 5=irrelevant)</td>
</tr>
<tr>
<td>Change of behaviour P&amp;R</td>
<td>n=77 PT User</td>
<td>66% of P&amp;R users said, that P&amp;R was a reason for them to use PT more often than before</td>
</tr>
</tbody>
</table>

Measure 7.5 Customer friendly stops for bus and tram
Several round tables and focus groups with interest groups have taken place. Results of the discussions have guided the implementation.

Complaint management shows a lot of spontaneous feedback by (not only disabled) customers.
A survey among PT users was realised after the reconstruction of important tram stops. (n= 100, personal interviews at the new user-friendly stop in Andritz)
59% of the PT passengers, which use the new user friendly stop in Andritz state, that PT has become more attractive through the reconstruction (as a comparison: 68% state, that the new buses that link Graz to the Hinterland make PT more attractive for them, whereas only 35% state, that Bike & Ride makes PT more attractive for them). Most positive remarks refer to a better overview and division of space, 57% however complain about the lack of green areas.

The following table summarises the evaluation in this area:

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Sample</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptance: increase attractiveness of PT</td>
<td>n=86 PT User</td>
<td>59% state, that the reconstruction of the new customer friendly stop in Andritz increases the attractiveness of PT</td>
</tr>
<tr>
<td>Quality: satisfaction with the measure</td>
<td>n=86 PT User</td>
<td>Referring to the reconstruction of the new customer friendly stop in Andritz most positive remarks refer to a better overview and division of space. 57% however complain about the lack of green areas</td>
</tr>
</tbody>
</table>
Measure 7.6 Park and Ride facilities

The frequentation of the carparks is measured regularly taking into account the presence of the monitoring agent under the responsibility of the transport operator.

Relay Parks connected to the CITADINE high level of service lane

<table>
<thead>
<tr>
<th></th>
<th>Porte de Val.</th>
<th>Norexpo</th>
<th>Champ de Mars</th>
<th>Total 3 parkings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacité</td>
<td>330</td>
<td>370</td>
<td>1500</td>
<td>2200</td>
</tr>
<tr>
<td>Moyenne journalière</td>
<td>22</td>
<td>48</td>
<td>511</td>
<td>581</td>
</tr>
<tr>
<td>Taux d'occupation / capacité</td>
<td>7%</td>
<td>13%</td>
<td>34%</td>
<td>26%</td>
</tr>
</tbody>
</table>

Relay Parks connected to the subway:

A rate of filling beyond 75% is measured since January 2005. At this stage the level of saturation is reached some days

Daily occupation is as follows:

<table>
<thead>
<tr>
<th></th>
<th>4 Cantons</th>
<th>CHR B Calmette</th>
<th>ST Philibert</th>
<th>Les Près</th>
<th>Portes des Postes</th>
<th>Portes d'Arras</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacité</td>
<td>600</td>
<td>300</td>
<td>350</td>
<td>150</td>
<td>80</td>
<td>100</td>
<td>1580</td>
</tr>
<tr>
<td>Fréq moy 1er sem 05</td>
<td>424</td>
<td>228</td>
<td>229</td>
<td>154</td>
<td>79</td>
<td>67</td>
<td>1181</td>
</tr>
<tr>
<td>Taux de remplissage</td>
<td>71%</td>
<td>76%</td>
<td>65%</td>
<td>103%</td>
<td>99%</td>
<td>67%</td>
<td>75%</td>
</tr>
<tr>
<td>Evolution / 1er sem 04</td>
<td>+18%</td>
<td>+49%</td>
<td>+258%*</td>
<td>+10%</td>
<td>-9%**</td>
<td>+3%</td>
<td>+36%</td>
</tr>
</tbody>
</table>

This relates to the following historical records:

<table>
<thead>
<tr>
<th></th>
<th>4 Cantons</th>
<th>CHR B Calmette</th>
<th>St Philibert</th>
<th>Les Près</th>
<th>Portes des Postes</th>
<th>Portes d'Arras</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>203</td>
<td>236</td>
<td>254</td>
<td>266</td>
<td>265</td>
<td>306</td>
<td>203</td>
</tr>
<tr>
<td>1999</td>
<td>236</td>
<td>172*</td>
<td>40*</td>
<td>48*</td>
<td>121*</td>
<td>617</td>
<td>617</td>
</tr>
<tr>
<td>2000</td>
<td>254</td>
<td>160</td>
<td>65</td>
<td>117</td>
<td>105</td>
<td>37</td>
<td>618</td>
</tr>
<tr>
<td>2001</td>
<td>266</td>
<td>153</td>
<td>56</td>
<td>96</td>
<td>93</td>
<td>17</td>
<td>681</td>
</tr>
<tr>
<td>2002</td>
<td>265</td>
<td>156</td>
<td>65</td>
<td>117</td>
<td>105</td>
<td>37</td>
<td>745</td>
</tr>
<tr>
<td>2003</td>
<td>306</td>
<td>136</td>
<td>65</td>
<td>130</td>
<td>111</td>
<td>49</td>
<td>797</td>
</tr>
<tr>
<td>2004</td>
<td>356</td>
<td>178</td>
<td>107</td>
<td>137</td>
<td>81</td>
<td>61</td>
<td>920</td>
</tr>
<tr>
<td>2005</td>
<td>424</td>
<td>228</td>
<td>229</td>
<td>154</td>
<td>79</td>
<td>67</td>
<td>1181</td>
</tr>
</tbody>
</table>

Measure 7.7 Linking different ways of public transport
Assessment was based on the results of periodic traffic surveys, on monitoring the service by bus control centre, on monitoring of multiple aspects of the actual operation of the bus service and last but not least it was based on suggestions provided by the public. Results as well as passenger suggestions are available in electronic form. Our assessment of environmental impacts was based on the premise that some passengers have switched from private cars to this newly introduced public transport service.

Before starting the actual operation there had been certain concerns about poor acceptance of this new transport connection by the public as well as concerns about a low level of use of the transport capacity offered. However, such concerns turned out to be false; just to the contrary, introduction of the bus line met with positive response and from the first days of operation the line has been reasonably used and has become a natural part of Prague Integrated Transport system. Other concerns included existing unfavourable physical configuration of street network along the route, frequent congestions at some busy locations and undisciplined car users (inappropriate parking, passage obstructing etc.). These concerns partly proved to be right but were flexibly solved through coordinated efforts of the staff of Bus Control Centre of Prague Public Transit company and through an effective cooperation with Traffic Squads of the Police of the Czech Republic and City Police of the City of Prague. These forces did not hesitate to take even restrictive measures against undisciplined drivers. Currently, the situation in terms of smooth traffic flow along the route has been stabilized under permanent cooperation with Police Forces.
6. Fulfilment of WP Objectives

6.1 Fulfilment of objectives for each measure

Measure 7.1 Increasing public transport passengers

SL did not reach the goal to increase the number of public transport passengers in Stockholm with 15%, i.e. from 640,000 a day based on year 1998 to 740,000 a day by the end of year 2004.

The number of passengers has increased from 640 000 a day (1998) to 700 000 a day by the end of year 2004. Population is growing less than expected in the County and together with a high unemployment and a raise of the ticket price is likely to be some of the reasons for not reaching the goal. A lot of habitats have also discovered the benefits of using the bicycle, which of course affects SL’s figures.

SL do not have statistics telling us the exact figures for travel length from 1998 compared to 2004 but a fact is that there are more kilometres driven in the end of 2004 than the years before.

If the increase of 60 000 passengers is calculated as if all those passengers instead of using the public transport should have gone by car there is a decrease of 46 000 cars per year. The average use is 1.3 persons per car which means 60 000 / 1.3.

SL therefore believe that we have contributed to the reduce of both energy use and emissions without having any exact figures to present.

The quantifiable targets for the measure are:

Rising the number of public transport users from 640,000 a day based on year 1998 to 740,000 a day by the end of year 2004: NO

- The number of passengers has increased from 640 000 a day (1998) to 700 000 a day by the end of year 2004. Population is growing less than expected in the County and together with a high unemployment and a raise of the ticket price is likely to be some of the reasons for not reaching the goal. A lot of habitats have also discovered the benefits of using the bicycle, which of course affects SL’s figures.

An increase of 17% of the number of “Satisfied Passengers within the Public Transport”, i.e. from 58% to 75%. NO

- Problems with the contractors, especially on the commuter trains and price raises have made that SL only have reached the level of 64%. The indications are though that the percentage will increase further.

An increase of 4% of the number of “Regular Passengers”, i.e. from 56% to 60%. YES

An increase of 15% of the number of “Satisfied habitants in the County”, i.e. from 55% to 70%. NO

- At the opposite what was expected, there was a decrease to 54 % of satisfied habitants. Probable causes are the same as for “Satisfied Passengers…”

Milestones and deliverables

D 7.1.1 Report on quantity of public travelling YES
D 7.1.2 Report on quality of public travelling YES
D 7.1.3 Report on the increase of the number of passengers compared to year 1998 YES
D 7.1.4 Report on effects of direct marketing YES
M 7.1.1 2003-2004 information and marketing campaigns YES
M 7.1.2 Introduction of a Travel Guaranty including all kinds of travel modes within the public transport system YES
Measure 7.2 Public transport security

Measurement of the security and safety level and of its perception by the public is a regular action by the Public Transport operator Transpole.

Indicators and results have been presented above in §4.

Objectives are fully met and this measure is expected to contribute significantly to the rise of PT use in Lille Metropolis

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shorter intervention time in case of emergency situations</td>
<td>YES</td>
</tr>
<tr>
<td>Better image of Public Transport</td>
<td>YES</td>
</tr>
<tr>
<td>Contribution to LMCU objective of 30% increase in PT passenger travels in year 2004</td>
<td>YES</td>
</tr>
</tbody>
</table>

Milestone and deliverables

| M 7.2.1 Set up of the radio contact system                                        | YES |
| M 7.2.2 Set up of the localisation service for buses and police vehicles          | YES |

Measure 7.3 Intermodal local/regional transport interchanges

As the interchanges are not yet built, measurements will not be produced. The indicators will be based on the planning process in relation to travel time, intermodal delays, traffic evolutions, reduction of noise levels, comfort of use level, general satisfaction of the users, reduction of private car traffic, etc.

The objective of the interchanges in terms of increase of intermodality and reduction of the use of private car will be reached as per the implementation studies

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less car use will lead to decrease in pollution.</td>
<td>YES</td>
</tr>
<tr>
<td>Stimulus of PT (see LMCU objective of 30% increase in PT passenger travels in year 2004)</td>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>D 7.3.1 Summary of Implementation studies on 2 intermodal exchange points (subcontracting)</td>
<td>YES</td>
</tr>
<tr>
<td>M 7.3.1 Two (2) new intermodal interchanges</td>
<td>YES</td>
</tr>
<tr>
<td>D7.3.2 Global evaluation study on Lille PT Measures</td>
<td>YES</td>
</tr>
</tbody>
</table>
Measure 7.4 Seamless linkage of modes

(Measurements are based on Counts of parked cars and PT passengers, survey)

Objectives are partly met, as Area “Liebenau” is linked to a P&R facility that will be realised on the premises of a supermarket after tramline 4 to the South (Liebenau) has been extended. The planning activities could be finalised., construction will only start in 2005 and will not be finalised within Trendsetter.

Signs leading to the P&R lots have been posed, but an electronic guidance system could not yet get installed, because the new parking company could not finance it.

Rising the number of public transport users from 640.000 a day based on year 1998 to 740.000 a day by the end of year 2004 and at the same time reach:

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implemented improvement of the linkage of modes in 5 areas</td>
<td>Mostly</td>
</tr>
<tr>
<td>Increase of PT travellers in the concerned corridors of at least 10%</td>
<td>Yes</td>
</tr>
<tr>
<td>Level of satisfaction with the new guidance system of at least 70%</td>
<td>No</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 7.4.1 Evaluation concept for the linkage of modes programme</td>
<td>Yes</td>
</tr>
<tr>
<td>M 7.4.2 Submission of detailed planning for official approval Area 2/3, start of operation of Area 1</td>
<td>Yes</td>
</tr>
<tr>
<td>M 7.4.3 Submission of detailed planning for official approval Area 4, start of operation Area 2 and 3</td>
<td>Yes</td>
</tr>
<tr>
<td>M 7.4.4 End of implementation start of operation Area 5</td>
<td>No</td>
</tr>
<tr>
<td>D 7.4.1 Evaluation report</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Measure 7.5 Customer friendly stops for bus and tram

Several round tables and focus groups with interest groups have taken place. Results of the discussions have guided the implementation.

Complaint management shows a lot of spontaneous feedback by (not only disabled) customers.

A survey among PT users was realised after the reconstruction of important tram stops. (n= 100, personal interviews at the new user-friendly stop in Andritz)

The interview revealed no importance of the new stops for a better image of the PT provider. Still, some of the new stops lack shelters or sufficient lighting, and also the idea for area maps will be kept for the future. There is unfortunately no budget or time set aside for accompanying marketing strategies in order to attract new customers.

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementation of 60 high level PT stops</td>
<td>Yes</td>
</tr>
<tr>
<td>Level of satisfaction with the new stops at least 70%, also for people with mobility restrictions</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase of the level of customer satisfaction with PT (due to the more modern image) and modern image of PT</td>
<td>Yes</td>
</tr>
</tbody>
</table>

More than 60 stops could be equipped

It is hard to measure, whether PT usage grew (or remained stable) due to the new stops. However, a question in the interview "Has the new stop made the usage of PT more attractive for you?" hints towards an unspecified contribution: 59% say, that this is the case.

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M 7.5.1 Evaluation concept for the customer friendly PT stop programme, and general design of stop</td>
<td>Yes</td>
</tr>
<tr>
<td>M 7.5.2 Start of implementation of the programme/continued implementation repeated each year</td>
<td>Yes</td>
</tr>
<tr>
<td>M 7.5.3 Sixty high level PT stops are implemented</td>
<td>Yes</td>
</tr>
<tr>
<td>D 7.5.1 Evaluation report</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Measure 7.6 Park and Ride facilities
The frequation of the carparks is measured regularly taking into account the presence of the monitoring agent under the responsibility of the transport operator.

Objectives have been largely exceeded

<table>
<thead>
<tr>
<th>The quantifiable targets for the measure are:</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,100 new parking places</td>
<td>YES</td>
</tr>
<tr>
<td>Less cars- and thus less pollution in Lille Metropole</td>
<td>YES</td>
</tr>
<tr>
<td>Contribution to Lille objective of a rise of 30% in PT travels in year 2004.</td>
<td>YES</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Milestones and deliverables</th>
<th>Yes/No</th>
</tr>
</thead>
<tbody>
<tr>
<td>M7.6.1 Establishing of 4 new car/Bicycle parks</td>
<td>YES</td>
</tr>
<tr>
<td>D7.6.2 Global evaluation study on Lille PT Measures</td>
<td>YES</td>
</tr>
</tbody>
</table>

Measure 7.7 Linking different ways of public transport
Assessment was based on the results of periodic traffic surveys, on monitoring the service by bus control centre, on monitoring of multiple aspects of the actual operation of the bus service and last but not least it was based on suggestions provided by the public. Results as well as passenger suggestions are available in electronic form. Our assessment of environmental impacts was based on the premise that some passengers have switched from private cars to this newly introduced public transport service.

Planned objectives have been fulfilled.
Before starting the actual operation there had been certain concerns about poor acceptance of this new transport connection by the public as well as concerns about a low level of use of the transport capacity offered. However, such concerns turned out to be false; just to the contrary, introduction of the bus line met with positive response and from the first days of operation the line has been reasonably used and has become a natural part of Prague Integrated Transport system. Other concerns included existing unfavourable physical configuration of street network along the route, frequent congestions at some busy locations and undisciplined car users (inappropriate parking, passage obstructing etc.).
These concerns partly proved to be right but were flexibly solved through coordinated efforts of the staff of Bus Control Centre of Prague Public Transit company and through an effective cooperation with Traffic Squads of the Police of the Czech Republic and City Police of the City of Prague. These forces did not hesitate to take even restrictive measures against undisciplined drivers. Currently, the situation in terms of smooth traffic flow along the route has been stabilized under permanent cooperation with Police Forces.
### 6.2 Contribution to Trendsetter objectives

Trendsetter’s objectives are to ameliorate urban air quality and noise levels, and congestion while supporting exceptional mobility and urban quality of life. Specifically, wp7 addresses these objectives in the following way:

<table>
<thead>
<tr>
<th>High level objectives</th>
<th>Measures</th>
<th>7.1 Increasing public transport passengers</th>
<th>7.2 Public transport security</th>
<th>7.3 Intermodal/local transport interchanges</th>
<th>7.4 Seamless linkage of modes</th>
<th>7.5 Customer friendly stops for bus and tram</th>
<th>7.6 Park and Ride facilities</th>
<th>7.7 Linking different ways of public transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide examples</td>
<td></td>
<td>N</td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td></td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td></td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Increase Mobility</td>
<td></td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td></td>
<td></td>
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<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td></td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>Reduce noise levels in demonstrating cities</td>
<td></td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Enhance Environment (direct contribution)</td>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Reduce annual fossil CO₂ emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year.</td>
<td></td>
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<tr>
<td>Reduce NOₓ emissions by 900 tonnes/year and particulate matter by at least 1800 tonnes/year</td>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Reduce noise levels in demonstrating cities</td>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Save Energy (direct contribution)</td>
<td></td>
<td>Y</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>Save over 850 TJ (≈ 20 300 TOE) energy per year</td>
<td></td>
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</tbody>
</table>
Reaching these objectives is based on specific demonstration objectives as detailed below:

<table>
<thead>
<tr>
<th>Measures</th>
<th>7.1 Increasing public transport passengers</th>
<th>7.2 Public transport security</th>
<th>7.3 Intermodal local/regional transport interchanges</th>
<th>7.4 Seamless linkage of modes</th>
<th>7.5 Customer friendly stops for bus and tram</th>
<th>7.6 Park and Ride facilities</th>
<th>7.7 Linking different ways of public transport</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demonstration objectives</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Public transport bus fleets</strong></td>
<td></td>
<td></td>
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<tr>
<td>128 biogas buses (Lille)</td>
<td></td>
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<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel (Graz)</td>
<td></td>
<td></td>
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<tr>
<td><strong>Clean vehicles and infrastructure</strong></td>
<td></td>
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<tr>
<td>320 new clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets (Stockholm and Lille)</td>
<td></td>
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<tr>
<td>5 new biogas refuelling stations (4 Stockholm, 1 Lille)</td>
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<tr>
<td>7 biogas waste freighters (Stockholm)</td>
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<tr>
<td>120 taxis converted to bio-diesel (Graz)</td>
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<tr>
<td>100 clean vehicles in private company fleets (Stockholm)</td>
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<tr>
<td>300 substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td></td>
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<td></td>
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<tr>
<td>26 clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transport and mobility management</strong></td>
<td></td>
<td></td>
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<tr>
<td>1 High level service bus lane (Lille)</td>
<td></td>
<td></td>
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<tr>
<td>2 Bus priority signal systems (Stockholm, Prague)</td>
<td></td>
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<tr>
<td>4 Environmental restriction zones (Stockholm, Prague, Graz and Pecs)</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>3 Environmentally oriented Parking zones (Graz, Pecs, Stockholm)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>1 Smart Card system in full scale (Stockholm)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4 Improved intermodal links (Graz, Lille)</td>
<td>Y Y</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>60 High customer friendly bus and tram stops (Graz)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities (Lille)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Y</td>
<td></td>
</tr>
<tr>
<td>1 Logistic Centre including 8 clean vehicles (Euro 4 standard)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 IT based logistic management systems</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>Y Y</td>
<td></td>
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</tr>
</tbody>
</table>
Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice:

<table>
<thead>
<tr>
<th>Scientific &amp; Technical objectives</th>
<th>Measures</th>
<th>7.1 Increasing public transport passengers</th>
<th>7.2 Public transport security</th>
<th>7.3 Intermodal local/regional transport interchanges</th>
<th>7.4 Seamless linkage of modes</th>
<th>7.5 Customer friendly stops for bus and tram</th>
<th>7.6 Park and Ride facilities</th>
<th>7.7 Linking different ways of public transport</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm³ biogas by the end of the project.</td>
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<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
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<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
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<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
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<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Y</td>
<td>Y</td>
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<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
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<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
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<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Y</td>
<td>Y</td>
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</tr>
</tbody>
</table>
The organisation of the measures to reach the specific WP objectives is

<table>
<thead>
<tr>
<th>Workpackage objectives</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve the PT travellers / passengers information</td>
<td>Y Y Y Y Y Y Y</td>
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<tr>
<td>Ameliorate the PT security</td>
<td>Y Y Y Y Y Y Y Y</td>
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<tr>
<td>Strength the PT intermodality</td>
<td>Y Y Y Y Y Y Y Y Y</td>
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<tr>
<td>Enforce the PT attractiveness</td>
<td>Y Y Y Y Y Y Y Y Y</td>
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<tr>
<td>Save energy and emissions through increase use of PT</td>
<td>Y Y Y Y Y Y Y Y Y</td>
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</tbody>
</table>

- **WP7 Public Passenger Transport Report – June 06**
7. Used Technology

7.1 Overview of used technology within WP

Measure 7.1 Increasing public transport passengers
No specific technology has been used in this measure

Measure 7.2 Public transport security
The measure used existing commercial technology

Measure 7.3 Intermodal local/regional transport interchanges
No specific technology was used in this measure

Measure 7.4 Seamless linkage of modes
The usage of technology such as the traffic management system could not be realised. Now, the P&R lots are only announced by signs. Frequency or departure of the next tramline is not indicated.

Measure 7.5 Customer friendly stops for bus and tram
New curb stones (Kassler Sonderbordstein) are used, which have never been used in Austria before, which guide the bus as closest as possible to the sidewalk without steering (see pictures). Most difficult is their handling when a stop is built: they weigh about 100 kg and are of 3 times the size of a normal curb stone). Special stones are needed for different circumstances (e.g. curves, exits).

Measure 7.6 Park and Ride facilities
No specific new technology has been used in this measure

Measure 7.7 Linking different ways of public transport
Within the framework of fulfilling this task Prague Public Transit Co. Inc. used, for the first time ever, small-sized buses (so-called midi-buses) in regular operation which were even modified to be accessible to persons with reduced mobility. New lighted stop posts supplied by ELTODO were also installed for the first time in connection with this bus line.

7.2 Positive aspects, problems & solutions, new concepts
In this WP, use of new technologies is not a real issue, rather the innovative use of existing and ruggedised technologies to the service of Public passenger transport.

7.3 Comparison and conclusions
Available technologies are sufficient to serve public passenger transport requirements and allow progress in a substantial way.
8. Economical Aspects, Cost Benefit

8.1 Per measure

**Measure 7.1 Increasing public transport passengers**

The Travel Guarantee initially seems as a cost but the goodwill it gets would probably cost more to achieve using common channels for marketing, i.e. advertising, market campaigns etc. Direct Marketing towards recently moving in to different housing areas has a cost for administration and handing over a free try-out-ticket. A great likeliness is that the cost is returned in revenues as it reaches habitants that if no contact had been taken, had not become to be passengers.

**Measure 7.2 Public transport security**

Economic aspects are related to the general objectives of reduction of use of private car and increase of use in Public Transport.

**Measure 7.3 Intermodal local/regional transport interchanges**

The cost of the interchanges is co financed by the transport regulation authorities (région Nord pas de Calais, Département du Nord, Lille Metropolis). Several transport operators are involved in the implementation. The city is also involved in the decision making, and the citizens are giving their opinion through polling.

**Measure 7.4 Seamless linkage of modes**

Using the P&R is free of charge. It is assumed, that the car drivers buy a PT ticket when they switch to the tramline.

**Measure 7.5 Customer friendly stops for bus and tram**

For the PT provider, esp. the new curb stones are profitable. There are less irreparable damages of the tyres. But at the moment the profit cannot be quantified.

**Measure 7.6 Park and Ride facilities**

The economical impact is indirect, through a higher use of Public Transport in the urban zones, pushing the car away from the city.

**Measure 7.7 Linking different ways of public transport**

A generally positive economic aspect (from the operator’s perspective) was an increased number of both regular and occasional users of the new bus service. With regard to intermodality of the transport system, however, this does most likely not mean an absolute increase in the number of new clients as the source of journey of most new bus service users falls outside its scope and the absolute majority of clients change at intermodal interchanges Karlovo Square and I.P.Pavlova (Metro and trams).
8.2 Positive aspects, problems and solutions
 Costs and investments have to be evaluated at least at the whole public transport operation level, and better at the level of the whole urban community, be it the city, the metropolis or even the region.

Also what can initially be perceived as a cost can become a source of global savings when integrated in the total environment of application.

Economical analysis shall include related elements such as:
  o land
  o construction
  o fiscal
  o employment
  o environment
  o …

8.3 Comparison and conclusions
 The various measures insist on the fact that any innovation must be sold, using economic arguments but also other important arguments.

It is also clear that the economic analysis must be brought at a broader level than the simple public passenger transport.
9. **Synergies**

9.1 **Need for supplementary measures for each measure**

**Measure 7.1 Increasing public transport passengers**

The most area to work with is the factors of punctuality and cleanliness. All surveys made shows that those factors are the ones most appreciated by the passengers.

Other important factors are

- Easiness to buy a ticket and being received with kindness and professional service by the personnel.
- Use technique for mobile phones to reach out to passengers via short messages about disruptions in the traffic.
- Build a customer database to be able to offer selected groups of passengers’ beneficiaries and/or information.

**Measure 7.2 Public transport security**

No need for specific supplementary measures is perceived.

**Measure 7.3 Intermodal local/regional transport interchanges**

The 2 interchanges are the first to be implemented in a series of 12, to cover the major intermodal nodes of the metropolis.

**Measure 7.4 Seamless linkage of modes**

Marketing and signing needs to point out the new P&R facilities; marketing and information should also be extended to the surrounding communities.

**Measure 7.5 Customer friendly stops for bus and tram**

At the same time of rebuilding stops, close crossings and pedestrian access are rebuilt (and for instance also equipped with a guidance system for the visually impaired). The quality of public space needs to be sufficient to motivate walking and create comfortable access. This might sometimes have failed in Graz, as the planning was completely let to the architects, which do not always anticipate people's demand for green space, so that new squares are often rather futuristic. The city now interferes more and complaints about a lack of green areas are taken up against the will of many architects, who in the previous years have created a lot of modern space without greens.

**Measure 7.6 Park and Ride facilities**

In order to develop use of parkings, it was necessary to transform sites where „wild“ parking was usual into urban green spaces, therefore contributing to the quality of air

**Measure 7.7 Linking different ways of public transport**

Not identified
9.2 Comparison and conclusions

All measures are part of a broader environment and cannot be implemented absolutely alone, although the current demonstrations can be rather conclusive.

It is in particular important that, when promoting public passenger transport, as cars are pushed away from the city, the space left is recovered for other urban activities and functions, for an identified benefit to the citizen.

It is also important that the operations are complemented by adequate communication and marketing.
10. Political and Administrative Aspects

10.1 Overview of major political and administrative aspects influencing the measures

**Measure 7.1 Increasing public transport passengers**

Not applicable to this measure.

**Measure 7.2 Public transport security**

The strong cooperation between the PT operator, the police and the justice is a key element to bring field operations to a dissuasive level for those of make troubles in PT

This requires practical agreements and an excellent human cooperation, which needs time to establish.

**Measure 7.3 Intermodal local/regional transport interchanges**

The cost of the interchanges is cofinanced by the transport regulation authorities (région Nord pas de Calais, Département du Nord, Lille Metropolis). Several transport operators are involved in the implementation.

The city is also involved in the decision-making, and the citizens are giving their opinion through polling.

**Measure 7.4 Seamless linkage of modes**

For rebuilding the end stop Andritz; it was necessary to gain property from a neighbouring school. It was thanks to a double role of the school director being a representative in the local city district "parliament", that the whole area around the end-stop could be rebuilt. This would not be possible today anymore. The very intensive cooperation between the city district and the city was also facilitated through the interest of both for a reconstruction: the city in order to provide good interchange possibilities and the district to build an attractive main square in the district.

There were 3 citizens lobby groups against the reconstruction, which had to be considered in a participation process. Business representatives were satisfied, as at the same time 3 new parking lots were created.
Measure 7.5 Customer friendly stops for bus and tram

The curb stones are very difficult to handle, which makes it more expensive to build them into the ground (they are 3 times as big and heavy).

The curb stones are very well visible (1/2 m width) and in that help to identify bus stops for the (potential) customers: PT becomes more visible.

Political support was given - the city department for construction sees the consultation process also as lobbying for its own work - sometimes (as city areas are governed by own Bezirksräte), there are cooperation difficulties. Then, either the stops were not rebuilt (Wetzelsdorf) or the city overrules the districts.

Within the city administration, the separation of tasks and responsibilities related to transport in city various departments leads to non-coordination. The last 8 years, only 1 stop per year was rebuilt. In the meantime it is 10 stops per year. Sometimes weekly meetings for coordination take place, including the PT provider.

The fact that the PT provider only is responsible for customers as long they are IN the buses has not yet caused severe problems: the city feels responsible for all stops and access routes to stops. Although for trams, actually the PT provider would be responsible, the city also accepts responsibility here.

Planning needs to envisage timeperiods of more than 15 years and anticipate the population growth (or decline), the future usage of unused urban space, traffic development in motorised, non-motorises, private and public transport etc). Sometimes this is not the case.

Highly motivated people are necessary at the PT provider as well as the city administration - this also refers to financial planning and fighting for it. Mostly it is not a question of money, but more a question of dividing up and spending resources.

From 2005 onwards, the department of planning becomes an own department including financial "independency". This will give more power and weight for transport planning: in general, it is absolutely necessary that there is a counterpart for the PT provider to be found in the city administration.

Measure 7.6 Park and Ride facilities

A very strong political willingness to address this issue was necessary, as there was a strong opposition from shops and residents to push the cars away from city centre.

Measure 7.7 Linking different ways of public transport

Positive aspect can be seen in an undisputedly increased prestige of urban public transport. Service of a new type was introduced to a formerly unserviced area that was frequent destination of many people. While having a specific nature (with respect to the target user group) the new transport service has no exclusive nature (i.e. only for certain groups); just to the contrary, it forms a natural part of Prague Integrated Transport system, i.e. it is accessible to anyone under tariff conditions applicable within the entire transport system.
10.2 Positive aspects, problems and solutions

The main issues raised in the various measures are broadly (although not exclusively) related to the complexity of the decision making at administrative level:

- Co-operation between authorities and corresponding intermediation to reach agreements of the initiatives from all administrative and political stakeholders. This is in particular complex when many stakeholders, eventually from different political opinions, are to take common decisions.
- Homogeneous view and interpretation of investments and financing conditions must be cleared, in order to allow decisions on the same economic language.
- Eagerness in taking decisions, starting processes and showing examples is a key issue to allow the adequate administrative processing (there is always a good reason not to move !!!)
- Organisation issues are important also, particularly when several communes are involved.
- Raising the image of Public Transport might have different level of priority, sometimes for members of the same administration.

10.3 Comparison and conclusions

The political and administrative issues mentioned for each measure are in fact directly applicable for all sites, at various levels.
11. Up-scaling and Transferability

11.1 Potential for up-scaling and transferability to other cities

Measure 7.1 Increasing public transport passengers

SL estimates that an up-scaling of all the measures within this package will increase the number of passengers. SL has therefore made a decision that the measures will be a part of the ordinary activities. The traffic disturbance information will be used over the entire County of Stockholm. If there are disruptions the passengers shall be able to be aware of that within a few minutes. The personnel working at the different depots are introduced to new technique as well as informed of the concept of wording to be used. In a near future SL is also looking at the possibility to use mobile phones to send short messages with disturbance information.

The travel guarantee will be looked over on a regular basis to see if there are any changes that can be done to meet the passengers expectations better, for instance increase the accepted amount of money to be paid for a taxi trip. From the beginning (in year 2002) SL had a boundary that only 200 sek would be paid for a taxi trip. That amount has already been changed to 400 sek.

Incentives to contractors are looked over on a regular basis. Before every new contract is signed there is an analysis made of what incentives has given the best results (most satisfied customers) to the lowest cost.

Quality and quantity surveys will be made twice a year continuously. The surveys are SL’s best tool to measure the amount and satisfaction of the public transport passengers.

Reaching out to habitants recently moved within or moved in to the County of Stockholm by Direct Marketing will continue. By sending a free try-us-card together with information of where and when they can use the public transport SL has received a lot of goodwill – and hopefully passengers that will stay with them. All people being reached to has also being asked if they would like to be a part of a customer database where SL can send them news or offers belonging to the area they live or work in. Over 60 % of the passengers that have used the offer have been willing to be a part of that database. Approximately 180 000 people are moving in or within the County of Stockholm so in a few years time the database will contain a lot of people that can be the target of other directed campaigns.

Measure 7.2 Public transport security

The measure has been implemented in full scale in Lille Metropolis as part of a concerted plan on the development of Public Transport from 1998 to 2015.

Measure 7.3 Intermodal local/regional transport interchanges

Several poles are envisaged on the Lille Metropolis territory within the framework of an overall policy of treatment of the main access points of the territory. The fare integration running in parallel will be an accelerator for the project.

Measure 7.4 Seamless linkage of modes

The extension of the existing P&R facility in Mariatrost will be reconsidered if the first step is successful and there is increasing demand. Although the original suggestion of 500 new lots was not accepted, there is a chance for a bigger lot.

Measure 7.5 Customer friendly stops for bus and tram

Of course, all PT stops should become accessible, and most of them should receive real-time information.
**Measure 7.6 Park and Ride facilities**

The success is high and, in certain cases, saturation is expected rapidly.

Multi level parks can be envisaged.

**Measure 7.7 Linking different ways of public transport**

There is a possibility of potential up-scaling the system, preliminary proposals have been already drawn up. The main obstacle for extension of the system is the lack of sufficient funds available for acquisition of new vehicles.

**11.2 Comparison and conclusion**

All measures are a total (or at least partial) success and can be up-scalable in their own environment, if appropriate and replicable to other sites.

Such replication is of course subject to the adaptation to a new site of the measures, which cannot be transposed “as such”.

Main issues to be considered for replication are:

- Integration of the measure in a global policy
- Investment and financial control
- Adequate timing of the implementation.
12. **Assessment of All Measures**

A list of the measures, with comments of their implementation (e.g. implemented as planned/partly implemented/not implemented) and fulfilment of measure objectives and contribution to WP objectives.

For each heading (Implementation, Fulfilment of measure objectives and Contribution to WP objectives) and measure in the table below, please choose one of the options in the parenthesis.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure 7.1 Increasing public transport passengers</td>
<td>YES</td>
<td>PARTLY</td>
<td>1, (2), (3), 4, (5)</td>
</tr>
<tr>
<td>Measure 7.2 Public transport security</td>
<td>YES</td>
<td>YES</td>
<td>(1), 2, 4</td>
</tr>
<tr>
<td>Measure 7.3 Intermodal local/regional transport interchanges</td>
<td>PARTLY</td>
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<td>(1), 3, 4, (5)</td>
</tr>
<tr>
<td>Measure 7.4 Seamless linkage of modes</td>
<td>YES</td>
<td>YES</td>
<td>1, 3, 4, (5)</td>
</tr>
<tr>
<td>Measure 7.5 Customer friendly stops for bus and tram</td>
<td>YES</td>
<td>YES</td>
<td>1, (3), 4, (5)</td>
</tr>
<tr>
<td>Measure 7.6 Park and Ride facilities</td>
<td>YES</td>
<td>YES</td>
<td>(1), 3, 4, (5)</td>
</tr>
<tr>
<td>Measure 7.7 Linking different ways of public transport</td>
<td>YES</td>
<td>YES</td>
<td>(1), 3, 4, (5)</td>
</tr>
</tbody>
</table>

Contribution to WP objectives (between brackets means as an induced or secondary achievement)

1. Improve the PT travellers / passengers information
2. Ameliorate the PT security
3. Strength the PT intermodality
4. Enforce the PT attractiveness
5. Save energy and emissions through increase use of PT
PART D – Conclusions and Recommendations

13. Barriers and Drivers of the Measure Implementation

13.1 General description of barriers and drivers for each measure

**Measure 7.1 Increasing public transport passengers**
A driver to implement the Travel Guarantee was learned experiences from another country similar to Sweden, Norway. They implemented the Guarantee before Stockholm and the public transport users in Norway received it positively.
The surveys conducted in Stockholm showing the two factors most important for passengers’ approval have been the trigger to focus on incentives towards the contractors. Punctuality and cleanliness have to reach a certain level of satisfaction otherwise the contractors have to pay a fine. On the other hand if they go beyond that level they receive a bonus, The bonus triggers the contractors to work even harder and the passengers receive what they eager for most.

**Measure 7.2 Public transport security**
The main driver to this measure is the possibility to facilitate the access to PT for all citizens through the perception of an acceptable level of security. This of course contributes to the effective reduction of problems, including aggressions and vandalism
The main barriers to the actions implemented are
- the investment (40 M€ in Lille Metropolis), but this is rapidly compensated by the reduction of aggressions and vandalism
- the difficulty to implement joint actions between the PT operator, the Police and the Justice

**Measure 7.3 Intermodal local/regional transport interchanges**
The significant barriers are:
- the too great number of stakeholders on this file.
- Heavy administrative procedures requiring multiple validations
- Times of instruction of the land files, the tender files
- The follow-up of the obligations in terms of health and labour regulations

For Armentières, a great difficulty was due to the requirement to manage the interchange at the same time as a complete requalification operation for the sector (with construction of cultural residences and equipment): the deadlines, the problems and the stakes of these two files being different, coordination is difficult. The progress of the interchange must sometimes wait for the progress of the requalification of the district to avoid doing work twice.
In addition, the regulation imposes that an additional control comes to follow the realization of these 2 operations, which complexifies even further the follow-up.
Measure 7.4 Seamless linkage of modes
Andritz (interchange):
- Personal commitment and power of individuals
- No disadvantages were feared by local business
- Simultaneous wish of city and district to upgrade the endstop into a local centre.
- Architectural design-competition and visualisation of the future shape.
Mariatrost (P&R)
- Compromise and not pushing through the biggest solution
Liebenau, Puntigam:
- Clever cooperation with other projects
- Public private partnership

Measure 7.5 Customer friendly stops for bus and tram
There was unfortunately no budget set aside to provide for PT marketing profiting from the newly provided service quality.

Measure 7.6 Park and Ride facilities
Technical and economic analysis is required to motivate further investments. At this stage, such elements are in favour of further development of Park & Ride solutions.

Measure 7.7 Linking different ways of public transport
Apart from the lack of financial funds the main barrier of the implementation of a new type of transport service were traffic-related problems as well as difficulties of technical nature resulting from necessary modifications of the proposed route, particularly with respect to traffic signs in favour of smooth flow of bus traffic and with respect to minor technical problems and property rights-related problems in connection with installation of lighted stop posts. We think that such problems are usual by-products accompanying introduction of new lines in general and these were continuously resolved and had no adverse impact on the commencement date. A driving force of the measure implementation was particularly the commitment to achieve successful implementation of the proposed measure. Such commitment was clearly shown by all actors involved.

13.2 Technical barriers and drivers
There are no major technical barriers.

13.3 Political and administrative barriers and drivers
These relate essentially to the necessity of inserting measures in the complete context and coordinating a large and complex variety of stakeholders involved in public passenger transport.

13.4 Economical barriers and drivers
The main economical barriers and drivers relate to the following issues:
- Some investments are very heavy, even if depreciated on long time periods.
- Decisions may require progressive implementations
- Decisions must often be validated by pilots, to demonstrate economic feasibility and viability.
14. Lessons to Consider for Replication and Take-up by Other Cities

14.1 General description of replication potential for each measure

Measure 7.1 Increasing public transport passengers

Travel Guarantee seems as a huge success. If a transport provider has image problems where customers do not appreciate what is being done but getting criticised for the things going bad, introducing a guarantee may be the solution. SL has to pay 4 millions per year but have the apprehension that marketing campaigns reaching the same goodwill would be more expensive.

Focus on selected groups when marketing. The information can be directed in a way that will increase the possibilities for the campaign to be a success.

Be aware of how important it is to be updated of what the customer wishes for and need. The information can be used in campaigns as well as in changes in infrastructure and general information.

Measure 7.2 Public transport security

Replication of this measure shall be considered on a case to case basis, paying high attention to the following issues:

- Technical: optimal position implementation of intervention fleet and common tools and procedures with police and justice
- Economical: consideration of the cost of non-security vs. security while validating investments
- Political: set up the legal framework for cooperation between all the stakeholders involved - PT operator(s), police and justice

Measure 7.3 Intermodal local/regional transport interchanges

It is necessary to manage in priority the transfer of property, if ground is to be acquired. In the case of the interchanges, the only ground available was next to the site. There is not another choice; this property thus has a great value on which it is very difficult to negotiate.

Measure 7.4 Seamless linkage of modes

Use step-by-step strategies to proceed from smaller to big solutions according to the actual demand

Create synergies to other (private) projects

Measure 7.5 Customer friendly stops for bus and tram

Evaluate the expert plans by groups of customers e.g. disabled persons.
**Measure 7.6 Park and Ride facilities**
Political willingness is at the basis of such extensive plans for Park & Ride

**Measure 7.7 Linking different ways of public transport**

14.2 Technical issues
There are no particular technical issues that show critical elements for replication purposes.

14.3 Political and administrative issues
Political issues to be considered for replication essentially relate with the 2 major aspects:
- Political willingness to push a measure to well argumented and evaluated objectives
- Prior validation of the complete legal framework to facilitate the decision making of a large and complex variety of stakeholders.

14.4 Economical issues
Main economical issues to be considered for replication essentially relate to:
- In depth analysis of costs need to take into account the global economic impact, beyond the sole public passenger transport level. This sometimes show clearly that there is a higher cost NOT to implement a measure
- Land is often an issue in urban environments, in terms of price, property, management etc.
15. Recommendations to EC and Other Actors

15.1 Specific recommendations from the measures

Measure 7.1 Increasing public transport passengers
Not applicable in this measure.

Measure 7.2 Public transport security
Feeling of security and safety is a major driver for the attractiveness of PT operations. Investments related with improvement of security and safety are partially or totally compensated by the results, when analysed at the whole community level and not only through the PT operation part.

Measure 7.3 Intermodal local/regional transport interchanges
Important political willingness is necessary to incentive mode change from private car to public transport.

Measure 7.4 Seamless linkage of modes
Park and Ride lots are much more successful if there is a direct connection to a tramline, than the connection with a shuttle service.
Points of interchange like Andritz should also perform as a local centre in order to attract more PT-customers.

Measure 7.5 Customer friendly stops for bus and tram
In Austria PT systems within the cities have to be financed mainly by the cities themselves. Funding often does not get to where they are needed (this is solved in a better way in Germany, where responsibility AND funding for transport is given to the regions). This results in a lack of funding for the cities PT, and of smaller scale projects on the local level.
Funding of PT should be long-term dedicated to projects for the city and its surroundings. A continuous support of the cities is also needed in Austria.

Measure 7.6 Park and Ride facilities
Important political willingness is necessary to incentive mode change from private car to public transport

Measure 7.7 Linking different ways of public transport

15.2 General recommendations from the workpackage

Main recommendations can be summarized in 3 aspects:
- Funding: subsidies and financial support can be sometimes the spark to allow decisions to be made. It also sometimes allow demonstrations which are instrumental in the deployment decisions. However, it is clear that decisions cannot be made on the basis of subsidies only.
- The support from EC is giving authority and credibility to coherent programmes, facilitating the consensus and the decision making
- The image of collective programmes is normally high and positive.
## Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
</tr>
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<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.1</td>
<td>Widening of the Environmental Zone</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
<td>Prague</td>
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<td></td>
<td></td>
<td>5.6</td>
<td>Congestion charging</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Strolling zones</td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
<td>Graz</td>
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<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
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<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
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<tr>
<td>WP6 Integrated Pricing Strategies</td>
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<td>6.1</td>
<td>Smart card systems and integrated ticketing</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
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</tr>
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<td></td>
<td>Parking</td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>6.4</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td>Establishment of a zone-model parking in the central city area</td>
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<td>WP7 Public Passenger Transport</td>
<td>Information to passengers</td>
<td>7.1</td>
<td>Increasing public transport passengers</td>
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<tr>
<td></td>
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<td>7.5</td>
<td>Customer friendly stops for bus and tram</td>
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<td>Public transport safety</td>
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<td>7.3</td>
<td>Intermodal local/regional transport interchanges</td>
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<td></td>
<td>7.4</td>
<td>Seamless linkage of modes</td>
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<td>7.6</td>
<td>Park and Ride facilities</td>
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<td>7.7</td>
<td>Linking different ways of public transport</td>
<td>Prague</td>
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<tr>
<td>WP8 New Forms of Vehicle Use</td>
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<td>8.1</td>
<td>New services and services for special customer groups</td>
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<td>Company mobility plan in the administration fleet</td>
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<td>8.3</td>
<td>Increasing car occupancy</td>
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<td>Awareness rising</td>
<td>8.4</td>
<td>Site level Mobility Management</td>
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<td>WP9 New Concepts for the Distribution of Goods</td>
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<td>Material logistic centre – to optimise freight deliveries at construction site</td>
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<td>Distribution of goods - Green city logistics</td>
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<td>Logistic centre for Old Town of Stockholm</td>
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<td>WP 10 Innovative Soft Measures</td>
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<td>Innovations in bicycle transport</td>
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<td></td>
<td>10.2</td>
<td>Make bicycling attractive (B&amp;R information on the Internet)</td>
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<td>Trip planning</td>
<td>10.3</td>
<td>Creation of a visitor web for optimal trip planning</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>10.5</td>
<td>Marketing/information and quality management</td>
<td>Graz</td>
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<td></td>
<td>Awareness of clean transport and safety</td>
<td>10.6</td>
<td>Awareness for speed reduction and less car use</td>
<td>Graz</td>
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<tr>
<td></td>
<td></td>
<td>10.4</td>
<td>Taxi drivers as information multipliers for clean transport</td>
<td>Graz</td>
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<tr>
<td>WP 11 Integration of Transport Management Systems</td>
<td>Traffic information</td>
<td>11.2</td>
<td>Traffic monitoring and supervision</td>
<td>Stockholm</td>
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<tr>
<td></td>
<td></td>
<td>11.3</td>
<td>Dynamic traffic management system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11.4</td>
<td>Accessible road network (street) data</td>
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<td></td>
<td>Improving PT traffic flow</td>
<td>11.5</td>
<td>More adaptive signal control in a bus priority system</td>
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<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
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<td>11.7</td>
<td>High level service bus routes</td>
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<td></td>
<td></td>
<td>11.1</td>
<td>Technical basis for an efficient customer focussed operation and information</td>
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<td>WP 12 Clean Public and Private fleets</td>
<td>Heavy vehicles</td>
<td>12.1</td>
<td>Clean and efficient heavy vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.2</td>
<td>Biogas bus fleets</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>12.3</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.6</td>
<td>Waste collection with biogas-vehicles</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>12.4</td>
<td>Clean municipal fleets</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.5</td>
<td>Clean municipal fleets</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.7</td>
<td>Bio-diesel taxi fleet and bio diesel service station</td>
<td>Graz</td>
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<tr>
<td></td>
<td></td>
<td>12.11</td>
<td>Making Clean Vehicles less expensive</td>
<td>Stockholm</td>
</tr>
<tr>
<td></td>
<td>Clean fuel distribution</td>
<td>12.8</td>
<td>Optimisation of the bio-diesel collection system</td>
<td>Graz</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 2 – Trendsetter cities

Four cities among the 5 of Trendsetter effectively participate to WP7. Stockholm and Prague, 2 capital cities of the European Union and Lille and Graz, two regional capitals of different size. They show each a particular context, allowing the necessary diversity of application environments to allow conclusive experiments and replication strategies.

Stockholm context

AB Storstockholms Lokaltrafik (SL) is the Public Transport Authority in Stockholm. SL has the task to offer public transport services to people living and working in the County of Stockholm. SL is responsible for the extent, planning and development of public transport as well as for the administration of transport facilities, determination of the output of transport and pricing in accordance with the owners’ decisions. During an average weekday, over 600 000 passengers’ travel by using buses, trams, suburban trains, commuter trains and the underground.

SL is owned by the County of Stockholm, which is the body responsible for the common concerns of the population with respect to medical care and public transport within the County.

Transport operations is conducted entirely with the aid of appointed traffic contractors.

Partners in Stockholm

There are seven partners within Trendsetter Stockholm:
- City of Stockholm, Environment and Health Administration (MF)
- Stockholm Transport (SL)
- Swedish National Road Administration, Stockholm Region (SNRA)
- Stockholm Real Estate and Traffic Administration (GFK)
- Statoil Detaljhandel AB (Statiol)
- AGA Gas AB (AGA)
- Home 2 You AB (H2U)

Demonstration measures

The partners in Stockholm will implement twenty different measures within Trendsetter

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Other partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>Widening of the Environmental Zone</td>
<td>GFK MF</td>
</tr>
<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
<td>Congestion charging</td>
<td>MF</td>
</tr>
<tr>
<td>WP7 Public Passenger</td>
<td>Parking</td>
<td>Reduced parking fees to promote clean vehicles</td>
<td>MF</td>
</tr>
<tr>
<td>WP8 New Concepts for the Distribution of Goods</td>
<td>Logistic centre for Old Town of Stockholm</td>
<td>MF</td>
<td></td>
</tr>
<tr>
<td>WP9 Innovative Soft Measures</td>
<td>Bicycle measures</td>
<td>Make bicycling attractive</td>
<td>SNRA</td>
</tr>
<tr>
<td>WP10 Integration of Transport Management Systems</td>
<td>Trip planning</td>
<td>Creation of a visitor web for optimal trip planning</td>
<td>SNRA</td>
</tr>
<tr>
<td>WP11 Clean Public and Private fleets</td>
<td>Heavy vehicles</td>
<td>Clean and efficient heavy vehicles</td>
<td>MF</td>
</tr>
<tr>
<td>Light vehicles</td>
<td>Waste collection with biogas vehicles</td>
<td>MF</td>
<td></td>
</tr>
<tr>
<td>Clean municipal fleets</td>
<td>Increasing clean vehicle use in private company fleets</td>
<td>MF</td>
<td></td>
</tr>
<tr>
<td>Measure fused with 12.11</td>
<td>MF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure fused with 12.12</td>
<td>MF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure fused with 12.13</td>
<td>MF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure fused with 12.14</td>
<td>MF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measure fused with 12.10</td>
<td>MF</td>
<td>AGA and Statiol</td>
<td></td>
</tr>
</tbody>
</table>

The figure below illustrates the organisation in City of Stockholm.
Geographical context

As shown in the picture above, the measures in Stockholm are demonstrated on different spatial scale. Some are demonstrated on regional level, some on municipal level and other on smaller parts within the city.

Map with an overview of all Stockholm’s measures
**Lille Context**

The public transport activities in Lille Metropolis are placed in a specific legal context:

- the law on the air of December 1996 which recognizes to anyone the right to breathe an air which does not harm its health.
- The Urban Mobility Plan (PDU) adopted by LMCU in June 1999 which aims to limit pollution of the cities by supporting the development of the alternative modes.

In addition to the development of the collective transport system, the PDU recommends to improve the railway offer between Lille and the large cities and encourages the creation of multimodal interchanges for urban transport.

In order to obtain a coherent, balanced and readable urban environment, all the actions carried out in the city must contribute to the improvement of the connections in collective transport and to the opening on the Lille metropolis which is in the heart of a network connecting six European capitals (Brussels, Bonn, the Hague, London, Luxembourg and Paris).

**Partners in Lille**

There are two partners within Trendsetter Lille, as described in the accepted Inception Report:

- Lille Metropole (LMCU)
- Syndicat Mixte des Transports (SMT)

Other partners involved in Trendsetter under the coordination of Lille are very numerous: organizing authorities of transport (Lille metropolis Urban Community + Nord/Pas-de-Calais Area + Department of North), transport operators (the SNCF, RFF, Transpole), towns, energy agency (Ademe), …
Demonstration measures

The partners in Lille will implement ten different measures within Trendsetter, described in detail in the Inception Report and in subsequent documents:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of measures</th>
<th>Measure N°</th>
<th>Measure description</th>
<th>Measure leader</th>
<th>Other partners</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP6 Integrated pricing strategies</td>
<td>Smart Card Systems</td>
<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>PT safety</td>
<td>7.2</td>
<td>Public Transport Safety</td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PT intermodality</td>
<td>7.3</td>
<td>Intermodal local/regional transport interchanges</td>
<td>LMCU</td>
<td>SMT</td>
</tr>
<tr>
<td></td>
<td>Park &amp; Ride facilities</td>
<td>7.6</td>
<td></td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td>WP8 New forms of vehicle use</td>
<td>Car pooling/sharing</td>
<td>8.2</td>
<td>Company Mobility Plan in the administration fleet</td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Awareness raising</td>
<td>8.5</td>
<td>Urban Mobility Plan</td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td>WP11 Integration of Transport Management Systems</td>
<td>Improving PT traffic flow</td>
<td>11.7</td>
<td>High Level Service Bus Routes</td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td>WP12 Clean Public and Private Fleets</td>
<td>Heavy vehicles</td>
<td>12.2</td>
<td>Biogas Bus Fleets</td>
<td>LMCU</td>
<td>SMT</td>
</tr>
<tr>
<td></td>
<td>Light vehicles</td>
<td>12.5</td>
<td>Clean Municipal Fleets</td>
<td>LMCU</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Clean Fuel distribution</td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>LMCU</td>
<td>SMT</td>
</tr>
</tbody>
</table>

The working organisation involves two partners:
LMCU (Lille Métropole Communauté Urbaine), the Lille Metropolis Authority, and SMT (Syndicat Mixe des Transports), the local Transport Authority. Which brings together LMCU and the Département of Nord.

Lille operational organisation

![Lille operational organisation diagram](image)

Picture 1 Organisation in City of Lille.
Geographical context

Marquette
Biogas from sludge (12.9)

Armentières
Intermodal Interchange (7.3)

Sequedin
Depôt for Biogas buses (12.2)

Sequedin (ORC)
Biogas from organic waste (12.9)

Don Sainghin
Intermodal Interchange (7.3)

P&R St Philibert (7.6)

P&R Champ de Mars (7.6)

Safety command Center (7.2)

HLS bus lane Citadine (11.7)

P&R Porte de Valenciennes (7.6)

P&R CHR Calmette (7.6)
**Synergies between measures**

The measures in Lille Metropolis are included in a 20 year+ plan for the optimisation of the Public Transport environment, supported by local, regional and national Authorities.

The figure below illustrates the organisation of the measures according to the high level objectives of the Lille Metropolis (one measure may address several objectives)

<table>
<thead>
<tr>
<th>Objectives organisation in Lille</th>
<th>Double the yearly Public Transport trips from 100 M in 1998 to 200 M in 2015</th>
<th>Promote alternatives to the use of private cars</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increase PT attractiveness</strong></td>
<td>6.2</td>
<td>12.2</td>
</tr>
<tr>
<td></td>
<td>7.2</td>
<td>11.7</td>
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<tr>
<td></td>
<td>7.3</td>
<td></td>
</tr>
<tr>
<td><strong>Intermodality and Fare Integration</strong></td>
<td>7.5</td>
<td></td>
</tr>
<tr>
<td><strong>Increase PT efficiency</strong></td>
<td>7.6</td>
<td></td>
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<tr>
<td></td>
<td>8.2</td>
<td></td>
</tr>
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<td></td>
<td>7.8</td>
<td></td>
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<td><strong>PT operation</strong></td>
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<td></td>
</tr>
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<td></td>
<td>8.9</td>
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<tr>
<td><strong>Increase PT environment friendlyness</strong></td>
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<td></td>
<td>11.7</td>
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<tr>
<td><strong>Alternatives to the use of private cars</strong></td>
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<td>11.7</td>
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<td>12.9</td>
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<td></td>
<td>12.5</td>
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</tbody>
</table>

There will be therefore high synergy effects when implementing sets of measures. The synergy effects will be taken into account when evaluating the measures.

It is also important to note that many indicators are global, and the individual contribution of each measure cannot be detailed.
### Graz Context

#### Partners in Graz

There are eight partners within Trendsetter Graz:
- City of Graz (Graz)
- Spedition- und Internationale Transport GmbH (ITG)
- Public Transport Company of Graz (GVB)
- Taxi Group 878 Cityfunk Ltd (Taxi878)
- Styrian Transport Association, STVG Ltd (STVG)
- Erlach Consulting & Engineering (ECE)
- Province of Styria (LAND)
- Austrian Mobility Research (FGM-AMOR)

#### Demo measures

The partners in Graz will implement seventeen different measures within Trendsetter.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure owner</th>
<th>Other partners</th>
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<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Strolling zones</td>
<td>5.3 Implementation of strolling zones</td>
<td>Graz</td>
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</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>Information to passengers</td>
<td>7.5 Customer friendly stops for bus and tram</td>
<td>GVB</td>
<td>Graz</td>
</tr>
<tr>
<td>WP8 New Forms of Vehicle Use</td>
<td>Car pooling/sharing</td>
<td>8.3 Increasing car occupancy</td>
<td>Graz</td>
<td>LAND</td>
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<tr>
<td>WP9 New Concepts for the Distribution of Goods</td>
<td>Bike measures</td>
<td>10.1 Innovations in bicycle transport</td>
<td>Graz</td>
<td>FGM-AMOR</td>
</tr>
<tr>
<td>WP10 Innovative Soft Measures</td>
<td>Traffic planning</td>
<td>10.5 Marketing Information and quality management</td>
<td>GVB</td>
<td>STVG and FGM-AMOR</td>
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<tr>
<td>WP10 Innovative Soft Measures</td>
<td>Awareness of clean transport and safety</td>
<td>10.6 Awareness for speed reduction and non car use</td>
<td>Graz</td>
<td>FGM-AMOR</td>
</tr>
<tr>
<td>WP11 Integration of Transport Management</td>
<td>Traffic information</td>
<td>11.1 Dynamic traffic management system</td>
<td>Graz</td>
<td>FGM-AMOR</td>
</tr>
<tr>
<td>WP12 Clean Public and Private Fleets</td>
<td>Heavy vehicles</td>
<td>12.1 Clean and user friendly biocatalytic bus fleet</td>
<td>GVB</td>
<td>Graz</td>
</tr>
<tr>
<td>WP12 Clean Public and Private Fleets</td>
<td>Light vehicles</td>
<td>12.2 Biocatalytic taxi fleet and biocatalytic service station</td>
<td>Taxi878</td>
<td></td>
</tr>
</tbody>
</table>

The figure below illustrates the organisation in City of Graz.

![Organisation in City of Graz](image)

*Picture 2 Organisation in City of Graz*
**Prague context**

Large locality in the city centre with narrow streets and a great number of medical centres and facilities (hospitals, clinics) with no public transport services available.

Actors: DP Praha,a.s. (Prague Public Transit Co. Inc.), Transport Department of Prague City Council (DOP MHMP), Police of the Czech Republic, Metroprojekt, ROPID (Regional Organizer of Prague Integrated Transport), City Police, Municipal District Authority of Prague 2, General Teaching Hospital, Technical Road Administration (TSK), ELTODO

Integration: the new city-bus line integrated into Prague Integrated Transport (PID) system, including tariff measures

**Partners in Prague**

There is one partner within Trendsetter Prague:

- City of Prague

**Demonstration measures**

The partner in Prague will implement three different measures within Trendsetter

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure Description</th>
<th>Project owner</th>
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<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
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</tr>
<tr>
<td>WP7 Public Passenger Transport</td>
<td>PT intermodality</td>
<td>7.7</td>
<td>Linking different ways of public transport</td>
<td>Prague</td>
</tr>
<tr>
<td>WP11 Integration of Transport Management Systems</td>
<td>Improving PT traffic flow</td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
</tbody>
</table>

The figure below illustrates the organisation in City of Prague
Geographical context

Picture 3 Organisation in City of Prague.
### Appendix 3 – Wordlist

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
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</thead>
<tbody>
<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
</tr>
<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
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<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
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<td>EC</td>
<td>European Commission</td>
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<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
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<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
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<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS- – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
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<td>Resekortsföreningen I Norden -</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
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<td>SL</td>
<td>Stockholm Transport</td>
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<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l’Integration Reseaux et des Tarifs</td>
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<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDSSETER</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.</td>
</tr>
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<td>WP</td>
<td>Work Package</td>
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The European project Trendsetter involves 50 individual projects, all of which aim to; improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union. Read more about Trendsetter at www.trendsetter-europe.org. Read more about the Civitas project at www.civitas-initiative.org
Evaluation Report – Transport Management (WP11)

June 2006

Trendsetter Report No 2005:9

Trendsetter External Deliverable No 4.3g
Contract No: NNE-2001-00323

**Contractors**
1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
7. Swedish National Road Administration, Stockholm Region
8. Stockholm Real Estate and Traffic Administration
9. Public Transport Company of Graz
10. Taxi Group 878 Cityfunk Ltd
11. Styrian Transport Association, STVG Ltd
12. Erlach Consulting & Engineering
13. Province of Styria
14. Austrian Mobility Research
15. City of Pécs
16. Pecs Municipal Operations and Property Management Company
17. Syndicat Mixte des Transports
18. Statoil Detaljhandel AB
19. AGA Gas AB
20. Home 2 You AB

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PART A – Report Summary

TRENDSETTER
The spontaneous development of transport in Europe is not sustainable. For changing this, an integrated approach is needed. TRENDSETTER involves 50 individual projects, all of which aim to improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate, Stockholm, Graz, Prague, Lille and Pecs, to ensure real impact by setting good examples and encouraging others to follow. TRENDSETTER is one of four demonstration projects within the EU-supported Civitas I initiative.

WP 11 Integration of Transport Management Systems
Within work package 11, Integration of Transport Management Systems, problems regarding information support have been solved and measures within traffic management and control have been developed. The measures have been divided into two subgroups;

- Traffic information and control
- Improving public traffic flow.

The measures have led to increased access to in-data through implementation of new technology. In-data is the solid ground for efficient management of the road transport system. This had led to better traffic flow and positive environmental effects. Increased access to information also provides the basis for traffic information services to develop and be more used. This can in turn lead to further positive environmental effects.

The new technologies provided within the measures also give possibility to decide which mode to control. The bus priority systems used in Stockholm and Prague can as example be used as a tool to control the bus traffic towards the set goals. The buses can e.g. not only be prioritised, but also stopped if i.e. three buses come too close to each other. The aim is to achieve regularity.

With an efficient traffic management system the road operator can meet goals set by the politicians regarding traffic levels within the city centre, emission levels etc.

- Traffic information and control
  
  Objective: To optimize the transport net
  ⇒ Better traffic flow
  ⇒ Environmental effects

- Improving public traffic flow
  
  Objective: Efficiently organize the public transport
  ⇒ Better traffic flow
  ⇒ Increased quality
  ⇒ Environmental effects
Measures within WP 11

Technical basis for an efficient customer focussed operation and information, Graz (11.1)

The aim of the measure is to achieve an overview of the traffic situation, so the traffic can be managed and controlled. The measure will be managed by a renewed control centre, on board computers on trams and buses, real time information signposts and on board information on trams and buses.

A better flow of public transport increases the emissions and improves the attractiveness of it. One way of achieving this is traffic management and control.

The process of implementation is not fully completed. Slight adaptation activities are still ongoing especially concerning stability of the system and passenger information.

The effects of the measure are:

- Energy use: -5.77 TJ/year
- Emission of fossil CO2: -241 tons/year
- Emissions of NOx: -0.96 tons/year
- Emissions of PM: -0.068 ton/year

Traffic monitoring and supervision, Stockholm (11.2)

When traffic can be managed and controlled, the traffic flow can be improved and environmental effects achieved. The measure has implemented a platform for traffic forecasts, MatriX, which will be used for supervision, management and control.

In order to predict the traffic and control in the best way possible, several means of data sources are used in the multi-modal transport model. These will be connected to automatic or operator control applications e.g. lane closure, speed advise and traffic signals. MatriX does not lead to any environmental effects itself, but the access to information is a solid ground for efficient management of the road transport system. MatriX has potential to be an important piece in the whole chain of efficient traffic management.

The effects of the measure are:

- Energy use: + (reduction)
- Emission of fossil CO2: + (reduction)
- Emissions of NOx: + (reduction)
- Emissions of PM: + (reduction)
- Mobility: ++ (reduction)

The five-degree Trendsetter index is used (-- / - / 0 / + / ++).

Mobility contains four different parts; Number of detected trips (+), Travel time (+), Quality of service (delayed) and Acceptance (+).
**Dynamic traffic management system, Graz (11.3)**

The measure is not implemented yet due to delays.

A dynamic traffic management system will be implemented. The measure will be implemented in order to get an overview of the traffic situation so it can be managed and controlled. This will lead to a better traffic flow and environmental effects. Data from various sources will be collected and the information will be distributed in different channels. This is done in order to achieve:

- Online overview presentation of the current traffic situation
- Strategic control/management of traffic
- Acceleration of PT
- Information management

**Accessible road network (street) data, Stockholm (11.4)**

When data is linked together the access to the information will increase and data needed for basic analyses can easily be brought out. The increased access to information also expects traffic information services to develop and be more used. This can in turn lead to positive environmental effects.

Within the measure an IT-based road network model has been implemented to which data that the Traffic administration in Stockholm wants to make available can be linked and thereby easily accessed. The information linked has got a geographical position. For facilitating integration between different systems so data can be shared, the platform has been built with technology that can be used by different kinds of systems.

The effects of the measure are:

- Energy use -21 TJ/year
- Emission of fossil CO₂ -2000 tons/year
- Emissions of NOₓ -9 tons/year
- Emissions of PM -0,15 ton/year
- Mobility* +

*The five-degree Trendsetter index is used (- - / - / 0 / + / ++). Figures without parenthesis indicate short-term effects, figures with parenthesis indicate long-term effects.

More accessible data provides the basis for traffic information services to develop and be more used

**More adaptive signal control in a bus priority system, Stockholm (11.5)**

In order to increase the traffic flow of public transport, a more adaptive bus priority system has been installed in Stockholm.

The more adaptive signal control system has been installed at 11 intersections and compared with an existing one. The new system has increased the reliability and attractiveness of the bus service, reduced the queuing and thereby the pollution.
The effects of the measure are:

- Energy use: -5 TJ/year
- Emission of fossil CO₂: -400 tons/year
- Emissions of NOx: -0.8 tons/year
- Emissions of PM: -0.5 ton/year
- The mobility is estimated to increase due to reduced travel times and increased quality of service.

The measure has shown that the potential of local emission control is large. The number of stops is reduced and the speed is increased by approximately 15-20%, i.e. completely new vehicle trajectories.

**More adaptive signal control in a bus priority system, Prague (11.6)**

In order to increase the traffic flow of public transport, a more adaptive bus priority system has been implemented and demonstrated in Prague.

The new system has increased the reliability and attractiveness of the bus service, reduced the queuing and thereby the pollution. The reliability of the bus service is 100 per cent. All measured buses have driven within valid tolerance according to timetables. The commercial speed has increased as well as the number of trips with public transport. The quality of service of the public transport has the highest grade (++) in the five-degree Trendsetter index. The measure has also shown some environmental effects.

The effects of the measure are:

- Energy use: -3,358 GJ/year
- Emission of fossil CO₂: -0.029 tons/year
- Emissions of NOx: -0.066 tons/year
- Emissions of PM: -0.001 ton/year
- Mobility*: ++

*The five–degree Trendsetter index is used (-- / - / 0 / + / ++). Mobility contains three different parts; Number of trips¹, Travel time², Quality of service³.

The evaluation is made after the system has been extended with five traffic lights at crossroads that are linked with timetables. Priority is required mainly by buses running behind time.

The measure is a good example of how limited investments can give good results.

**High level service bus routes, Lille (11.7)**

A changeover to more sustainable transport modes is a part of the approach for reaching a sustainable transport system. The measure has improved the attractiveness of public transport and reduced the car traffic and emissions in the city centre. This has been achieved by:

- Construction of bus lanes on the existing roads (less place for cars)
- A bus location system to give buses priority at junctions, so they can drive more frequently and speedily.

¹ May 2003: 25/h. November 2004: 70/h
² May 2003: -00:26. November 2004 –00:16
³ May 2003: PT+ Car 0. November 2004: PT++ Car 0
• A higher commercial quality i.e. better accessibility for the customers, layout changes of bus stops and interchanges and better timetable and journey information.

The effects of the measure are*:

• Energy use - 1 850 GJ/year
• Emission of fossil CO₂ - 130 tons/year
• Emissions of NOx - 300 kg/year
• Emissions of PM - 7 kg/year
• Mobility 20% reduced travel time, 12 000 passengers/day

Connected to three P&R facilities

* Data of the high level bus route “Citadine”. It is important to note that this route is short. When the total 12 routes are implemented the effects will be much higher 12 times these results.

Overall results

• New systems for traffic management have been implemented and demonstrated.
  New transport management systems have been set up for enabling better management tools, and bus priority systems have been implemented.

  A traffic management system is a good tool for reaching goals regarding congestion, emissions and traffic volume. For example, well-tuned traffic signals are very efficient to reduce congestion. Traffic signals giving priority to public transport is also a successful, easy and quite cheap measure. It is cheaper to implement traffic management systems than investing in new roads, but communication and operation costs can be high.

• End users have benefit of the improved information systems.
  Several of the measures within the WP don’t give any effects itself, but improve other applications.

• Fuel consumption, emissions and noise have reduced, and a modal shift to sustainable transport modes have been achieved.
  Several of the measures within the WP don’t give any environmental effects itself, but improve other applications which i.e. can reduce the fuel consumption more.

• Best practice examples and strategies have been provided to follower cities
• Input to European policy making have been provided
• Public transport have been promoted
Lessons to Consider for Replication and Take-up by Other Cities

- Traffic management systems are recommended in larger cities where different sub-systems need to be coordinated.

- There are risks for increased traffic when congestion decreases. Sticks and good traffic management systems are needed to prevent this.

- Organizational aspects
  Increased systems for traffic management and control will change the work within the transport system area. A paradigm shift/mind shift is needed in organizations, for being able to see and work with the possibilities of the new systems. It is important with an organisation that supports good cooperation and operation between stakeholders, who need to focus on the possibilities with the new system instead of focusing on building roads and doing maintenance on them.

  Public transport and commercial fleet owners benefit directly from supervising their fleets while road administrations do not have the same economic incentive. Cooperation between these players is recommended to achieve a well-functioning system.

- Lack of support- internally and externally
  Support is important when new systems are developed. It can work as a driver, while lack of it can be a barrier. Peoples doubts of systems used, i.e. MatriX, have been a barrier.

- Experience from earlier projects and successful implementations
  Within all measures in work package 11, experience from earlier projects and successful implementations have acted as good examples and drivers. With reused information time and money have been saved. As example, the MatriX system originates from earlier EU-funded projects. A lot of knowledge has been re-used, and time and money could instead be spent on further development. Experience within Trendsetter has also been used, i.e. interaction between measure 11.5 in Stockholm and 11.6 in Prague (More adaptive signal control in a bus priority system).

- Synergy effects
  Measures carried out as part of a greater whole have had synergy effects and been a great driver, as example efforts on comprehensive plans and work prospecting the Cultural Capital in Graz and ongoing projects matching the Trendsetter objectives in Lille. Projects affecting each other are however not always positive. You must be aware of how different measures can affect each other and take action of that. The effect can then be positive instead of negative.

- Political opposition or support- crucial barrier or driver
  Political opposition or support can be the crucial barrier or driver for a measure. Politicians must also be informed about problems that need to be taken care of. Brave politicians are needed for showing the way foreword.
• Media as a strategy for introducing the measures
  Media has been used in some measures as a strategy for introducing the measures. Information has thereby reached the public as well as professionals. For example newspapers in Lille has been supportive and written about new transport activities as well as Metro in Prague that reach 100 000 readers every day.

• Also small scale measures give results - i.e. a few crossings with bus priority

Recommendations to EC and Other Actors

• Policy work
  Policy work can work as a starting point/stick. It can also create a greater whole in projects, which benefit synergy effects.

• Interoperability
  Different sub-systems have to be able to work together when connected to a larger traffic management system. Open interfaces, open specifications and good documentation are essential variables to ensure this. It is then possible to co-operate and integrate systems. It is however often against vendors interest.

• Re-use output
  Re-use of output from earlier projects is a way of saving money, resources and time.

• Common understanding
  A common understanding of the usefulness of the measure is important for a successful implementation phase. Jointly planning and financing of the measure is one way for achieving this.

• Support
  Support projects such as TRENDSETTER as they serve well as drivers for projects on local level. The cities cannot easily cut the budgets of EU-supported measures. The measures will then be carried out. The measures carried out can also give synergy effects.
PART B – Common Trendsetter introduction

1. Introduction

1.1 Background
Satisfying mobility for both people and goods is essential for the vitality of our cities, and a well functioning transport system is vital for a good life in the city. However, increased traffic may actually decrease mobility when people and goods get stuck in congestion. Increasing emissions and noise levels threaten citizens’ health and make the cities less attractive. In the long term, the issues of climate change and energy scarcity also puts a demand to ameliorate the negative sides of traffic, while keeping the flow of people and goods high.

The Trendsetter project – one of four projects financed by the Civitas I Initiative – has tackled these problems. By setting good examples, the five participating cities Graz, Lille, Pécs, Prague and Stockholm can inspire other cities and show them how to facilitate sustainable mobility. Trendsetter also shows that by following our examples, cities can meet the Kyoto and EU goals for emissions.

Trendsetter has implemented 52 specific measures in different thematic areas that complement and reinforce each other. Advanced mobility management schemes and clean vehicle fleets are among these measures. The project has also promoted the use of public transport, other alternatives to private cars and showed new ways to improve goods logistics and efficiency. Furthermore, Trendsetter has increased the acceptance for bio-fuels among citizens and encouraged operators, politicians and social groups to use innovative, low-noise and low emission technology.

Trendsetter and other European projects have shown efficient ways to reduce car use, introduce clean vehicles and make public transportation efficient and thus make European cities healthier, less energy demanding, less oil dependent and more attractive.

There are immense efforts going on within Europe to implement measures for achieving sustainable transport systems and societies. Lessons learned in Trendsetter cities can serve as a toolbox for ambitious followers.

1.2 Trendsetter – a part of the Civitas Initiative
The CIVITAS Initiative (CIty-VITAlity-Sustainability) addresses the challenge to achieve a radical change in urban transport through the combination of technology and policy based instruments and measures.

Within CIVITAS I (2002-2006) 19 cities were clustered in 4 demonstration projects, while 17 cities in 4 demonstration projects are taking part in CIVITAS II (2005-2009). The EC supported CIVITAS I within the 5th Framework Research Programme. CIVITAS II within the 6th Framework Research Programme.

The key elements of CIVITAS;

- CIVITAS is co-ordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
• Political commitment is a basic requirement
• Cities are living ‘Laboratories’ for learning and evaluating

The overall objectives of the Civitas Initiative are:
• to promote and implement sustainable, clean and (energy) efficient urban transport measures
• to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
• to build up critical mass and markets for innovation

Each city implement a policy-mix based upon the categories of measures that are the backbone of the CIVITAS initiative. The policy-mix chosen by each city differs. Although aiming for the same result, each takes into account specific local circumstances.

The five Trendsetter cities are briefly described in appendix 1.

1.3 Achievements within Trendsetter
Working within Trendsetter has given the participating cities a chance to learn from each other and compare practices. Trendsetter has helped the cities to implement local projects, to show this work to other cities and to show Europe what cities can achieve. Not only has the cooperation between the cities been rewarding – the cities’ own local work and institutional networks have also been developed and strengthened through the European
dimension. Because of the overall Trendsetter framework, local work has been more structured and well planned in some cases. It has also been easier to create momentum for innovative ideas within an EC-financed project.

**Improving access to public transport**

All Trendsetter cities have made large efforts to improve the public transport system in order to attract more passengers. Some of the measures have aimed at improving the access to public transport, and others to facilitate trip planning for smartest choice.

Lille has improved the safety and security of their public transport system, using both technical equipment and additional personnel. Lille also implemented integrated fares in the region. Both Stockholm and Lille have prepared for an implementation of a smart card system. The improved safety and security, the fare integration system, Park&Ride facilities, creation and improvements of multimodal nodes and the implementation of high level of service bus lanes support an increased use of different forms of public transport in Lille.

In Graz, 60 bus and tram stops, situated at important junctions, were rebuilt and improved to make them more customer-friendly. Both Stockholm and Graz have increased the quality of services in the public transport system by using regular quality surveys, real-time information at bus stops and on the Internet, a travel guarantee for delays, mystery shoppers reporting on quality, and incentives for contractors to perform better.

To make the buses more efficient, dynamic bus priority systems have been implemented in Prague and Stockholm, while Lille has introduced a bus lane with high-level service, the first in a future series of twelve similar bus lanes. New bus lines for special needs have been implemented – one to a hospital area in Prague and one between Graz and its suburbs on weekend nights. The attractiveness and image of public transport has also been improved by the introduction of biogas buses in Stockholm and Lille and bio-diesel buses in Graz.

**Trip planning, traffic control and cycling**

To make it easier for passengers to plan their trips, Trendsetter cities have introduced real-time information systems with information on arrivals and departures, trip-planning tools on the web, and mobility centres.

By controlling the traffic flow with e.g. traffic lights and motorway systems it is possible to achieve a smoother flow, avoid congestions and accidents and decrease emissions. Within Trendsetter, both Graz and Stockholm have implemented traffic management systems that collect and analyse real-time and static data.

Bicycle measures aim at making cycling more attractive. Both Stockholm and Graz use Internet route planning to help cyclists plan fast and safe routes. Graz also focuses on bicycle training for children and bicycle audits. Within Trendsetter, Graz and Lille have worked to make cycling an attractive alternative also on longer distances by marketing cycling, extending the cycling network and equipping tram and bus stops and metro stations with Bike&Ride facilities.

**Access restrictions for reduced traffic**

Different types of access restrictions have been demonstrated within Trendsetter. Graz has implemented strolling zones in the city centre. Pécs has implemented a car-free zone, zones restricting heavy vehicles and a zone-model parking system. In Prague, the access
restrictions for transit traffic have been extended and stricter rules have been adopted for part of the zone. Stockholm has increased compliance within the existing environmental zone, which prohibits entry by heavy vehicles older than eight years. Stockholm has also worked with congestion charging – a full-scale trial will be implemented in January 2006.

**Marketing and mobility management**

Marketing activities have shown to be an efficient way of changing peoples’ behaviour and encouraging them to choose public transport. Stockholm has identified new inhabitants in specific neighbourhoods, and companies with an environmental profile, as important targets for direct marketing campaigns. Graz has focused on image strengthening and has carried out ‘unconventional’ marketing activities.

In Graz, mobility management has been given priority for several years. Mobility management for companies, schools and big events is carried out in Graz within Trendsetter. Lille has implemented a mobility plan for its 2,200 employees, setting a good example for private companies.

**Co-transportation of goods**

Graz and Stockholm have shown that consolidation of goods can reduce transports and their negative environmental impact. A logistic centre has been established in Graz, consolidating retail goods. In Stockholm, a logistic centre handles deliveries to a large construction site and another handles deliveries to restaurants. The demonstrations have also shown that, under special circumstances, logistic centres can be profitable.

**Clean vehicles and fuels**

Trendsetter has shown that biofuels are suitable options for city buses and car fleets and that it is possible for a city to inspire and support private companies. This starts off the development of a clean vehicle society. Within Trendsetter, biodiesel, biogas, ethanol and electric hybrid vehicles have been demonstrated. Infrastructure for biodiesel (Graz) and biogas (Stockholm and Lille) has been set up. A new major biogas production plant in Lille – the largest in Europe producing biogas from organic waste - is under construction.

More than 230 buses, fuelled with biodiesel or biogas have been demonstrated in Lille, Stockholm and Graz. Other heavy vehicles, e.g. nine waste freighters and five trucks in Stockholm, have also been taken into operation. Clean vehicles have been introduced both in city fleets and private company fleets. Lille has 55 new gas cars in their city fleet. Graz has worked together with one of the large taxi companies, which has now converted its whole taxi fleet of approximately 120 vehicles to biodiesel. Within Trendsetter, Stockholm has introduced more than 320 new clean vehicles in the city fleet, and more than 3,000 in private company fleets.

**Incentives and promotion of clean vehicles**

Incentives such as reduced parking fees and subsidies for extra vehicle costs have been used as a tool to increase the interest in clean vehicles. In Stockholm, clean vehicles are excluded from congestion charges, which can save the driver up to SEK 1200 (€130) per month. Demanding clean vehicles and fuels when procuring transport services or vehicles has also shown to be efficient. In Stockholm, other promotional activities, e.g. test fleets for companies, networks of clean drivers, and websites promoting clean vehicles have been carried out.
1.4 Overview of achieved effects

The table on the next page shows an overview of the emission, energy, mobility, time, investment cost and operational cost for measures in different areas and categories. The following scale is used:

<table>
<thead>
<tr>
<th>Effects on Emissions, Energy, and Mobility</th>
<th>Implementation time</th>
<th>Costs for cities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Short</td>
<td>Low</td>
</tr>
<tr>
<td>Large</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td></td>
<td>Long</td>
<td>Large</td>
</tr>
</tbody>
</table>

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure.

Time—implementation time
<table>
<thead>
<tr>
<th>Areas</th>
<th>Categories</th>
<th>Emissions</th>
<th>Energy</th>
<th>Mobility</th>
<th>Time</th>
<th>Investment cost</th>
<th>Operational cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenient access to public transport</td>
<td>Integrated fares and smart cards</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Increased public transport security</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Convenient and safe intermodality</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Customer-friendly stops</td>
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<td></td>
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<tr>
<td></td>
<td>Dedicated bus lanes and priority at junctions</td>
<td></td>
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<tr>
<td></td>
<td>New services for special needs</td>
<td></td>
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<tr>
<td></td>
<td>Quality management</td>
<td></td>
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<tr>
<td>Trip planning for smartest choice</td>
<td>Real-time information helps staff and passengers</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Planning trips on the web</td>
<td></td>
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<tr>
<td></td>
<td>Integrated public transport services</td>
<td></td>
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<tr>
<td>Traffic management</td>
<td>Traffic management</td>
<td></td>
<td></td>
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<tr>
<td>Cycling</td>
<td>Cycling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Access restrictions</td>
<td>Zones favouring pedestrians makes cities attractive*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Selective access restriction for heavy vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Congestion charging</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Marketing attractive alternatives</td>
<td>Marketing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobility management</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved goods distribution</td>
<td>Consolidation of goods *</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean vehicles and fuels</td>
<td>Biofuelled vehicles</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biofuel production</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

*Measures that mainly have local effect
All implemented measures can be up-scaled within the city or transferred to another city. Which measure or bundle of measures that suits different cities are strongly dependent of the current situation and problems to be solved in the city as well as the priorities of the city concerning environmental effects, fossil energy use, mobility, time needed and investment costs as well as operational costs.

1.5 Trendsetter cities after Civitas

The involvement in Trendsetter and Civitas has been valuable for the participating cities in many ways and not only by the introduction of the measures and the effects they have had on the environment, energy consumption, mobility etc. The implementation of sustainable urban transport strategies in cities have improved the prerequisite for the future work within these fields by creating networks and cooperation between cities within Civitas on different levels; policy makers, politicians, technicians and city administrations. The Trendsetter cities all experience that the project also have created a platform for cooperation, since the cooperation between different fields have improved due to the participation in the Trendsetter project.

Not only the Civitas I cities benefit from cooperation. Other cities have shown great interest in the work performed and the lessons learnt. The Civitas II cities have a large advantage as being followers to the first initiative, learning from both mistakes and successes.

The Trendsetter cities will continue the work performed within the Civitas Initiative. Graz will continue with mobility issues and the focus on biodiesel. In Lille, the biogas experience will continue with the biogas plant in operation, making it possible to introduce additional vehicles fuelled by biogas. Stockholm continues their commitment on sustainable transport solutions, including even further development of clean vehicles and fuels. Stockholm coordinates the EC-funded projects BEST (BioEthanol for Sustainable Transport) and Lille coordinate Biogasmax, where also Stockholm participates. Pécs further develop their strategic work on transport and urban development while Prague go on focussing on offering the citizens attractive public transport.
2. Overview of the Evaluation Framework

2.1 Evaluation at different levels
The Trendsetter project has been evaluated in different levels: measure level, WP level, City level, Trendsetter level and European level. The Trendsetter evaluation follows mainly a bottom-up procedure, i.e. the evaluation originates within the demonstration measures.

<table>
<thead>
<tr>
<th>Evaluation level</th>
<th>Objectives</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure Evaluation</td>
<td>Measure objectives</td>
<td>Measure leader</td>
</tr>
<tr>
<td>WP Evaluation</td>
<td>WP objectives</td>
<td>WP leaders</td>
</tr>
<tr>
<td>City Evaluation</td>
<td>City objectives</td>
<td>City coordination</td>
</tr>
<tr>
<td>TRENDSETTER Evaluation</td>
<td>TRENDSETTER objectives</td>
<td>TRENDSETTER Evaluation Manager</td>
</tr>
<tr>
<td>European Evaluation</td>
<td>CIVITAS objectives</td>
<td>METEOR, in cooperation with the Evaluation Liaison group</td>
</tr>
</tbody>
</table>

An indicator-based evaluation approach has been chosen for all levels. Each measure have been evaluated with indicators at several levels:
- TRENDSETTER common indicators
- Workpackage common indicators
- Individual indicators for each specific measure
The indicators at all three levels above are harmonised with the CIVITAS Common Core Indicators when applicable and possible.

5.1 Indicator based evaluation
Below is a table with the Trendsetter Common Core Indicators that are used in the evaluation.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable)</td>
<td>Joule/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year</td>
</tr>
<tr>
<td>Environment</td>
<td>Noise levels</td>
<td>dBA/A</td>
</tr>
<tr>
<td>Mobility</td>
<td>No of trips</td>
<td>No or Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time</td>
<td>Reduction in hours or %</td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service</td>
<td>Qualitative 5-degree scale</td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance</td>
<td>Qualitative 5-degree scale</td>
</tr>
</tbody>
</table>

Do-nothing scenarios
When evaluating the measures, it is not enough to only compare before and after measurements. To be able to show results from actual measures or bundle of measures, a Do-nothing scenario have to be taken into account.
Early in the project, Trendsetter adopted the strategy suggested by Meteor, to use the model ITEMS to produce a Do-nothing scenario. Despite the fact that the participants
spent much time and effort delivering data to be used in the model and discussing the outcome, Meteor never succeeded to present calibrated model results. Trendsetter then abandoned the idea of using ITEMS. Instead the experts in each city tried to derive what was related to Trendsetter and what had other reasons. It was not always possible to evaluate the effect of a single measure, but for a package of measures.

**Methodology**

The Trendsetter indicators aim at evaluating the effects on emissions, noise, energy and mobility, to be able to assess the fulfilment of the high level objectives. These indicators also feed into the cross-European evaluation. What indicators to be used in different measures was stated in Evaluation Plans. The possibility to perform quantitative analyses differs between measures and between indicators. The Trendsetter strategy was to perform a quantitative analysis if possible. The evaluation should take general trends and other measures into account. For measures/indicators where a quantitative evaluation isn’t possible to carry out, qualitative assessments are recommended, using a five degree scale (\(--\) - 0 + ++).
3. Trendsetter objectives

The Trendsetter over-all objectives have been divided into High level objectives, Demonstration objectives and Scientific-/technical objectives. These objectives and their fulfilment are shown in the next pages.

3.1 Trendsetter High level objectives

Trendsetter objectives are to ameliorate urban air quality, noise levels and congestion while supporting mobility and urban quality of life. The high level objectives and their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Trendsetter High level objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide examples:</td>
<td></td>
</tr>
<tr>
<td>Provide input to European policy making and promote a sustainable transport future in Europe.</td>
<td>Yes</td>
</tr>
<tr>
<td>Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.</td>
<td>Yes</td>
</tr>
<tr>
<td>Increase mobility:</td>
<td></td>
</tr>
<tr>
<td>Promote the use of public transport and other alternatives to private cars</td>
<td>Yes</td>
</tr>
<tr>
<td>Demonstrate new ways to improve urban goods logistics and efficiency.</td>
<td>Yes</td>
</tr>
<tr>
<td>Enhance Environment:</td>
<td></td>
</tr>
<tr>
<td>Reduce annual fossil CO2 emissions by 5 %, approximately 75 000 tonnes per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes per year and particulate matter by at least 1800 tonnes per year, for all cities within Trendsetter.</td>
<td>No, not yet (see below)</td>
</tr>
<tr>
<td>Reduce noise levels in all cities within Trendsetter</td>
<td>Yes</td>
</tr>
<tr>
<td>Save Energy</td>
<td></td>
</tr>
<tr>
<td>Save over 850 TJ (20 300 TOE) energy per year, for all cities within Trendsetter</td>
<td>No, not yet (see below)</td>
</tr>
</tbody>
</table>

The objectives concerning emissions of fossil CO2, NOx and particles as well as the objective about energy savings are not met yet. The measures implemented in Trendsetter have the potential to fulfil the objectives, but not within the period of Trendsetter. Change of behaviour takes long time, longer than the Trendsetter projects. Other reasons for the late fulfilment of objectives are that some measures were delayed due to financial, political or technical problems. Delayed measures and measures that already in the contract had a late implementation had no possibility to reach its full effect during the evaluation phase. In most cases, the desired effects will be reached, but not during 2005, but during 2006 and 2007. Another very important factor is that in many measures, a quantitative evaluation of the effects of emissions and energy has not been possible to carry out. Instead, a qualitative evaluation has been accomplished, but the effect is not shown in the calculated figure below, on emissions and energy savings.
The calculated reduction of fossil CO2 was approximately 57 000 tonnes a year. The objective of 75 000 tonnes is expected to be reached, but not within the project period. The reduction of NOX emissions is calculated to 315 tonnes a year, but late implementations and qualitative assessments are not included in that figure. The actual reduction is larger, but not possible to quantify. The objective of 900 tonnes will be reached within a few years and the Trendsetter effect is larger already today, if quantitative results are included.

The reduction of particles is calculated to 50 tonnes. This figure will increase during 2006 and 2007, when the effects of all measures are achieved. A mistake when calculating the objective in the proposal phase was made, which made the objective concerning particles unreasonable, and impossible to reach.

The saving of energy in the Trendsetter cities was calculated to just over 250 TJ/year, qualitative results not included.
3.2 Demonstration objectives

The demonstration objectives and their fulfillment are presented below. A few objectives are not reached while others are over achieved. Those not reached are commented below.

<table>
<thead>
<tr>
<th>Public transport bus fleets</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biogas buses</td>
<td>128</td>
<td>128</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel</td>
<td>97</td>
<td>134</td>
<td>+37</td>
<td>Graz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Clean vehicles and infrastructure</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>New clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets</td>
<td>320</td>
<td>408</td>
<td>+88</td>
<td>Stockholm 324 Lille 84</td>
</tr>
<tr>
<td>New biogas refuelling stations</td>
<td>5</td>
<td>5</td>
<td>0</td>
<td>Stockholm 4 Lille 1</td>
</tr>
<tr>
<td>New biodiesel refuelling station</td>
<td>-</td>
<td>1</td>
<td>+1</td>
<td>Graz</td>
</tr>
<tr>
<td>Biogas waste freighters</td>
<td>7</td>
<td>9</td>
<td>+2</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Taxis converted to bio-diesel</td>
<td>120</td>
<td>63</td>
<td>-57</td>
<td>Graz</td>
</tr>
<tr>
<td>Clean vehicles in private company fleets</td>
<td>100</td>
<td>100</td>
<td>0</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)</td>
<td>300</td>
<td>3000</td>
<td>+2700</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)</td>
<td>26</td>
<td>26</td>
<td>0</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport and mobility management</th>
<th>Target</th>
<th>Achieved</th>
<th>Difference</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level service bus lane</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Lille</td>
</tr>
<tr>
<td>Bus priority signal systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Prague</td>
</tr>
<tr>
<td>Environmental restriction zones</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz, Pécs, Prague (Stockholm)</td>
</tr>
<tr>
<td>Environmentally oriented Parking zones</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm, Graz, Pécs</td>
</tr>
<tr>
<td>Smart Card system in full scale</td>
<td>1</td>
<td>0</td>
<td>-1</td>
<td>Stockholm</td>
</tr>
<tr>
<td>Improved intermodal links</td>
<td>4</td>
<td>3</td>
<td>-1</td>
<td>Graz</td>
</tr>
<tr>
<td>High customer friendly bus and tram stops</td>
<td>60</td>
<td>60</td>
<td>0</td>
<td>Graz</td>
</tr>
<tr>
<td>Approximately 1100 P&amp;R parking places in 4 P&amp;R facilities</td>
<td>1100</td>
<td>3000</td>
<td>+1900</td>
<td>Lille</td>
</tr>
<tr>
<td>Logistic Centres</td>
<td>3</td>
<td>3</td>
<td>0</td>
<td>Stockholm 2, Graz 1</td>
</tr>
<tr>
<td>IT based logistic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>Several IT-based transport information systems and traffic management systems</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>Stockholm, Graz</td>
</tr>
<tr>
<td>City bus line</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Prague</td>
</tr>
</tbody>
</table>
3.3 Scientific and technical objectives
Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The scientific and technical objectives as well as their fulfillment are presented below.

<table>
<thead>
<tr>
<th>Scientific and technical objectives</th>
<th>Have the objective been reached?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a total amount of 11 million Nm³ biogas by the end of the project.</td>
<td>No, not yet</td>
</tr>
<tr>
<td>Reduce the commercial cost of biogas fuel by 20% in demonstrating cities</td>
<td>Partly</td>
</tr>
<tr>
<td>Implement a complete biogas technology chain in Stockholm and Lille, from production to end use</td>
<td>Partly</td>
</tr>
<tr>
<td>Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm</td>
<td>Yes</td>
</tr>
<tr>
<td>Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision</td>
<td>Yes, with exemption of smart card system in full scale</td>
</tr>
<tr>
<td>Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.</td>
<td>Yes</td>
</tr>
<tr>
<td>Evaluate the effectiveness and political acceptability of environmental zones</td>
<td>Yes</td>
</tr>
<tr>
<td>Develop integrated city mobility plans integrating environmental protection, traffic and public health policies</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Each demonstration objective and the fulfilment of it is described below

*Produce a total amount of 11 million Nm³ biogas by the end of the project.*
In Stockholm, the production plant has not been a part of the Trendsetter project. Total production of biogas fuel during the project is 15 million Nm3, but biogas vehicles have consumed only 4,26 million Nm3. The rest has been used for heating and electricity production or just flared.
Before Trendsetter, the local biogas production in Lille was 0,12 Nm3 biogas per year. In November 2004, the construction of a new large organic waste plant started. In 2007, when the new waste plant is in operation, the production will be 3,6 million Nm3 per year.
This objective is not applicable for the other three cities.

*Reduce the commercial cost of biogas fuel by 20% in demonstrating cities*
The commercial cost of biogas fuel has not changed during the project in Stockholm. The total costs per km (investment and operation) are still slightly higher for biogas buses than for diesel vehicles.
In Lille, the price for biogas will be the same as for natural gas. This implies that the cost per km of a biogas bus is at the same level as the cost per km for diesel buses (including both investments and operational costs).
This objective is not applicable for the other three cities.
Implement a complete biogas technology chain in Stockholm and Lille, from production to end use

In Stockholm, the complete chain of biogas technology was already in place when the project started. The chain has been improved within Trendsetter, through a new distribution system (AGA swap-body technology) and new filling stations. New biogas car models are also improved with integrated tanks.

In Lille a complete biogas chain has been initiated. The chain will be finalised in 2007, when the new organic waste plats will be ready.

This objective is not applicable for the other three cities.

Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm

Electric hybrid lorries and electric vans were demonstrated in Stockholm within the ELCIDIS project, which ended in 2002. The feasibility and effectiveness using them for urban goods transports have been evaluated within Trendsetter.

All six hybrid trucks have now been converted from hybrid to diesel mode. As long as the hybrid functionality was available they were usually running on electricity. The conversion was caused by problems with the charging system. The vehicle manufacturer did not supply new external charging system as replacement for the internal malfunctioning system. Thus, it became very difficult to operate the hybrid vehicles due to frequent technical failures.

According to the manufacturer the problem with the charging system could be solved using other types of batteries and charging system. Today there is not enough demand for heavy hybrid lorries and thus not possible to have a serial production running. This means that the purchase cost for these vehicles still is rather high. But Mercedes Benz claims that the hybrid technology is reliable now.

The former operators of the hybrid lorries are still in favour of using environmentally adapted vehicles and could be interested in using other types of clean vehicles and fuels.

Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision

Bus signal systems as well as Traffic control and supervision has been successfully tested within the Trendsetter project. The smart card system in Stockholm has not been implemented in time, so it has not been tested in full-scale yet.

Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.

The following web-based information and telematics have been evaluated within Trendsetter:

- The Swedish web portal www.trafiken.nu are showing the current traffic situation, real time travel times for the most important arterials, a travel planner for public transport, web cameras, parking information and bicycle information. A normal day, the portal has 8000 to 10 000 visits. The objective for 2006 is to reach 150 000 visits a month. An extensive evaluation of the impacts of the portal and other ITS (intelligent transport systems) solutions in the Stockholm area have been performed.
− A Swedish digital road network, to which data can be linked. The digital road network is estimated to give improvements in decreased energy use, emission of fossil CO2, emissions of NOx and PM and increased mobility as a result of increased use of telematics as traffic signals, navigation systems, Incident management, parking information and ISA (Intelligent Speed Adaptation).

− A real-time multi-modal transport model, MatriX, was implemented in Stockholm and will serve as a platform for a traffic management system, and optimise and balance traffic flows on various main roads. Telematics as navigation systems, VMS (variable message signs), incident management and dynamic park&ride information is expected to increase as a result of this. Evaluation of the effects on environment, mobility and transport has shown positive results both on short and long term.

− In 2004, Stockholm launched a national website regarding clean vehicles, www.miljofordon.se, in co-operation with the cities Göteborg and Malmö. The number of visits has increased steadily, now being approximately 12 000 visits per month. The evaluation shows that the website has been successful in reaching potential buyers and to have a reliable and relevant content.

− In Graz a dynamic traffic management system was planned to be implemented in order to get an overview of the traffic situation so it can be managed and controlled. Data from various sources will be collected and the information will be distributed in different channels. Due to problems concerning the budget, the measure was delayed two years. The complete integration of all data sources is expected to be finalised mid 2006.

Evaluate the effectiveness and political acceptability of environmental zones

The concept/definition of environmental zones can include both zones with restrictions for heavy vehicles depending on age, weight or the engine’s Euroclass standard, but also car-free zones and strolling zones where restrictions are set up also for cars. Trendsetter has shown that environmental zones can play an important role for reducing environmental impact and negative health consequences in urban areas.

− An environmental zone was established in Stockholm 1996. The effectiveness of the environmental zone has been monitored twice yearly. The political acceptance has risen from a rather low level, when the issue was in its initial phase during the mid-90’s, to a very high acceptance among transport operators, politicians and the general public. Also the obedience has been monitored regularly. Initially it was rather high but decreased after some years. Thanks to Trendsetter the enforcement was strengthened and the obedience level increased, being 96.2 per cent in 2004 (resulting in better air quality and less noise).

− The widening of the environmental zone in Prague was implemented as planned and has resulted in reduced emissions and energy consumption. The public positively accepted the measure and consequently the political acceptance for a measure like this is good. The only concern from the urban authorities has been increased administration work because of the widened zone.

− Four strolling zones were established in Graz within Trendsetter. The work was delayed because of Graz being Cultural Capital of Europe in 2003 and the city council wanted to minimise disruption. Shop and restaurant owners were against the strolling zones initially, but later it became clear that the zones boosted commercial activity and contributed to a human-friendly city centre.
– In central Pécs a car-free zone was established, along with other complementary restriction actions such as speed limit, heavy vehicles restrictions etc. There has been good political support from all parties for this measure, even if the local politicians at first wanted to give in to the demands from citizens that were sceptical to the car-free zone. By 2010 it is planned that the whole city centre of Pécs will be closed for private cars.

*Develop integrated city mobility plans integrating environmental protection, traffic and public health policies*

In Lille, integrated city mobility plans including environmental protection as well as traffic and public health policies have been successfully developed. The Lille Metropolis Urban Mobility Plan, implemented in Lille for their 2,200 employees, set a good example for private companies. The plan had the objectives to improve car-pooling in the Lille Municipal fleet, favour two-wheelers and increase the use of public transport.

The interest for company mobility plans has been adopted by many other organisations in the region, such as regional authorities, department authorities and private companies.
4. **Overview of work package**

4.1 **Work package objectives**

The work package objectives for WP11 – Transport management are:

- Implementation and demonstration of new systems for traffic management in urban environment. The Work package measures comprise data collection, improved traffic management systems, improved systems for public transport operation, priority systems for public transport in terms of adaptive signal priority systems and dedicated lanes for PT followed by real-time information accessible through different media.

- End users benefit from improved information systems with real-time information, P&R facilities, parking guidance systems, dynamic signs with traffic information and faster, more reliable and thus more attractive public transport.

- Reduction of fuel consumption, less emissions, less noise and a modal shift to sustainable transport modes is the objectives for the measure.

- By introducing the measures provide best practice examples to follower cities.

4.2 **Short overview/description of measures within WP**

Work package 11, Integration of Transport Management Systems, problems regarding information support have been solved and measures within traffic management and control developed. The measures have been divided into two subgroups; *Traffic Information and Control* and *Improving Public Transport flow*. Four cities take part in Trendsetter work package 11; Stockholm, Graz, Prague and Lille.

- **Traffic information and control**
  
  Objective: To optimize the transport net
  
  ⇒ Better traffic flow
  
  ⇒ Environmental effects

- **Improving public traffic flow**

  Objective: Efficiently organize the public transport
  
  ⇒ Better traffic flow
  
  ⇒ Increased quality
  
  ⇒ Environmental effects
Technical basis for an efficient customer focussed operation and information (11.1), Graz

The measure ‘Technical basis for an efficient customer focused operation and information’ has been implemented at the 'Grazer Stadtwerke AG - Verkehrsbetriebe', the main public transport provider in Graz. The project has been elaborated together with the town-council of the city of Graz and the provincial government of Styria.

270 trams and buses have been equipped with on board computers so the vehicles can be located. A computerized operational control centre has been renewed to fulfill the requirements of a modern transport company. The on board computers sends the vehicles actual position to the computerized operational control centre. Controllers at the control center can thereby get an overview of the traffic situation in the network and the location of all vehicles. Priority to public transport can also be given. Drivers will be informed about deviations from the regular timetable and can make backlogs in the schedule. It is then possible to secure the connection to another line since it will always be known exactly where the two vehicles are at the moment. Within all vehicles on-board-information is given both visually and acoustically so that also people with hearing problems or visual impairments can have access to the information. A second parallel data radio system has been installed to increase the coverage of the whole transport management system.

104 real time information signposts have been constructed to inform passengers with real time information at public transport stops. All old real time information signposts have been adapted and integrated in the new system. The displays inside and outside of the vehicle as well as the acoustic facilities are controlled by the on board computers.

The new system aims at creating an interoperable platform for optimised operation. This will allow buses from all participating companies (also small ones) to profit from the system. For the first time, the traffic operation system enables an efficient organisation of the operation of tramways and buses. Through the “re-routing” management tramway stops can be serviced by buses in case of accidents or tramway lines being obstructed by cars parked on the rails. Furthermore the use of additional buses can be initiated quickly, in cases of overcrowded or defect buses. The collected data can be used to improve timetables and vehicle usage. The measure has an interconnection to measure 7.5 (Customer friendly stops).

<table>
<thead>
<tr>
<th>Group of measures</th>
<th>Measures within WP 11</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic information and control</td>
<td>11.2 Traffic monitoring and supervision</td>
<td>Stockholm</td>
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<tr>
<td></td>
<td>11.3 Dynamic traffic management system</td>
<td>Graz</td>
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<td>Improving PT traffic flow</td>
<td>11.5 More adaptive signal control in a bus priority system</td>
<td>Stockholm</td>
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<td></td>
<td>11.6 More adaptive signal control in a bus priority system</td>
<td>Prague</td>
</tr>
<tr>
<td></td>
<td>11.7 High level service bus routes</td>
<td>Lille</td>
</tr>
<tr>
<td></td>
<td>11.1 Technical basis for an efficient customer focussed operation and information</td>
<td>Graz</td>
</tr>
</tbody>
</table>
Traffic monitoring and supervision (11.2), Stockholm
The Traffic Management Centre in Stockholm collects, processes and provides information about the traffic situation, accidents, road works and traffic flows. By providing travelers with information and guidance, the Traffic Management Center can reduce accidents, alleviate congestion, and thereby improve access and mobility while reducing the harmful impact of traffic on the environment.

Within this measure the database is being used to create a system providing real-time information that takes current traffic flows for all modes of transport into account. The underlying dynamic real-time model is called MatriX. MatriX will serve as a platform for a traffic management system.

The idea behind the MatriX system is to use several means of data sources in a multi-modal transport model in order to predict the traffic and control it the best way possible. In future projects the model will be integrated into management systems. The model will have real time capabilities in order to assist operators, planners and other professionals in making decisions at e.g., incidents in the network. The MatriX-system will also be connected to automatic or operator control application e.g. lane closure, speed advise and traffic signals. The traveller will receive information, either from the Traffic Management Centre or through variable message signs or other media such as radio or web sites – www.trafiken.nu.

The project is a vital source of comprehensive real time information from the road net in Stockholm and its vicinity. It covers the most traffic intensive parts of Stockholm and includes the main state and municipality roads. The stakeholders are city of Stockholm and the branch of Swedish Road Administration in the region. It supports the Trendsetter project 10.3 “Creation of a visitor web for optimal trip planning” and 11.5 “More adaptive signal control in a bus priority system (SPOT-project)” as well as the Traffic Management Centre with refined traffic data in terms of speed, flow, travel time etc to be used at signs along the roads as well for other Traffic Information providers such as radio or telecom companies.
The activities within the measure includes the following:

*MatriX installation*
The MatriX system originates from the 5T Consortia in Torino and is found to be a good tool in Stockholm for generating traffic information. It has also capability to control traffic by means of traffic signals (SPOT), variable message signs etc when needed. A lot of knowledge is re-used from earlier EU-projects (partly “Quartet plus” and “Cleopatra”).

*MatriX calibration/validation*
One difficulty in the project is to calibrate the description of links so it meets the reality in terms of number of lanes, their capacity (flow and speed), speed flow relation and origin-destination matrixes etc. This is critical in the use of such a system. Another difficulty is to evaluate flow, speed and travel times in a neutral way so the results are correct both on sections that are equipped with sensors as well as non-equipped sections.

*Extended input data*
One of the costly parts in the project is to get enough traffic data from different sources (for example sensors mounted in the road surface (loops) and sensors mounted above the lanes (microwave)). A new way of getting data is from GPS-equipped vehicles. A set of agreements have been organised with fleet management companies/commercial fleets (taxis, goods distribution companies) so GPS-reports from their vehicles that are driving in the road network are delivered. The data is fused and quality assured in a process before it is used.

*Delivery of data to Web-site and TMC*
The result from the project makes it possible to deliver different kinds of traffic data. Partly real time traffic flows, speeds and travel times, partly the equivalent data but normalised to different periods of days and between days, all collected in databases.

*Evaluation of the data*
An independent evaluation will be performed and included in the result of the project. This will cover quantitative as well as qualitative methods. The time plan has been delayed during the project, and the evaluation tests on the field will not be finished within the Trendsetter programme. Results from these evaluations will be available on request as soon as they have been carried out.
As in many other cities, it has been difficult for the general public in Graz to get reliable information about the current traffic situation. In Graz there are several systems in parallel, some of them very modern: e.g., traffic control system, RBL-System (computer based vehicle location and operational control system), the street database or the online fleet management system of the taxi operator. These systems are run by different operators and have not been interlinked. In this measure, data from various sources has been collected, processed and combined and presented in ways useful to citizens and professional drivers.

The new system incorporates two innovative aspects: it includes information from different sources and it addresses different channels to distribute the information. This gives a new quality to the system and enables strategic and dynamic reactions to steer the...
traffic system for the first time. The realization of the dynamic traffic management system has been done in different steps. Step one has been a part of Trendsetter and has encompassed the following subprojects:

*Online overview presentation of the current traffic situation*

The Technical University Munich (TU München) developed an innovative methodology to combine traffic data of the fleet management system of the taxi operator 878 (floating car data; FCD) with data from automated traffic counts and of a traffic control optimizer called MOTION

*Strategic control/management of traffic*

The existing control of the network will be extended to enable strategic and dynamic reactions to events such as congestion, tunnel closure etc

*Acceleration of PT (public transport)*

By utilizing the radio telegrams of the on board computers of the GVB traffic management system, the traffic lights will be influenced in favor of PT.

*Information Management*

The online and real-time information about the current traffic situation will become the basis for strategic decisions of the police traffic control centre as well as for information via Internet and mobile phone to all traffic participants

*Accessible road network (street) data (11.4), Stockholm*

Digital information within the Traffic Administration in Stockholm (TK) has been stored in separate databases without geographic connection. This measure aimed to find an IT-based road network model to which data that TK want to make available can be linked and thereby easily accessed. The information linked has got a geographical position. When data is linked together the access to the information will increase and data needed for basic analysis can easily be brought out. The increased access to information also expects traffic information services to develop and be more used. This can in turn lead to positive environmental effects.
Though it is important to share data within a larger area than the administrative area of Stockholm it is important to find a solution that can communicate with other applications. Instead of letting each separate existing or new system, handling road or traffic data, implement its own technique for adhering to the Swedish standards this information platform has been built with technique that can be used by different kinds of systems that would like to integrate with the road network and share data with each other.

When data is integrated it can be used for various purposes like exporting data, making public services, new analysis which in turn can result in better traffic planning, improvement on the environment and other positive effects. The work of connecting different data sources and databases to the digital road network will continue for several years. Some of the wanted data exists in databases today and some data need to be collected.

**More adaptive signal control in a bus priority system (11.5), Stockholm**

The Urban Traffic Control (UTC) system in Stockholm aims at minimising the total time lost by private vehicles and their emissions during their trips within the controlled area, subject to the constraint that public vehicles for which weighted priority has been requested shall not be delayed at intersections with traffic lights.

This measure is a technology assessment project. A new more adaptive traffic control system has been compared with an existing one and reports over the assessment including system descriptions, assessment methodology, implementation and results has been compiled into reports delivered within the Trendsetter project as well as complementary reports.

The compared systems have been installed in parallel at eleven intersections within a test area. For a number of days in May 2003 the two systems was in operation alternately.

The situation before and after has been measured according to an evaluation plan defined within Trendsetter, complemented with performance indicators specific for the local road authorities.

This has increased the reliability and attractiveness of the bus service and reduced queuing and thereby reduced the pollution.
More adaptive signal control in a bus priority system (11.6), Prague

The objective of the measure was to establish a demonstration IT-system for signal (traffic light) timing at busy junctions, for public buses. The adaptive signal control system for bus priority increases the attractiveness of the bus service, through better reliability of the bus services and reduction of queuing. This also leads to less pollution and energy consumption. The measure is a part of a generally implemented public transport priority over private cars in line with adopted transport policy principles of the City of Prague. The actors involved are Transport Department of Prague City Council, Transport Engineering Institute (ÚDI), Police of the Czech Republic, Metroprojekt, Technical Road Administration (TSK), Eltodo, Prague Public Transit Co. Inc. (DP Praha,a.s.).

The active detection system, giving buses priority through junctions, is based on radio communication between the vehicle and signal timing controller. It consists of a stationary part and a mobile part. An infra-red beacon located before the junction is used to localize vehicles. The priority system is linked to timetables of particular lines. This allows the system to assess the actual location of a bus and compare it with the timetabled location. Buses can then be given priority individually, according to actual delay on street. Based on such pre-defined conditions, priority is thus provided only to vehicles that need it.

Two areas are covered with the signal control system since 2002. One of the areas is part of a road system with extremely busy traffic. Thousands heavy goods vehicles from Northern and Western Europe use the road as transit to eastern and south-eastern parts of Europe. Several important bus lines run in the area. The other intersection is in an area of a wider city centre with 1 busy radial bus line and with busy car traffic in radial direction (particularly private cars and commercial vehicles).

The measure has been very successful and has been followed by bus priority system implementation in more crossings.
High level service bus routes (11.7), Lille

The measure aims to improve the attractiveness of public transport in Lille, and thereby reduce car traffic and emissions in the city centre. The development of the service require:

- Construction of bus lanes on the existing roads (less place for cars)
- A bus location system to give buses priority at junctions, so they can drive more frequently and speedily.
- A higher commercial quality i.e. better accessibility for the customers, layout changes of bus stops and interchanges and better timetable and journey information.

Implementation studies including technical, financial and legal specifications for four high service bus routes have been carried out. One of the bus routes have been implemented, the other three are expected to be brought into service at the end of 2007. In a longer perspective 12 bus routes are expected to be implemented. The objective of these lines is to anticipate a more ambitious project: the tram-train.

The CITADINE-line was brought into service in September 22, 2004 and operates daily from 7 AM to 8 PM (and 10.30 PM when there is a football match). The line circulates with gas buses, and is connected with three Park&Ride facilities (1 500, 390 and 330 parking places). During the first 6 months, within the framework of a promotional campaign, Park&Ride facilities and shuttle were free. During the free startup phase, the Citadine transported 14 000 travellers daily. Today it transports 12 000/day. The stakeholders of the CITADINE are the elected officials and the technicians of the urban community of Lille, the cities, the conveyor.

Dedicated lanes, priority at crossroads, location system and commercial quality are the common characteristics of all the High Service bus routes to be implemented in Lille Metropole in the long run. The creation of high level service bus routes is placed in a specific legal context:

- The law on the air of December 1996, which recognizes to anyone the right to breathe air which does not harm its health.
- The Urban Mobility Plan (PDU) adopted in June 1999 which aims to limit pollution of the cities by supporting the development of the alternative modes.

In addition to the development of the collective transport network, the metropolitan mobility plan (PDU) defined a network of buses routes with high level of service characterized by a high commercial speed (allowing a gain from 20 to 30 % on travel time), a high frequency (every 6 minutes in peak hour), a broad amplitude and a more constant offer over the time. In the long term, a network of 60 km, serving 20 communes,
comprising 12 routes has been suggested, in complementarily with the existing operations including TER (regional trains), the subway and the tram.

4.3 Problems to be solved by the measures

The spontaneous development of transport in Europe is not sustainable. To change this it is necessary to mobilise and present a carefully chosen combination of measures that cover several areas and involve various responsibilities in the cities rather than a list of isolated efforts. Or in other words, to have an integrated approach. All Trendsetter Cities work in this way both within Trendsetter and elsewhere to achieve this.

In Trendsetter this is illustrated by the promotion of innovative management methods to enhance mobility; improved logistics for greater energy efficiency; the use of public transport and car-sharing and increased use of zero and low emission vehicles.

Measures within WP 11 Integration of Transport Management Systems are just a part of the approach for reaching a sustainable transport system. Within this WP problems regarding information support have been solved and measures within traffic management and control developed. Different modes can now i.e. be chosen for traffic management, so a better traffic flow and less emission can be achieved. The use of transport net can thereby be optimized. The measures within the WP have been divided into two subgroups:

Traffic information and control (11.2, 11.3 and 11.4)

The overall objective to be solved by the measures within the group Traffic Information is to build interfaces for an integration of existing systems so data can be exchanged.

When data can be exchanged, information can be spread (internal and external) and other services can be supported (i.e. journey planning, traffic regulation and information with variable message signs and incident management). When optimizing the transport net it is requisite to have information of traffic flow, travel times, consequences of lane closure, accidents etc. This has been a main problem to solve.

Improving PT traffic flow (11.1, 11.5, 11.6, 11.7)

The overall problems to be solved by the measures within the group Improving PT traffic flow is to efficiently organize the public transport. This has been done by solving problems so vehicles are possible to locate, buses can trigger free way when approaching traffic lights, lanes can be dedicated for buses on existing roads (less place for cars) and
dynamic information can be implemented so passengers know when the next bus/tram depart. Also problems with technical, legal and financial specifications for four High Level Service Bus routes have been solved.

When introducing a more adaptive signal control in a bus priority system, experience say that local conditions such as network and intersection design, overall traffic control policies and most important, the situation before, has more to say about the results (in per cent) than the actual system installed. Therefore a local assessment, down to the nuts and bolts of the system, must be performed prior to a decision to replace present technology with a new one. Hence, a main problem to be solved is to quantify typical results for (i.e.) Stockholm with the new system compared to what can be done with present technology.

4.4 Interaction within WP/Civitas

There has been a lot of interaction within the work package as well as with other projects within and without Civitas. Technical issues, acceptance, evaluation methods etc. have been discussed both on meetings, seminars, workshops and study visits. A lot of lessons and experiences have thereby been learnt from each other.

When starting the project a kick-of was held in Graz. This gave involved people a context of Trendsetter and Civitas, as well as contact with each other.

In May 2003 a workshop was held in Prague where experience from the Civitas projects (Miracles, Vivaldi, Tellus and Trendsetter) where presented. Information about the European Civitas Initiative was presented along with the latest news on congestion charging from London. Two parallel sessions where also held; access restrictions and traffic management. After a presentation of the measures a discussion was held about problems on the way, important lessons for cities, technical issues to be solved and technical issues to focus on.

In May 2004 a workshop was help in Stockholm where people from Stockholm and Prague discussed bus priority and environmental zones in two parallel blocks. After a presentation of Trendsetter projects in Stockholm (describing which projects that are carried out, how the evaluation of the projects will be performed and what parameters that are used for this) the bus priority system was presented. SPOT, controlled traffic signals, signal technology, detection technology and results from the evaluation in Stockholm was discussed. On a study tour the bus priority system and the 11 intersections in the test-area that are controlled by SPOT-technology were seen.

In January 2005 a work package meeting was held in Graz. Focus was on the status of the measures, remaining evaluation process and lessons learnt (technical, economical, synergies, political/administrative). A study visit was also arranged, where measures within WP 11 as well as other measures were studied.

In April 2005 a workshop on traffic management was held in Graz, organized by the Graz partners of Trendsetter. About 50 people from different countries and organisations participated.

Information about projects within Trendsetter has also been spread at the European Conference on Mobility Management (ECOMM) 2003, and at Transportforum 2004. Transportforum is the biggest conference on transport in Sweden, and Trendsetter had a
half-day session. On several other conferences, seminars, meeting etc information about the measures have been spread.
PART C – Results and Analysis

5. Indicators

5.1 Indicators and results

Several different indicators are evaluated in the measures. Trendsetter core indicators are used for being able to compare results of different measures and for evaluating what Trendsetter has achieved in total.

The table below show which Trendsetter core indicators that were planned to be evaluated within work package 11.

<table>
<thead>
<tr>
<th>Evaluation area</th>
<th>Indicator</th>
<th>Unit</th>
<th>11.1</th>
<th>11.2</th>
<th>11.3</th>
<th>11.4</th>
<th>11.5</th>
<th>11.6</th>
<th>11.7</th>
<th>CCCI*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Energy use (total and renewable) Energy use per passenger Energy use per bus</td>
<td>Joule/year, index Joule/passenger Joule/bus</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M4</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of fossil CO₂</td>
<td>Tons/year index</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M8</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of NOx</td>
<td>Tons/year index</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M10</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>Emissions of PM</td>
<td>Tons/year index</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M11</td>
<td></td>
</tr>
<tr>
<td>Environment</td>
<td>No of trips PT, car, pers/hour</td>
<td>Vehicles/hour</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M21,22,23</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Number of trips (in the new service area) (bus)</td>
<td>trips /year</td>
<td>X</td>
<td></td>
<td></td>
<td>(M21, 22, 25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time PT, car, pers/hour</td>
<td>Seconds of saving minutes/routes</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M23</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Travel time Improvement of Origin Destination time (bus)</td>
<td>Km/hour</td>
<td>X</td>
<td></td>
<td></td>
<td>(M23)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Quality of service PT, car, pedestrians, cyclists Regularity respect (bus) Stop and delay for PT and other vehicle Reliability of bus service</td>
<td>Index, Vehicle / minutes Time headway distribution (minutes or sec)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M19</td>
<td></td>
</tr>
<tr>
<td>Mobility</td>
<td>Acceptance PT, car, pedestrians, cyclists Evolution of the attractiveness of PT by bus</td>
<td>Index</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>M14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Civitas Common Core Indicators

Except for the Trendsetter Common Core indicators, the evaluation area Transport is evaluated in most measures within WP 11. Examples of indicators within Transport are available real-time traffic flow data, available real-time travel data, changes in overall number of buses put in service each day, traffic volumes, guaranteed connections between trams/buses, modal shift and accuracy of PT time keeping. Also the evaluation area Society is evaluated in some measures. Examples of indicators within Society are safety and effects for cyclists and pedestrians.
5.2 Analysis and comparison of results on indicator level

*Technical basis for an efficient customer focussed operation and information (11.1)*

The aim of the measure is to achieve an overview of the traffic situation, so the traffic can be managed and controlled. A better flow of public transport increases the emissions and improves the attractiveness of it.

The process of implementation is not fully completed. Slight adaptation activities are still ongoing especially concerning stability of the system and passenger information.

<table>
<thead>
<tr>
<th>Estimated effects of 11.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
</tr>
<tr>
<td>Emission of fossil CO2</td>
</tr>
<tr>
<td>Emissions of NOx</td>
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<tr>
<td>Emissions of PM</td>
</tr>
</tbody>
</table>

*Traffic monitoring and supervision (11.2), Stockholm*

Traffic management is an important measure for increased traffic flow and more efficient use of the space. A better traffic flow leads to positive environmental effects. Also the mobility is expected to increase. MatriX has potential to be an important piece in the whole chain of efficient traffic management.

MatriX does not lead to any environmental effects itself, but the access to information is a solid ground for efficient management of the road transport system, which leads to positive environmental effects. Indicators within the areas energy, environment, mobility and transport show positive results. Real time traffic flow data and real time travel data is available for 45 per cent of the main road network. Normal traffic flow data and normal travel data is available for 100 per cent of the main road network. Predictions of travel times in a short horizon perspective can be made for 45 per cent of the main network.

<table>
<thead>
<tr>
<th>Estimated effects of 11.2</th>
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</thead>
<tbody>
<tr>
<td>Energy use</td>
</tr>
<tr>
<td>Emission of fossil CO2</td>
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<tr>
<td>Emissions of NOx</td>
</tr>
<tr>
<td>Emissions of PM</td>
</tr>
<tr>
<td>Mobility*</td>
</tr>
</tbody>
</table>

*The five–degree Trendsetter index is used (-- / - / 0 / + / ++). Mobility contains four different parts; Number of detected trips (+), Travel time (+), Quality of service (delayed) and Acceptance (+).*

The long term effects are estimated to be larger than the effects in short term. The positive effects will not reach the ++-level in long-term, because all road-users will not be
reached by the information. On the other hand, MatriX is optimized for decreasing problems in a local manner, which also decreases the effects in the global perspective. MatriX is one piece of the “traffic management puzzle”.

The evaluation is based on seminars and workshops together with experts, where qualified assumptions and presumptions about the effects that can be derived from MatriX were made. The planned methodology based on i.e. floating cars had to be changed due to delays in the project.

**Dynamic traffic management system (11.3), Graz**

Measure 11.3 is not implemented yet, and has thereby not contributed to reduction of energy use or emissions yet⁴.

**Accessible road network (street) data (11.4), Stockholm**

Putting up a digital road network doesn’t give any environmental positive effects in itself. But when data is linked together the access to the information will increase and data need for basic analysis can easily be brought out. The data can more easily be used for things like better traffic planning, better information to the public about alternative routes or traveling methods. The more efficient use of the traffic net, more adequate public information and better planning tools are believed to give improvement on the total environment. Evaluating the environmental effects was done through literature studies and workshops.

<table>
<thead>
<tr>
<th>Estimated effects of 11.4</th>
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<tbody>
<tr>
<td>Energy use</td>
</tr>
<tr>
<td>Emission of fossil CO2</td>
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<tr>
<td>Emissions of NOx</td>
</tr>
<tr>
<td>Emissions of PM</td>
</tr>
<tr>
<td>Mobility*</td>
</tr>
</tbody>
</table>

* The five–degree Trendsetter index is used (-- / - / 0 / + / ++). Figures without parenthesis indicate short-term effects, figures with parenthesis indicate long-term effects.

Mobility contains two different parts; Quality and Acceptance. The effects of studied applications are: Traffic signals ++ (++), Public transport priority in traffic signals + (+), Navigation systems + (+), Traffic regulation and information with variable message signs n.a. (n.a.), Motorway control n.a. (-), Incident management + (+), Journey planning n.a. (+), Parking information + (+), Dynamic Park&Ride information n.a (+), Intelligent speed adaptation ISA n.a. (n.a.) Road user charges n.a (+), Environmental zone n.a. (+) Heavy goods vehicles and hazardous goods n.a. (+)

In the first version of the system there might be about 100 persons in the municipality and the suppliers of the municipality that will work directly with the systems and with data correlated to the system. This doesn’t count those using data exported to the Swedish National Road Administration. In the extent of the project when producing public services and integration more systems there are likely to be thousands of people taking part of and benefiting directly form the data that has been integrated in the system.

⁴ Not implemented due to late city council decision on finances (see 12 Assessment of all measures)
More adaptive signal control in a bus priority system (11.5), Stockholm

The new adaptive traffic signal control system (SPOT) was implemented in central Stockholm. The results of 11.5 show no significant impact on local emissions when the cost function in the traffic control scheme is altered. The emission model used is a simplified national model where the estimates of CO₂ and NOx are based on only the traffic flow. Looking closer into the results from the simulation studies, these show that the number of stops is reduced and the speed is increased by approximately 15-20%, i.e. completely new vehicle trajectories. This indicates that the potential of local emission control is large.

<table>
<thead>
<tr>
<th>Estimated effects of 11.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
</tr>
<tr>
<td>Emission of fossil CO₂</td>
</tr>
<tr>
<td>Emissions of NOx</td>
</tr>
<tr>
<td>Emissions of PM</td>
</tr>
<tr>
<td>The mobility is estimated to increase due to reduced travel times and increased quality of service.</td>
</tr>
</tbody>
</table>

More adaptive signal control in a bus priority system (11.6), Prague

The implementation of adaptive signal control, giving buses priority, is a very successful measure! The reliability of the bus service is 100 per cent. All measured buses have driven within valid tolerance according to timetables. The commercial speed has increased as well as the number of trips with public transport. The quality of service of the public transport has the highest grade (++) in the five-degree Trendsetter index. The measure has also shown some environmental effects.

<table>
<thead>
<tr>
<th>Estimated effects of 11.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
</tr>
<tr>
<td>Emission of fossil CO₂</td>
</tr>
<tr>
<td>Emissions of NOx</td>
</tr>
<tr>
<td>Emissions of PM</td>
</tr>
<tr>
<td>Mobility*</td>
</tr>
</tbody>
</table>

*The five–degree Trendsetter index is used (-- / - / 0 / + / ++). Mobility contains three different parts; Number of trips⁵, Travel time⁶, Quality of service⁷.

The measure is a good example of how limited investments can give good results.

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⁵ May 2003: 25/h. November 2004: 70/h  
⁶ May 2003: -00:26. November 2004: -00:16  
⁷ May 2003: PT+ Car 0. November 2004: PT++ Car 0
High level service bus routes (11.7), Lille

As a whole, the reduction in travel time is estimated to 20%. In particular installations are implemented in the site and in the approach of the crossroads, in order to give the buses priority as compared to the rest of traffic.

The average speed of buses on dedicated lanes has increased; which makes urban buses more efficient and attractive to users. New signal technology for public bus transport has benefits to energy consumption, acceleration of the bus traffic and the attractiveness of buses to the bus users.

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### Estimated effects of 11.7*

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy use</td>
<td>- 1 850 GJ/year</td>
</tr>
<tr>
<td>Emission of fossil CO2</td>
<td>-130 tons/year</td>
</tr>
<tr>
<td>Emissions of NOx</td>
<td>-300 kg/year</td>
</tr>
<tr>
<td>Emissions of PM</td>
<td>-7 kg/year</td>
</tr>
<tr>
<td>Mobility*</td>
<td>20% reduced travel time,</td>
</tr>
<tr>
<td></td>
<td>12 000 passengers/day</td>
</tr>
<tr>
<td></td>
<td>Connected to three P&amp;R facilities</td>
</tr>
</tbody>
</table>

* Data of the high level service bus route “Citadine”. It is important to note that this route is short. When the total 12 routes are implemented the effects will be much higher than 12 times these results.
6. Fulfilment of Objectives

There are several different objectives of the measures within Trendsetter. The objectives are divided into different groups; Measure objectives, Work Package objectives, Trendsetter objectives (high level objectives, demonstration objectives and Scientific/technical objectives). The different objectives are presented below, together with a discussion of the achievement of them.

6.1 Achievement of Measure objectives

The objectives of measure 11.1 were to implement a Transport Management System for Public Transport. This would in turn lead to an efficient management of the operation of public transport (fewer disruptions, better traffic flow, increased quality of service, speed of operation and accessibility), reduced emissions and energy use as well as a reduced number of noise peaks, an integration of city buses and regional buses, a promotion of the use of public transport and a modal shift towards public transport.

All the objectives are fulfilled.

The objective of measure 11.2 was to implement a real time multi-modal transport model that can serve as a platform for a traffic management system. The management system would give possibility to optimise and balance traffic flows on various main roads, reduce effects of traffic incidents and accidents in terms of queues and delays, induce a modal shift from private cars to public transport facilities and contribute to a smoother traffic, reduction of energy consumption and thereby the emissions from the traffic. The multi-modal transport model starts with a monitoring function, which later will be developed to a management and control function.

The objective, to implement a real-time multi-modal transport model that will serve as a platform for a traffic management system, is still valid and is in progress in other project outside Trendsetter. The objectives are partly fulfilled. The measure has been delayed due to financial cutback and opening of a large tunnel system in southern Stockholm that affects the traffic flow.

The objective of 11.3 was primarily to reduce emissions of traffic in absolute terms through keeping the traffic flow steady, and to reduce congestion hours by keeping the traffic flow away from obstacles and congestion, and guide drivers to adequate parking spaces or park&ride areas, to thereby encourage a modal shift to other modes for mobility. The measures would reduce fuel consumption and environmental impacts.

Some political objectives were also linked to the measure; gain an overview about the whole traffic situation, comprehensive information of the traffic participants, acceleration of public transport, improvements of traffic control by integration of different systems, influencing traffic flows by providing information on routes and reduction of congestion and emissions (particulate matters).

The objectives are partly fulfilled. The whole traffic management system was delayed by two years due to a late decision on finances.

The overall objective of 11.4 was to make it possible to reduce congestion and improve mobility, by providing easy access as well to high quality network data, as to compiled information about the road situation within the Municipality of Stockholm. This would be
done by implementing an IT-based road network model to which all the data that City of Stockholm wanted to make public could be linked and thereby easily accessed, elaboration of a public virtual traffic database and implementation of a public interface to the traffic database.

The overall objectives have been carried out. The digital database has been developed and a lot of information is linked to a geographic digital road network. The process of linking more information from other systems to the new database will now start. There has thus not been enough time within Trendsetter to develop an external interface, but work with this will take place soon. It is already possible to export data to extern users and tests of this has been done, for example export of data to the Swedish National Digital Database and to projects using digital speed limit (Intelligent Speed Adaptation). Everyone who has asked for data has got it from the database developed within Trendsetter.

The objective of 11.5 was to install a dynamic IT-based bus priority system, with SPOT/UTOPIA-signal installations at eleven intersections. This aims to increase the reliability and attractiveness of the bus service and reduce queuing, which also will reduce pollution.

The objectives have been fulfilled.

The objective of 11.6 was to establish a demonstration of an IT-system for signal (traffic light) timing at busy crossroads for public buses. The adaptive signal control system for bus priority aimed to increase the attractiveness of the bus service through better reliability of the bus services and reduction of queuing. The bus traffic would flow faster and smoother and time losses at intersections with signal control system would be eliminated. This would also lead to less pollution and energy consumption.

The objectives have been fulfilled.

The objective of 11.7 was to launch bus lanes with priority at crossroads to facilitate the bus circulation, improve the attractiveness of public transport in Lille, improve accessibility, reliability, frequency and speed, and reduce fuel consumption in the bus service, reduce car traffic in the city centre and reduce emissions.

The objectives have been fulfilled.

6.2 Achievement of WP objectives

There are four primary objectives of Work Package 11.

The first WP objective is:

Implementation and demonstration of new systems for traffic management in urban environment. The Work package measures comprise data collection, improved traffic management systems, improved systems for public transport operation, priority systems for public transport in terms of adaptive signal priority systems and dedicated lanes for PT, followed by real-time information accessible through different media.

All measures within the WP (11.3 partly\(^8\), contribute to the first objective, which is basic for the possibility to fulfill the following three objectives. New transport management

\(^8\) 11.3 is delayed, see 12 Assessment of All Measures
systems have been set up for enabling better management tools, and bus priority systems have been implemented.

The second WP objective is:
End users benefit from improved information systems with real-time information, P&R facilities, parking guidance systems, dynamic signs with traffic information and faster, more reliable and thus more attractive public transport.

All measures within the WP (11.3 partly\(^9\)) contribute to the second objective. Several of the measures within the WP don’t give any effects itself, but improve other applications. Thereby the end users will have benefit from the improved information systems. The end-users benefits are thus dependent of how the information is used in the different applications. The measures implementing bus priority systems contribute more direct to a more attractive public transport. The third WP objective is:
Reduction of fuel consumption, less emissions, less noise and a modal shift to sustainable transport modes is the objectives for the measure.

All measures within the WP (11.3 partly\(^{10}\)) contribute to the third objective. Several of the measures within the WP don’t give any environmental effects itself, but improve other applications which i.e. can reduce the fuel consumption more. The environmental effects are thus dependent to which degree the different applications are used. The measures implementing bus priority systems contribute more direct to a reduction of negative environmental effects and modal shift to public transport.

The fourth WP objective is:
By introducing the measures provide best practice examples to follower cities.

All measures prepare, implement, test and evaluate new technology. Except from successful results from the measures, the measures altogether come out with a lot of conclusions, recommendations and lessons learnt. These experiences provide a best practice example to follower cities.

### 6.3 Contribution to Trendsetter objectives

**Contribution to Trendsetter High level objectives**

Four Trendsetter High level objectives are applicable for WP 11.

The first Trendsetter High level objective is *Provide input to European policy making and promote a sustainable transport future in Europe*. All measured in WP 11 contribute to achieve the objective.

The second Trendsetter High level objective is *Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets*. All measures in WP 11 contribute to achieve the objective.

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\(^9\) 11.3 is delayed, see 12 Assessment of All Measures

\(^{10}\) 11.3 is delayed, see 12 Assessment of All Measures
The third Trendsetter High level objective is *Promote the use of public transport and other alternatives to private cars*. Measures 11.1, 11.4, 11.5 and 11.7 contribute to achieve the objective (the rest of the measures are n.a.).

The fourth Trendsetter High level objective is *Demonstrate new ways to improve urban goods logistics and efficiency*. Measure 11.4 contributes to achieve the objective (the rest of the measures are n.a.).

The fifth Trendsetter High level objective is *Reduce noise levels in demonstrating cities*. Measure 11.4 and 11.7 contribute to achieve the objective (the rest of the measures are n.a.).

**High level objectives - Reduction**

<table>
<thead>
<tr>
<th>Objective</th>
<th>11.1</th>
<th>11.2</th>
<th>11.3</th>
<th>11.4</th>
<th>11.5</th>
<th>11.6</th>
<th>11.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce annual fossil CO$_2$ emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year.</td>
<td>-241 tons/year</td>
<td>+ (reduction) in the five-degree Trendsetter index (- / - / 0 / + / ++)</td>
<td>(Not implemented yet)</td>
<td>-2000 tons/year</td>
<td>-400 tons/year</td>
<td>-0,029 tons/year</td>
<td>-130 tons/year</td>
</tr>
<tr>
<td>Reduce NOx emissions by 900 tonnes/year</td>
<td>-0,96 tons/year</td>
<td>+ (reduction) in the five-degree Trendsetter index (- / - / 0 / + / ++)</td>
<td>(Not implemented yet)</td>
<td>-9 ton/year</td>
<td>-0,8 ton/year</td>
<td>-0,066 tons/year</td>
<td>-0,3 tons/year</td>
</tr>
<tr>
<td>Reduce particulate matter by at least 1800 tonnes/year</td>
<td>-0,068 tons/year</td>
<td>+ (reduction) in the five-degree Trendsetter index (- / - / 0 / + / ++)</td>
<td>(Not implemented yet)</td>
<td>-0,15 ton/year</td>
<td>-0,5 ton/year</td>
<td>-0,001 tons/year</td>
<td>-0,007</td>
</tr>
<tr>
<td>Save over 850 TJ (≈ 20 300 TOE) energy per year</td>
<td>-5,77 tons/year</td>
<td>+ (reduction) in the five-degree Trendsetter index (- / - / 0 / + / ++)</td>
<td>(Not implemented yet)</td>
<td>-21 TJ/year</td>
<td>-5 TJ/year</td>
<td>-3,4 TJ/year</td>
<td>-1,85 TJ</td>
</tr>
</tbody>
</table>
Contribution to Trendsetter Demonstration objectives

The following three Trendsetter Demonstration objectives are applicable for WP 11:

- 1 High level service bus lane (Lille)
- 2 Bus priority signal systems (Stockholm, Prague)
- Several IT-based transport information systems and traffic management systems

All the objectives have been fulfilled. 11.7 have contributed with a high-level service bus lane (Lille), 11.5 and 11.6 have contributed with two bus priority signal systems (Stockholm, Prague) and 11.1, 11.2, 11.3\textsuperscript{11} and 11.4 have contributed with several IT-based transport information systems and traffic management systems (Graz, Stockholm).

Contribution to Trendsetter Scientific/Technical objectives

Several of the scientific/technical objectives listed in section 2.2 are not applicable for the measures in WP 11. The not applicable measures are related to biogas and electric hybrid lorries. The measures within WP 11 thus contribute to three of the eight scientific/technical objectives.

All measures within the WP contribute to the objective Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision.

Measure 11.1 contributes to the objective Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.

Measure 11.2 and 11.7 contribute to the objective Develop integrated city mobility plans integrating environmental protection, traffic and public health.

\textsuperscript{11} 11.3 is delayed, see 12 Assessment of All Measures
7. Used Technology

7.1 Overview of used technology within WP

Technology used within the subgroup Traffic information and control:

Traffic monitoring and supervision (11.2)
The idea behind the MatriX system is to use several means of data sources in a multi-modal transport model in order to predict the traffic and control it the best way possible. The MatriX system is also connected to automatic or operator control applications on speed advice and traffic signals. Such information is very useful as input to the MatriX model.

The measure originates from earlier EU-projects (partly “Quartet plus” and “Cleopatra”) and a lot of knowledge is re-used. The activities Stockholm has dealt with are adoption, calibration and validation of its operation in the Stockholm environment.

One of the most important data sources for covering a large road net with real time data are the GPS-equipped floating cars that reports its speed and position. This information will then be matched into a section in the non-equipped part of the road network. This seems to be a very efficient way to cover large road networks without huge investments in detection infrastructure. The floating cars, or probes, are implemented in a way where for example a transport company can obtain other positive effects by using the positioning information in a win-win-situation.

For the major steps (implementation of the model and sub-tasks as validation of data, adaptation of the model for Stockholm conditions, calibration etc) one database server, two application servers and one workstation is used. The database server is equipped with Microsoft SQL Server. The servers and the workstation use Microsoft NT 4 as operating system.

Dynamic traffic management system (11.3)
The system as a whole consists of several modules that may only get implemented step by step. Different technologies are used for achieving online identification of the current traffic situation, strategic steering/management of the traffic, acceleration of public transport and Information Management.

Online identification of the current traffic situation
The technical university Munich (TU München) has developed an innovative methodology to combine traffic data of the fleet management system of the taxi operator 878 (floating car data) with data from automated traffic counts and of a traffic control optimizer called MOTION. A new model for data exploitation is applied in order to link different data sources with each other.

For the traffic control system, the following interfaces have been established:
- A data base of the street network, containing data about routes and traffic statistics
- The radio control centre of the taxi company 878, which runs a GPS-system for their taxi fleet, by which the actual position and routes of the taxis are recorded
- A central traffic computer, which records all data of counts and numerous specific values of the traffic control optimizer of MOTION
- An Internet platform, which will be installed within TRENDSERTER

Strategic steering/management of traffic
The existing steering of the network will be extended to enable strategic and dynamic reactions to events such as congestion, tunnel closure etc. The dynamic traffic control optimizer MOTION is updated to allow strategic intervention. The steering, which is currently only implemented for individual streets, will be extended to optimize the steering of the whole street network. Phases of green, cycle times and offset times are optimized and strategic events such as congestion, tunnel closures etc. will receive consideration as dynamic influencing variable.

Acceleration of public transport
By utilizing the radio telegrams of the on board computers of the GVB traffic management system, the traffic lights will be influenced in order to favor of PT.

In addition to the existing traffic lights, which already allow PT to influence their phases of green/red, 7 DKA and 5 traffic lights will be equipped with the system to achieve the objective of zero waiting time for PT. Apart from that, programmes of the existing influenceable traffic lights will be adapted and improved. The direct radio connection between the on board computers of the buses and the receivers of the steering equipment will serve as an interface.

Information Management
The online and real-time information about the current traffic situation will become the basis for strategic decisions of the police traffic control centre. The monitor will show the main street network indicating the real-time categories of their "levels of service" (LOI). This illustration of the traffic situation will also be processed for information to all traffic participants via Internet and mobile phone. This enables them to receive information about their planned trip before and during the trip and to adapt their planned trips if required by an unforeseen change in the traffic situation.

Accessible road network (street) data (11.4)
Digital geographical information is stored together with ordinary textual data. This possibility is made available by Oracle Spatial. This has proved to be successful and is essential for accomplishing the task set up in the project.

Microsoft .net has been used for development. This has been proved so be successful although there are some minor problems with compability between structures used for web services using the Microsoft technology and those systems using Java development environment.

For displaying data, one of the parts used is a geographical information web based component developed using the product GeoMedia WebMap Professional from Intergraph. This has proved to be successful especially after changing to their new SVG-based graphical rendering system (based on Adobe Technology). One problem with all
Web based GIS software is that one has to develop shells to encapsulate the map functionality to be able to use it in conjunction with other system components e.g. displaying textual data among other things.

Two methods have been used for exporting data. The most thorough way to export and import data are by the use of XML schemas. Here XML format of the Swedish standard is used. For certain purposes it might be more easy to use standard geographical formats like ESRI shape, MapInfo tab or Mid/Mif, AutoCad Dxf mainly because the receiver of the data might hav a software that can read such data but might not have implemented the possibility to read XML-files. For exporting data in map format GeoMedia Professional from Intergraph is used. This has proved to be fortunate since this software easily allows export of the road network into several other common GIS map formats.

Technology used within the subgroup Improving PT traffic flow.

More adaptive signal control in a bus priority system (11.5)

The present system of bus priority in Stockholm goes under the name PRIBUSS and started more than 15 years ago. The system is the state-of-the-art in Scandinavia in terms of providing priority within a co-ordinated signal network. In operation PRIBUSS is dependent of accurate predictions of individual public transport vehicle’s arrival to the intersection in order to activate any of the pre-designed functions to provide priority. On-board units communicating with the controller in the intersection manage this function.

PRIBUSS is a standardised toolbox providing several types of priority schemes, as well as compensation procedures, used not only in Stockholm.

The new system is named SPOT/UTOPIA developed in Torino, Italy by Mizar for public transport priority authorities in Torino. Instead of pre-defined fixed time-plans for the entire co-ordinated system with only small portions of flexibility SPOT runs a mathematical optimisation procedure over and over again to find the most optimal time to change color of the traffic lights. This is done every third second in present implementation of the software within SPOT. The hardware of the system consists of an industrial PC-card mounted together with communication hardware in a box installed on top of the present controller inside the signal controller cabinet, one for each intersection. Communication wiring between units and a central computer is also put in place. This allows for convenient monitoring of the system using standard office PC:s and modern communication technology.
More adaptive signal control in a bus priority system (11.6)

The active detection system in Prague, which gives buses priority through crossroads, is based on radio communication between the vehicle and signal timing controller. The system consists of a stationary part and a mobile part. An infra-red beacon located in front of the crossroads is used to localize vehicles. The priority system is linked to timetables of particular lines. This allows the system to assess the actual location of a bus and compare it with the timetabled location. Buses can then be given priority individually, according to actual delay on street. Based on such pre-defined conditions, priority is thus provided only to vehicles that need it.

High level service bus routes (11.7)

In the measure *High level bus routes*, road construction and traffic management technologies have been used. Lanes in the streets has been dedicated to buses and equipped with new signal technology (bus routes and GPS location system). The bus location system also give buses priority at junctions. On certain lines the bus is running on own site in the totality of the line. Some of the bus lanes have been constructed on existing roads, which gives less place for cars. A necessary condition for the creation of the buss corridor CITADINE, was to construct the road system against the direction of the general circulation on a broad boulevard. A necessary but difficult condition. Innovative vertical signalisation, unusual for cardrives, is used.

Technical basis for an efficient customer focussed operation and information (11.1)

The measure *Technical basis for an efficient customer focussed operation and information* can be divided in four major parts:

- Vehicle equipment
- Computerized control centre
- Radio system
- Dynamic passenger information system

Laying the basis for customer centred operation of public transport and for improved customer information, the measure sets up a physical system to improve the legacy operational control system. The durable equipment comprises the hardware and software necessary to operate this interoperable system:

- On board equipment for buses and trams (embedded computers, driver interface, communication modules via WLAN and IR, interfaces to CAN-Bus).
- Central components (operators work place with text and speech interaction possibilities to and from vehicles, central server, interfaces to the real time info at the stops, traffic management and passenger information system).
- Adjustments to the communication architecture, fixed WLAN and IR senders/receivers
- Interfaces to the existing on board displays.
This durable equipment has interfaces towards the dynamic customer information system at the stops (described in measure 7.5). Measure 11.1 serves as a source of data. Both measures focus on service quality, which can only be achieved through technical measures employing hard and software.

WLAN (wireless LAN) is used for data supply of the on board computers. This system works reliable. By means of this system on board computers very easily can be provided with new timetables.

WLAN is also used for a quick registration and deregistration of the vehicle on the real time information signposts. This is used for a so called “boarding” function of the real time information signpost. Immediately when the vehicle leaves the stop, the signpost is refreshed and the next trip is displayed on the signpost. WLAN is a very innovative mean for a communication between Vehicle and signposts. At the moment, there is still a need for improvement of the reliability of this system.

VoIP (Voice over IP) technology is used in combination with the radio system. The Controller in the computerized operational control centre via this system communicates to the driver as well as to the passengers in the vehicles and on the stops. A great advantage of this system lies in the possibility of an easy enlargement by further operational control centres of other transport companies.

7.2 Positive aspects, problems & solutions, new concepts

Positive aspects, new concepts

Traffic management based on real time information- always updated information
The idea behind the MatriX system is to integrate several means of data sources into a multi-modal transport model, which (not within Trendsetter) will be integrated into traffic management systems.

Telematics has a great potential in making all kinds of transport more efficient, by improving driver and passenger information and smoothing traffic flows.

Guidance or route planning systems are often based on static information about the road network. The road network is however constantly changing, but neither temporary nor permanent changes are communicated through these kinds of systems. This means that they are not based on updated information. That includes traffic orders as well as urban incident management.

Today several different data source systems are connected to a central traffic database. Traffic performance variables are calculated (by stored procedures) and stored in the database. These very simple algorithms are then used to get an indication of the actual traffic situation. The use of this method would presuppose installation of traffic sensors at every road sections in the transport system, but still this wouldn’t make predictions of travel times in a short horizon perspective possible.

Increased in-data gives possibility for supervision and control.
The measures have increased the in-data. In-data is the solid ground for efficient management of the road transport system. This had led to better traffic flow and environmental effects.
Increased access to information also provides the basis to expect traffic information services to develop and be more used. This can in turn lead to further positive environmental effects.

**New technology gives possibility to decide which mode to control**

The priority system used in Stockholm and Prague is a control system that opens up for other opportunities. The system can be used for control of also other modes. The controlled mode cannot only be prioritised, but also stopped if i.e. three buses comes too close to each other. The aim is to achieve regularity.

**Technical basis for an efficient organisation of PT**

Traffic operation systems in Graz, Lille, Stockholm and Prague enable an efficient organization of the operation of tramways and buses. Taking Graz as example, the driver is informed about deviations from the regular timetable and tries to make up backlogs in the schedule. It is possible to secure the connection to another line since it will always be known exactly where the two vehicles are at the moment. Through the “re-routing”, management tramway stops can be serviced by buses in case of accidents or tramway lines being obstructed by cars parked on the rails. Furthermore the use of additional buses can be initiated quickly, in cases of overcrowded or defect buses. The data collected can be used to improve timetables and vehicle usage. The traffic operation systems in Lille, Stockholm and Prague work in a similar way.

**Innovative solutions impose the respect of bus corridors**

In Lille high level of service bus routes will circulate in own site with innovative vertical signalization, unusual for car drivers. This will impose the respect of bus corridors. The Bus running in its own site has imposed the respect of bus corridors.

**User-friendly interfaces- now tools for the development and operation**

Slimmed organizations need to seek for rational operation and development of their systems. Modern technology allows for heavy and complex computations and new algorithms are more easily managed with more user-friendly interfaces down to the knots and bolts of the systems. This means that there are now tools for the development and operation - including monitoring. Auditing the function of the system can be done more accurately, more often and with lower risk for mistakes when tuning the system. It does not replace the need for traffic know-how and experts, but it sure supports their work with better information over the system performance.

Changes in local traffic demand are today handled using for instance past-end-green extensions within fixed co-ordinated time plans. This in combination with bus priority actions often ruins the whole idea with co-ordinated traffic signals. Since traffic demand varies over the whole day one must develop different time-plans for different traffic demand levels and patterns. This is only possible when these variations are well known or easily foreseeable. An adaptive traffic control system that can adjust for local or general changes in traffic demand will make obsolete the need for several time plans. This could save a lot of costs in the processes of developing alternate plans for different traffic demands.
Media as a strategy for introducing the measures

Media has been used in some measures for giving information to the public as well as professionals. Information has also been spread on Internet and different organisations Intranet. There have also been several articles in daily local and regional newspapers in several cities. For example newspapers in Lille has been supportive and written about new transport activities as well as Metro in Prague that reach 100 000 readers every day. Information have also been spread through official newsletters, i.e. the official city of Graz newsletter ‘BIG (Bürgerinformation Graz), local folders and information on the measures i.e. real time information signposts and sketches of the planned results of strolling zones put up while rebuilding the areas. For professionals information also has been spread through different publications, such as Yearbook of Transportation in Prague.

Measures that not have used media have the character of backbone systems, i.e. 11.2 Traffic monitoring and supervision. This kind of measures hasn’t had the same need for informing the public.

Problems & solutions

Unforeseen delays can happen to all measures. In Trendsetter late availability of the second data radio system caused delay in the implementation of measure 11.1. Also an early positioning of the real time information signpost in combination with the delay in the implementation resulted in troubles.

Problems with suppliers can also hit the measures. The use of only one supplier for building the main system has been a problem for 11.4. This has caused suspicion from other vendors and suppliers that have to adhere to technology produced by someone else (but smaller than for example Microsoft or other large vendors).

The problem could be overcome by the fact that the technology is starting to be used also by other large municipalities in Sweden such as Gothenburg and Malmoe. This means that other vendors and suppliers can sell their integration solutions on a larger market, which makes it more interesting to integrate things in the municipality of Stockholm. In spite of this there is a tendency amongst several vendors to try to lock their customers to the specific solutions of that company and these issues is something that the project have had to deal with.

Regarding 11.6 a certain barrier of the measure implementation could be the discrepancy between the process of furnishing vehicles with relevant components (so-called mobile part) and adaptation of actual signal timing systems (stationary part). It is therefore necessary to ensure binding coordination of works between the operator (rolling stock owner) and signal timing system administrator. This was a barrier in the project, but was overcome.

Problems of measures that are dependent on delivery from other systems can be complex. Work with real time information is an example of this. It is dependent on delivery of data from sensors e.g., and it is difficult to find errors in the description of road network. It is also a problem to control changes done in other systems that affects the MatriX system (chain reaction that may affect MatriX output badly).
A lot of people have doubts about the MatriX system. A lot of people also want to do the MatriX system on their own way. Experts want to do it different; they don’t see MatriX as a system, but a model. The global knowledge about the whole system is very useful in traffic management.

*Think about!*

- Implement measures in subsequent steps. Test before- inform actively if problems occur when established

Unforeseen problems with technology can occur. Thoroughly and intensive testing of the technology can thus avoid some troubles at the beginning. Regarding dynamic passenger information system, a realisation in subsequent steps starting with the installation of the computerized operational control centre and after extensive tests the implementation of the dynamic passenger information system is recommended. If deviations or problems occur, passengers should be actively be informed about this and about the planned solution of this problem.

- Thorough technical documentation for upgrading and integration

When implementing a technical system it is very important to have a thorough technical documentation of the measure. The client must have the possibility to distribute this documentation to all of the suppliers of the i.e. municipality. Otherwise it will be impossible to discuss with other vendors and suppliers how to make use of the new technology and for the other vendors and suppliers to make offerings on the integration part.

The same thing that goes for the documentation goes for the technology as well. In order for a specific vendor or supplier to find out what is possible in terms of integration and to put a cost to the implementation of this integration most vendors needs to put the technology in the hands of their technical staff.

- Problems have to be solved during the whole project- co-operation needed

Technical systems are not always possible to specify in detail as the projects start. This raises the need for qualified management during the whole project. Many aspects and problems have to be solved after the project has started, and in cooperation between i.e. the municipality and the chosen supplier. The suppliers are not able to solve all in dept problems of i.e. the municipality since they very seldom have all facts about the internal organisation. Many suppliers might also have goals of their own that not always are the same as their customers. This can be a major problem if it not is taken care of properly.

- Technology has a great impact- information needed years before implementation

When implementing i.e. new ways of handling data various units and management need to be informed on what is to be done and why. This probably needs to be carried out several years before the actual implementation of the technology since the technology has such a great impact on the whole information strategy.

- Support

When implementing a system, it is essential to have support from consultants.
Increased focus on management and control – less focus on building new roads
Increased systems for traffic management and control will change the work within the transport system area. The focus on possibilities with TMS (Traffic Management Systems) will increase, and focus on road investments decrease. New organisations are needed for running the technical systems that are implemented.

Investments in TMS are cheaper than road investments. Operation and maintenance costs are however higher. A modern road traffic system requires TMS for an efficient management of the road transport system.
8. Economical Aspects, Cost Benefit

A more effective transport system leads to many advantages.

Better traffic management/control can save time for individuals as well as companies. A better flow of traffic and less stop-and-go also lead to less emission and thereby a better environment, better public health and a higher quality of life. These indicators all gain the national economy.

Traffic signals giving priority to public transport, real time information and dedicated lanes make the public transport more attractive and increases the share traveling with it. One bus can replace several cars. If this is done emissions will reduce and there will be more space for the remaining traffic in the transport system.

The computerized operational control centre in Graz (11.1) enables an efficient organization of the operation of trams and buses. Passengers find real time information about the numbers and destinations of the next buses or trams and the departure-times of these vehicles, information about delays and special incidents (construction works, accidents, buses as substitute for trams, additional buses / trams, etc.). The real time information makes the journey time feel shorter. If there is a little delay of a feeder bus or tram, connections between lines can be guaranteed. This saves time for passengers.

Smart traffic signals can make the traffic flow with as few stops as possible. Fewer stops lead to lesser emissions. Usually more space/better flow in the transport system lead to more traffic until a new balance is created. With smart traffic signals the traffic into the city can thus be controlled, and the environmental winnings can remain. Possible queues can be controlled outside the city where the environmental impacts not are as big.

The objective of the work package is to implement and demonstrate new systems for traffic management. New systems are often expensive to implement, as time for barriers often is needed. New systems must be implemented and tested for achieving new knowledge. The MatriX system originates thus from earlier EU-funded projects and a lot of knowledge is re-used. This means large cost benefits in the need of developing software. The large costs can be derived to software license and local adjustments in order to work under Stockholm/Swedish conditions.

Regarding the measure accessible road network (street) data (11.4) the rather complex process needed to achieve the project’s goal could not be expected from small organisations or working units. Even though it is mainly within these businesses and areas of work the big benefits appears. The conclusion is that the investment and initiative must come from a higher level that have the possibility to overview the total effect for the whole municipality and for the society.

Benefits are found mainly within the different cases where data is used. The positive effects are more efficient planning, better quality in decisions and products and lower transportation costs in terms of time and environmental impact. The isolated effects are thus that small that it is difficult for each separate unit to take responsible for such a complicated and complex process. Many of the positive economical effects are likely to occur many years from now and are therefore very difficult to predict or measure. The
total sums of benefits from the investments are believed to be far greater than the investments made, although it might be difficult to measure more precise.

The measure 11.7 *High-level service bus routes* have had strong economic impacts for the communities, land had to be bought. The type of project requires heavy operational and investment budgets, as well as possible requests for subsidies.

The implementation of a high-level service bus route does not involve a major change of tendencies. It is a part of a puzzle, which makes it possible to obtain a significant impact on the travel behaviour of the inhabitants by decreasing car flows and reduces pollution on the considered district. It also reduces the costs of maintenance of the sites and reduces the negative environmental impact.

### 8.1 Positive aspects, problems and solutions

**Delayed payments**

The economical barriers have mainly been delayed payments from local authorities as well as the Commission. The delayed payments from the local authorities have been connected with political issues (see Political and administrative barriers and drivers). Delayed payments from the Commission have caused problems with the financing of the work being done. Some partners have not been able to lay out money so they had to discontinue the work while waiting for the money.

**Timing – investment cycle**

The timing of 11.5 (more adaptive signal control in a bus priority system) wasn’t in the light of the investment cycle of traffic control equipment optimal as the roll-out of present bus priority scheme was just finished. Four out of five blue-bus routes has been put into operation concluding a city-wide upgrade of the bus network and facilities, including upgrading of traffic controllers for bus priority (PRIBUSS) abilities. A lot of equipment, mostly traffic controllers, has been exchanged over the last years in order to renew the stock of equipment and replace obsolete technology. Both these circumstances lead to hesitation, as these investments needs to pay off before planning for their replacement.

**Shared data- investments and benefit**

The measure 11.4 (Accessible road network (street) data) has been about a new area in the computer area. From a state where data is being used isolated data is now starting to be shared inbound the organisation and on cooperation with others. This is the great possibility but also a great challenge. Since the budget in the municipality often is handled by separate unities in the municipality all of these units must contribute to the costs and efforts to incorporate their systems with the larger concept. Most people agree on that the overall effect for the municipality as such is of great value. But on the other hand there are many needs in each unity that might be thought of as more urgent seen from the smaller perspective. The strategy here has been to store such data in the road network database that is of interest for everyone so that each unity by their own will are interested in cooperation. The fact that each unity is autonomous is somewhat special for Sweden and is of great value sometimes but in cases like this (where other countries would just put up a policy for everyone to follow) it has been one of the challenges for the project and a rather time consuming such.
The fact that many of the positive effects of an investment like this is likely to occur in the future and in areas not directly connected to the areas in which the investments are made have made it more difficult to find acceptance for the investments. This project have been fortunate enough to have foreseeing management and government that have been able to understand all positive effects that might, and hopefully will, come from this project.

Construction work – consequences, financing and fears
Specific creations of bus lanes involve modifications of roadway, sometimes imposing modifications of construction under commune competence (street lighting, parks etc.). The financing of such construction work with a metropolitan dimension is yet to be solved in some cases.

Shops in the area of the construction work also fear loss of turnover during the period.

8.2 Comparison and conclusions
The fact that there has been part of an EU-project has helped to get decisions and support from local politicians and city servants.
9. Synergies

9.1 Need for supplementary measures

The cities within Trendsetter, just as Trendsetter as a whole, have an integrated approach for obtaining sustainable cities. Measures carried out as part of a greater whole have had synergy effects and been a great driver. The event Cultural Capital in Graz 2003, and with that effort on comprehensive plans and work, was a driver for several Trendsetter measures in Graz. Also in Lille other ongoing projects matched the objectives with the Trendsetter measures and worked as a driver.

Other examples where supplementary measures have contributed for creating a greater whole are 11.3 and 11.1. In 11.3 bus lanes with priority for PT and promotion of traffic participants’ use of Internet and GSM have been carried out besides the dynamic traffic management system in Graz (11.3). Besides the Technical basis for an efficient customer focused operation and information (11.1) low-floor buses and trams were ordered and customer friendly stops were built up. All for improving the customer orientation of the public transport system. The planning on high level service bus lanes (11.7) develops the agglomeration and the image of the cities crossed. Some mayors are very motivated for the project and are acting as relays of information towards the citizens. This functions as an accelerator for the measure.

In the accessible road network (street) data (11.4) more data/information from other databases need to be linked. Users of the system also need to be educated about the system, and coming users need to be informed that the database actually works. Data also need to be spread to external users.

Other measures, as 11.7 implementation of high level of service bus routs, must be done in conjunction with the other construction initiatives and in respect and coherence with other initiatives and local urban specificities.

Projects affecting each other are not always positive. You must be aware of how different measures can affect each other and take action of that. The affect can then be positive instead of negative.

Shortly, (after the Trendsetter-period) some measures will be complemented for further improvements. The MatriX system (11.2) consists of two different levels in use, the monitoring respectively the control levels. The first step is to increase the number of input sources (sensors e.g.) in strategic points. Today the sensors are concentrated in a finite area of the road network, since the main objective with most of the sensors are automatic incident detection and traffic management. With the complement of probes, or Floating Car Data (FCD), a larger road network will be covered. This is already under development.

The second step is to implement the control function. The MatriX system will have a “global” knowledge of the current traffic conditions and will be able to control traffic signals (SPOT) through the superior interface Utopia.
If both steps are successfully implemented, Stockholm will have a complete MatriX system including the control functionality.

Measure 11.5 has shown that there is a potential of local emission control. During 2005, based on the work done in Trendsetter, a new calibrated Swedish emission model will be developed within the Vissim simulation package.
10. Political and Administrative Aspects

10.1 Overview of major political and administrative aspects influencing the measures

Proper city planning
A proper city planning and regional planning is fundamental for reaching a sustainable transport system. Traffic management cannot overcome large capacity problem itself, but different measures in combination can make difference.

Measure 11.6 (More adaptive signal control in a bus priority system) is in line with adopted transport policy principles of the City of Prague. It contributes to increase the prestige of public transport. Benefits perceived from the users perspective will be apparent no sooner than after introduction of a greater number of intersections with signal timing control within integral segments resulting in higher time savings.

A coherence of city planning documents can be created by different measures. Measure 11.7 have made buses not only a accessible mean of transport, it is also a tool of urban renewal and economic development which makes it possible to better coordinate town planning, housing, installation and transport in a sustainable development perspective. There has also been a change of image of the agglomerations and cities crossed by the lines.

Information
It is important to inform politicians about problems that need to be taken care of. It is also important to have the city’s management committed to the project. There is a lot to win if the information is given in the best possible way. The information should be simple and uncomplicated, and the politicians should be informed at the right moment. The provincial government of Styria, the town-council of the city of Graz and the 'Grazer Stadtwerke AG - Verkehrsbetriebe' recognized the importance of measure 11.1 very early. This resulted in a jointly planning and financing of the measure. Also politicians in Lille have had a very strong interest and involvement in the measures, and gave almost a personal commitment to them.

Politics and budget
It is important that decisions regarding the measure are made together with an allocated budget. This is especially important between two legislative periods. A late decision on the finances delayed the whole traffic management system (11.3) two years. The previous city council in Graz had taken the content related decision without being able to provide the necessary finances. To adopt the program for the financial framework of the proceeding period the measure had to be redesigned, partly reduced and transformed into a step by step strategy before the financial decision could be taken. The promised budget from the region of Styria wasn't released as planned either. Experiences from Germany point into a similar direction: -even in the case that all processes and cooperation run smoothly, an implementation of a traffic management system takes several years.
Accepted platforms

The Stockholm implementation of the MatriX system originates from earlier EU-funded projects. The MatriX platform has then been accepted and evaluated in some towns in Europe and where positive effects have been received. That makes it easier to market the concept in Stockholm.

Different stakeholders also need listen and discuss with each other. For example the police in Prague didn’t want the measure 11.6 More adaptive signal control in a bus priority system. This could be a problem, but was in this case solved.

If the decisions can be committed during a longer period, the measures can be more long-lived. The continuity of the lanes for the high-level bus routes (11.7) is sometimes subordinated to the agreement of the mayors who debate the conditions of installations affecting the parking.

New opportunities- new organization

New opportunities affect the way of organization. Several questions have been raised because of all the things made possible of the accessible road network (street) data (11.4) and its new approach. Organisations that normally make a profit of selling data or a profit of the fact that data is hard or impossible to access may have to reconsider their business or pricing strategy. On the other hand there is a lot of new opportunities in the area of data preparation, data packaging and providing end user services using the new data. A significant problem is all “secret” data where the owner don’t want to share data because of data consists of business confidential information or other security aspects such as information that could be useful for criminals, hostile states or terrorists. A lot of these data could probably be shared if given a second thought. Another security aspect is the possibility to create or extract data from cross analysis of data where the result normally should be considered secret because of the possibility to identify information about individuals or companies. It is important to straighten out responsibilities, copyrights, sharing of investment costs given the fact that benefits will appear in other businesses than the ones that will produce original data.

Increased systems for traffic management and control will change the work within the transport system area. The focus on possibilities with TMS will increase. New organisations are needed for running the technical systems that are implemented.
11. Up-scaling and Transferability

Several of the measures in the WP are prepared for up-scaling, and there is an intention of doing it. Some measures can be up-scaled to a larger area, while others will be further developed and up-scaled in that way. Other measures are already in full scale, but can still be developed.

Regarding the technical basis for an efficient customer focused operation and information (11.1), an enlargement of the system by all transport operators in the region of Graz is already intended. All transport operators have been informed of the ongoing project at the very beginning of the project. Furthermore the system is prepared for enlargement.

In Stockholm a number of activities are identified as potential up-scaling factors of the MatriX-system (11.2):

- Expansion of sensors on the main roads, including FCD.
- Carry out a plan regarding where to strategically place sensors in an optimal way for MatriX, or other traffic models, purpose.
- Implementation of the control function in MatriX to be able to manage and balance traffic jams with traffic signals in some strategically areas
- Use MatriX output as input to Variable Message Signs
- Learn more about the environmental model used in MatriX
- Implementation in Traffic Management Centre and adjustment to the superior traffic management interface

The dynamic traffic management system in Graz (11.3) will cover the whole city area and will step by step include additional modules. More traffic lights can be equipped to allow interference by PT. This will thus be decided after the system has been implemented. A central management unit will be installed.

Regarding the accessible road network (street) data (11.4), there is no need for up scaling the measure. The project in not a pilot or test, all roads within the Municipality of Stockholm are stored in the database. The database covers the whole network but of course it is important to exchange data with other Cities/Municipalities around Stockholm and the national road network. To the benefit for different ITS services (traffic information, navigation systems etc.) more roads than those within the Stockholm area must be involved.

Regarding the measures more adaptive signal control in a bus priority system, the potential of up-scaling in Stockholm (measure 11.5) is about ten new areas similar to the Trendsetter area as a first shot. When up-scaling several aspects needs to be taken into account. The city’s budget is not the only matter that settles the possibility. Taking sources of hesitation into account, the very system tested within Trendsetter is rather limited. Sources that limits the potential of up scaling are as example the investment-cycle, development needs, the very busy local supplier, the very limited number of trained, educated and skilled persons available for installation, operation and maintenance and costs to acquire them. The results from using adaptive technology in traffic control has however inspired the City of Stockholm to develop the use of existing equipment
with the objective to achieve the same level of improvement for the environment as in Trendsetter during year 2005 - 2007.

In Prague gradual up scaling of the measure (11.6) is planned, based on good results of the first 2 (and following 5) intersections. The additional intersections with the system will be placed in compact areas with busy bus traffic.

In Lille preparation for additional three high level service bus routes have been prepared and planned to be brought into service at the end of 2007. In a longer perspective 12 bus routes are expected to be implemented. The objective of these lines is to anticipate a more ambitious project: the tram-train.

Knowledge has been transformed between the cities (see 4.3 Interaction within WP/Civitas).
12. Assessment of All Measures

The table below gives a rough overview of the assessment of all measures.

<table>
<thead>
<tr>
<th>Implementation (as planned/partly/not implemented)</th>
<th>Fulfilment of measure objectives (yes/partly/no)</th>
<th>Contribution to WP objectives (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1 Technical basis for an efficient customer focussed operation and information</td>
<td>Partly</td>
<td>Yes</td>
</tr>
<tr>
<td>11.2 Traffic monitoring and supervision</td>
<td>Partly</td>
<td>Partly</td>
</tr>
<tr>
<td>11.3 Dynamic traffic management system</td>
<td>Not implemented yet</td>
<td>Partly</td>
</tr>
<tr>
<td>11.4 Accessible road network (street) data</td>
<td>As planned</td>
<td>Partly</td>
</tr>
<tr>
<td>11.5 More adaptive signal control in a bus priority system</td>
<td>As planned</td>
<td>Yes</td>
</tr>
<tr>
<td>11.6 More adaptive signal control in a bus priority system</td>
<td>As planned</td>
<td>Yes</td>
</tr>
<tr>
<td>11.7 High level service bus routes</td>
<td>As planned</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Comments to the table:

Technical basis for an efficient customer focussed operation and information (11.1)
The process of implementation is not fully completed, slight adaptation activities are still ongoing especially concerning stability of the system and passenger information.

Traffic monitoring and supervision (11.2)
There has been a delay in the progress of the work compared to the work plan, due to financial cutback. It has influenced the project with approximately half a year. The newly opened huge tunnel system in southern Stockholm, Södra Länken, has also delayed the project with about half a year according to implementing the new infrastructure, updating O/D matrices and so on. The tunnel system has changed the travel patterns a lot in the Stockholm region, so it’s reasonable to let the system find the new equillibrium before evaluations in the field is taking place. Continuous work is done to review the quality of traffic data coming from the road equipment. Both from fixed sensors and probe vehicles. It is important to check the whole chain from input to output.

Not achieved milestones/deliverables will be delivered after the time frames of the project.
Dynamic traffic management system (11.3)
The whole traffic management system was delayed two years due to problems concerning the necessary budget. The measure will be fully implemented by 2006. The content related decision had not been linked to the financial decision and the promised budget from the region of Styria wasn't released as planned.

The planned P&R guidance system could not yet be implemented within this first step of development of the traffic management system, as the new organization responsible for parking management and the project team of the traffic management system could not yet agree about financial and technical details.

Some emphasis was put on the implementation of an innovative online illustration of the real time traffic situation, as this will be needed to communicate all traffic management measures. Yet, the implementation of this module will not be possible within Trendsetter, as the whole project started with a delay.

Accessible road network (street) data (11.4)
The objectives of the measure are fulfilled, with exception of development of an external interface. Work with this will thus take place within soon.

More adaptive signal control in a bus priority system (11.5)
Work has carried out as planned.

More adaptive signal control in a bus priority system (11.6)
Work has carried out as planned.

High level service bus routes (11.7)
The measure is formally on line with the contractual plans. Some deviations from the initial objectives have thus been made.
PART D – Conclusions and Recommendations

Information is the solid ground for efficient management of the road transport system. Measures within the WP have increased the information, so the management systems have developed/ been implemented. The traffic management leads to better traffic flow, energy savings and environmental effects.

Traffic management systems do not control the demand, but optimize the traffic flow. A consequence of the increased accessibility can be increased traffic. Sticks are thus needed.

| Traffic management systems- solid ground for efficient management of the road transport system | Traffic management systems do not control the demand, but optimize the traffic flow |
| ⇒ better traffic flow | ⇒ Increased accessibility |
| ⇒ environmental effects | ⇒ Increased traffic!! |
| ⇒ Sticks needed! |

Traffic information and control and improved public transport traffic flow lead to environmental effects without major changes in behavior. Other measures, as real time information signs, make public transport more attractive and accessible. Measures/support as this is important when people are trying to change their travel patterns, i.e. travel with PT instead of their own car.

13. Barriers and Drivers of the Measure Implementation

13.1 Technical barriers and drivers

Barriers

Organizational aspects
Increased systems for traffic management and control will change the work within the transport system area. The focus on possibilities with TMS will increase, and focus on road investments decrease. This has led to stress in the organisations of today. A paradigm shift/mind shift is needed in organizations, for being able too see and work with the possibilities of the new systems.

Lack of support- internally and externally
Support is important when new systems are developed. It can work as a driver, while lack of it can be a barrier. Peoples doubts of systems used, i.e. MatriX, have been a barrier.
People also want to work with the system in their own way. Several experts do not see MatriX as a system, but a model.

**Suppliers**
The use of only one supplier for building the main system has been a problem for 11.4 (Accessible road network (street) data). This has caused suspicion from other vendors and suppliers that have to adhere to technology produced by someone else (but smaller than for example Microsoft or other large vendors). In spite of this there is a tendency amongst several vendors to try to lock their customers to the specific solutions of that company and these issues is something that the project have had to deal with.

**Data from other systems**
Working with real time information is complex. It is dependent on delivery of data from other systems (sensors e.g.). It is difficult to find errors in the description of the road network. It is also a problem to control changes done in other systems that may affect the MatriX system (chain reaction that may affect MatriX output badly)

**Delays**
Delays in parts of the technical systems have been barriers, i.e. late availability of second data radio system or early positioning of real time information signpost in combination with the delay in the implementation.

**Drivers**
- Road operators want to get an overview over the current traffic situation and manage it. Now there are systems available that can help this.
- Experience from earlier projects and successful implementations

Within all measures in work package 11, experience from earlier projects and successful implementations have acted as good examples and drivers. With reused information time and money have been saved. As example, the MatriX system originates from earlier EU-funded projects (partly “Quartet plus” and “Cleopatra”) and a lot of knowledge has been re-used. The main development work (and costs) of the system had already been done, i.e. adjustment of well-established techniques to local conditions. Time and money can be spent on further development. The system is implemented (or nearly implemented) in some areas. The following applications of the Town Supervisor (MatriX) are established; Stockholm, Napoli, Autostrada Padova -Venezia, Eindhoven demo, Rome, Torino. This means that the system is well disseminated through Europe.

The system manufacturers of MatriX have a lot of experience from the development of the system, which ensures a stable platform and possibilities to make local adjustments.

Experience within Trendsetter have also been used, i.e. interaction between measure 11.5 in Stockholm and 11.6 in Prague (More adaptive signal control in a bus priority system).
13.2 Synergies barriers and drivers

Measures carried out as part of a greater whole have had synergy effects and been a great driver. Efforts on comprehensive plans and work prospecting the Cultural Capital in Graz 2003 were a driver for Trendsetter measures in Graz, “Kulturhauptstadt Graz 2003” indeed was a driver for a dynamic passenger information system” (11.1). Also in Lille other ongoing projects matched the objectives with the Trendsetter measures and worked as a driver. For 11.6 a driving force of the measure implementation was the commitment of all actors to concentrate all their abilities and efforts to achieve successful completion of the proposed measure.

Projects affecting each other are thus not always positive. You must be aware of how different measures can affect each other and take action of that. The affect can then be positive instead of negative.

The city administration and leadership also needs to have an open mind for synergies with other authorities. Regarding 11.5 (More adaptive signal control in a bus priority system) monitoring, data exchange, control and operation policies need to be synchronised for best flexibility in the traffic management. Current directives for different departments do not address this strongly enough.

13.3 Political and administrative barriers and drivers

Political opposition or support can be the crucial barrier or driver for a measure. Politicians must also be informed about problems that need to be taken care of. There is a lot to win with simple information at the right moment. A driving force has been politicians’ commitment and strong interest and involvement in the measures. Politicians in Lille have had a very strong interest and involvement in the measures, and have almost given a personal commitment to them. 12

Preparing decisions for the city team have been the main problem for other measures. A time-consuming decision process about content and finance, e.g. the necessity to bring the design of the measure in line with the given financial possibilities, had almost caused a stop of measure 11.3. It ended with a delay by two years as the content related decision was taken before the financial decision could be agreed about. Experience from other cities show that the implementation of a traffic management system takes several years, even in the case that all processes and co-operation run smoothly.

Different stakeholders need to listen and discuss with each other. The city administration and leadership also needs to have an open mind for synergies with other authorities. As example monitoring, data exchange, control and operation policies of different measures need to be synchronised for best flexibility in the traffic management. This needs to be addressed in directives for different departments.

Delays in payments have i.e. emerged due to election. When a new legislative period has started, financial frameworks have changed and the promised budget has thereby not been released as planned.

12 Notes from Graz
An administrative issue that need to be straightening out is questions connected to more accessible data. The issues concern security, economy and ownership. It is important to straighten out responsibilities, copyrights, sharing of investment costs given the fact that benefits will appear in other businesses than the ones that will produce original data.

A significant problem is all “secret” data where the owner doesn’t want to share data because it contains business confidential information or other security aspects such as information that could be useful for criminals, hostile states or terrorists. Another security aspect is the possibility to create or extract data from cross analysis of data where the result normally should be considered secret because of the possibility to identify information about individuals or companies.

There are also organizational issues that need to be taken care of when going from road operator to system operator. For avoiding stress in the organization, and instead being able to focus on the possibilities with new transport management systems, a paradigm shift/mind shift is needed.

13.4 Economical barriers and drivers
The economical barriers have mainly been delayed payments, both from local authorities and the Commission. The delayed payments from the local authorities have been connected with political issues (see Political and administrative barriers and drivers). Delayed payments from the Commission have caused problems with the financing of the work being done.

13.5 Organizational barriers and drivers
The timing of 11.5 (more adaptive signal control in a bus priority system) wasn’t in the light of the investment cycle of traffic control equipment optimal as the rollout of present bus priority scheme was just finished.

Measure 11.4 (Accessible road network (street) data) has been about a new part of the computer area. From a state where data is being used isolated data is now starting to be shared inbound the organisation and on co-operation with others. This is the great possibility but also a great challenge. Since the budget in the municipality often is handled by separate unities in the municipality all of these units must contribute to the costs and efforts to incorporate their systems with the larger concept. Most people agree on that the overall effect for the municipality as such is of great value. But on the other hand there are many needs in each unity that might be thought of as more urgent seen from the smaller perspective.
14. Lessons to Consider for Replication and Take-up by Other Cities

14.1 Technical issues

- Extra time in time schedule Also small scale measures give results- i.e. a few crossings with bus priority
  Unforeseen delays can happen to all measures (technical, political, economical etc)- have some extra time for unforeseen matters in the time schedule.

- Test before- inform actively if problems occur when established
  Unforeseen problems with technology can occur. Thoroughly and intensive testing of the technology can avoid some troubles. Realize measures in subsequent steps. If deviations or problems occur, inform actively about this and about the planned solution of the problem.

- Tendency amongst several vendors to lock customers to specific solutions of one company- use several vendors

- Also small scale measures give results- i.e. a few crossings with bus priority

- Thorough technical documentation needed for upgrading and integration!

- Use open interfaces to ensure upgrading of systems, integration of systems, multi vendor philosophy

- Perform local assessment before investments in new system

- Experience say that local conditions such as network and intersection design, overall traffic control policies and most important, the situation before, has more to say about the results (in percent) than the actual system installed (bus priority).

- Large changes in the road network may affect much of the work done in traffic control systems i.e. MatriX. O/D matrices has to be updated regarding to changes in the travel patterns, the changed areas has to be updated with the new/changes road network as well as changes within the road side equipment.

- Involve staff who should work with traffic management early in the process, for increased acceptance.

- Have basic conditions regarding road network models and in-data sources clear from the beginning of the project. Up-scaling is not only equal to up-scaling to a larger area. Up-scaling can also be equal to improvements of the service of the transport management systems leading to more efficient management.

  As example, the difficulty with bus priority is to give buses priority and still maintain the traffic flow for the rest of the traffic. A well-developed priority system in a small area (where the traffic flow for the rest of the traffic is maintained), is better than a less developed bus priority in a bigger area where a lot more traffic may be disturbed. The same discussion goes for other traffic management systems.
• Working technical system

Working technical systems is a basic condition for a well performed implementation. When a system for priority of PT is implemented, a communication system between vehicles and signposts is needed. The system used in Graz (11.1), WLAN (wireless LAN) is very innovative. It works well, but there is still need for improvements of the reliability of the system.

• Floating car data- complement to earn speed data

Floating Car Data, FCD, has shown up to be a good complement to earn speed data in a significant larger road network compared to the network covered by fixed sensors. It is a cost-efficient solution if it is processed as a win-win-solution for all the involved parts.

• Modern technology- new tools

Slimmed organizations need to seek for rational operation and development of their systems. Modern technology allows for heavy and complex computations and new algorithms are easier managed with more user-friendly interfaces. It does not replace the need for traffic know-how and experts, but it sure supports their work with better information over the system performance.

• New systems not always the best- perform local assessment

Regarding bus priority systems, experience say that local conditions such as network and intersection design, overall traffic control policies and most important, the situation before, has more to say about the results (in percent) than a the system installed.

14.2 Synergies

• Carry out measures as a greater whole- synergy effects!

• Combine indirect measures with direct measures- makes results more visible for the public

14.3 Political and administrative issues

• Brave politicians- Brave politicians are needed for showing the way foreword.

• Political opposition/interest- crucial barrier or driver

• Political decisions- risks for delays in projects: decisions on content and finances should be taken at the same time.

• Common understanding

A common understanding of the usefulness of the measure is important for a successful implementation phase. Jointly planning and financing of the measure is one way for achieving this.
• Communication- Implement a consistent and systematic communication flow with the citizens, and explain the long term benefits as opposed to the short term problems.

• Cooperation- Involve the stakeholders by explaining the project as clearly as possible, and by specifying the economic impact, the valorization of the employment poles, the savings in travel time, etc.

• Organisational aspects important when introducing new operation systems and new cooperation- be aware and structure!

• Land acquisition issues- manage problems of land acquisitions as early as possible

• It is important to inform politicians about problems that need to be taken care of. There are thus a lot to win if the information is given in the best possible way – simple, uncomplicated, at the right moment.

14.4 Economical issues

• Re-use output

Re-use of output from earlier projects is a way of saving money, resources and time.

• Settle decisions on the finances before the projects start; late decisions may delay the projects.

• If possible, it is good to have money prepared so late payments (local or from the commission) won’t stop or delay a measure. It is also recommended to have the money, and not only a promised budget, for the project before it starts. A promised budget can be taken away in case of i.e. an election
15. Recommendations to EC and Other Actors

How EC and other actors (national) might help when implementing measures.

Policy work
Policy work can work as a starting point/stick. It can also create a greater whole in projects, which benefit synergy effects.

Interoperability
Ensure that work is carried on that ensures that heterogeneous systems can work together. It is then possible to co-operate and integrate systems. It is thus often against vendors interest.

Support
Support projects such as TRENDSETTER as they serve well as drivers for projects on local level. The cities cannot easily cut the budgets of EU-supported measures. The measures will then be carried out. The measures carried out can also give synergy effects.

Cooperation
Persuading all market actors to cooperate is essential to achieve higher goals and synergy effects. This can be done by official standards that can be used as demands when buying solutions. It can also be done by placing demands on the suppliers more direct and precise. One should not expect the vendors to take responsibility in this by their own, since this somewhat might be in opposition to their own needs of preserving their own market and they might not be aware of the needs on the larger perspective of the municipality or organization.
# Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Subgroups</th>
<th>No</th>
<th>Measure</th>
<th>City</th>
</tr>
</thead>
<tbody>
<tr>
<td>WP5 Access Restrictions</td>
<td>Environmental Zones</td>
<td>5.1</td>
<td>Widening of the Environmental Zone</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>5.2</td>
<td>Widening of Environmental Zone for vehicles &gt; 3.5 tons</td>
<td>Prague</td>
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<tr>
<td></td>
<td></td>
<td>5.6</td>
<td>Congestion charging</td>
<td>Stockholm</td>
</tr>
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<td></td>
<td>Strolling zones</td>
<td>5.3</td>
<td>Implementation of strolling zones</td>
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<td></td>
<td></td>
<td>5.4</td>
<td>Establishment of a car-free zone in the inner city</td>
<td>Pecs</td>
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<tr>
<td></td>
<td></td>
<td>5.5</td>
<td>Preparation of a new traffic and transport strategy</td>
<td>Pecs</td>
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<tr>
<td>WP6 Integrated Pricing Strategies</td>
<td>Smart Card Systems</td>
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<td>Smart card systems and integrated ticketing</td>
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<td></td>
<td>6.2</td>
<td>Smart card systems and integrated ticketing</td>
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</tr>
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<td></td>
<td>Parking</td>
<td>6.3</td>
<td>Reduced parking fees to promote clean vehicles</td>
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<tr>
<td></td>
<td></td>
<td>6.4</td>
<td>Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles</td>
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<td></td>
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<td>Establishment of a zone-model parking in the central city area</td>
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<td>WP7 Public Passenger Transport</td>
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<td>Increasing public transport passengers</td>
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<td>Customer friendly stops for bus and tram</td>
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<td>Public transport safety</td>
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<td>Public transport safety</td>
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<td></td>
<td>PT intermodality</td>
<td>7.3</td>
<td>Intermodal local/regional transport interchanges</td>
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<td></td>
<td></td>
<td>7.4</td>
<td>Seamless linkage of modes</td>
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<td></td>
<td></td>
<td>7.6</td>
<td>Park and Ride facilities</td>
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<td>Linking different ways of public transport</td>
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<td>WP8 New Forms of Vehicle Use</td>
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<td>New services and services for special customer groups</td>
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<td>Car pooling/sharing</td>
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<td>Company mobility plan in the administration fleet</td>
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<tr>
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<td></td>
<td>8.3</td>
<td>Increasing car occupancy</td>
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<td></td>
<td>Awareness rising</td>
<td>8.4</td>
<td>Site level Mobility Management</td>
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<td></td>
<td>8.5</td>
<td>Urban Mobility Plan</td>
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<td>WP9 New Concepts for the Distribution of Goods</td>
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<td>Material logistic centre – to optimise freight deliveries at construction site</td>
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<td>9.2</td>
<td>Distribution of goods - Green city logistics</td>
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<td>Work Package</td>
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<td>WP 10 Innovative Soft Measures</td>
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<td>Innovations in bicycle transport</td>
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<td>Make bicycling attractive (B&amp;R information on the Internet)</td>
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<td>Trip planning</td>
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<td>Creation of a visitor web for optimal trip planning</td>
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<td>Marketing/information and quality management</td>
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<td>Awareness of clean transport and safety</td>
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<td>Awareness for speed reduction and less car use</td>
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<td>Taxi drivers as information multipliers for clean transport</td>
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<td>WP11 Integration of Transport Management Systems</td>
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<td>Traffic monitoring and supervision</td>
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<td>11.3</td>
<td>Dynamic traffic management system</td>
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<td></td>
<td>11.4</td>
<td>Accessible road network (street) data</td>
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<td>Improving PT traffic flow</td>
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<td>More adaptive signal control in a bus priority system</td>
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<td></td>
<td></td>
<td>11.6</td>
<td>More adaptive signal control in a bus priority system</td>
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<td>11.7</td>
<td>High level service bus routes</td>
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<td>Technical basis for an efficient customer focussed operation and information</td>
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<td>WP12 Clean Public and Private fleets</td>
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<td>Clean and efficient heavy vehicles</td>
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<td>Biogas bus fleets</td>
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<td></td>
<td>12.3</td>
<td>Clean and user friendly bio-diesel bus fleet</td>
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<td>Waste collection with biogas-vehicles</td>
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<td>Light vehicles</td>
<td>12.4</td>
<td>Clean municipal fleets</td>
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<tr>
<td></td>
<td></td>
<td>12.5</td>
<td>Clean municipal fleets</td>
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<tr>
<td></td>
<td></td>
<td>12.7</td>
<td>Bio-diesel taxi fleet and bio diesel service station</td>
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<td></td>
<td>12.11</td>
<td>Making Clean Vehicles less expensive</td>
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<td>12.13</td>
<td>Increasing clean vehicle use in private company fleets</td>
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<td>Clean fuel distribution</td>
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<td>Optimisation of the bio-diesel collection system</td>
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<tr>
<td></td>
<td></td>
<td>12.9</td>
<td>Analysis of the biogas experience</td>
<td>Lille</td>
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<td></td>
<td></td>
<td>12.10</td>
<td>Improved biogas refuelling infrastructure</td>
<td>Stockholm</td>
</tr>
</tbody>
</table>
Appendix 2 – Trendsetter cities

The five Trendsetter cities are described below.

Graz

With nearly 230,000 inhabitants, Graz is the second largest city in Austria, the capital of the Styria province and the cultural, economic and university centre of the region. About 80,000 commuters travel to the city of Graz daily. On an average weekday, 47% of commuters travel by car, 19% use public transport, 20% are pedestrians and 14% cycle.

Graz has a historic centre with many pedestrian precincts and much bicycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city area (except major roads) and the first Austrian city to open a mobility centre.

The main problem Graz faces is the rise of car use due to a tendency of people moving to the city outskirts. The increasing traffic as well as the topography and climate in Graz, lead to high air pollution levels in the city. Information technology will be used to make public transport more user-friendly and the services more attractive.

The following measures have been implemented in Graz within Trendsetter

<table>
<thead>
<tr>
<th>Measure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
<td>Strolling zones Implementation of strolling zones</td>
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<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
</tr>
<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Information to passengers</td>
</tr>
<tr>
<td></td>
<td>Integration</td>
</tr>
<tr>
<td>New Forms of Vehicle Use (WP8)</td>
<td>Vehicular</td>
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<td>Non-vehicular</td>
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<td>New Concepts for the Distribution of Goods (WP9)</td>
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<tr>
<td></td>
<td>Road logistics</td>
</tr>
<tr>
<td>Innovative Soft Measures (WP10)</td>
<td>Bicycle measures</td>
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<td>Traffic information</td>
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</tbody>
</table>

The map below shows the City of Graz.
Lille

Lille Metropole in France is an urban network of 85 communes with 1.2 million inhabitants. The community is close to the Belgian border and cooperates closely with its counterparts in Belgium. It is a base for distribution and a node for major routes north-south and east-west in Europe. Lille has built up a strong public transport network. On an average weekday, 150,000 passengers travel by bus, tram, commuter trains or metro. The following measures have been implemented in Lille within Trendsetter:

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<thead>
<tr>
<th>Work Package</th>
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<th>Measure description</th>
<th>Measure No</th>
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</thead>
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<tr>
<td>Integrated pricing strategies (WP6)</td>
<td>Smart Card Systems</td>
<td>Smart card systems and integrated ticketing</td>
<td>6.2</td>
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<tr>
<td>Public Passenger Transport (WP7)</td>
<td>Public Transport safety</td>
<td>Public Transport Safety</td>
<td>7.2</td>
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<td></td>
<td>Public Transport intermodality</td>
<td>Intermodal local/regional transport interchanges</td>
<td>7.3</td>
</tr>
<tr>
<td>New forms of vehicle use (WP8)</td>
<td>Car pooling/sharing</td>
<td>Company Mobility Plan in the administration fleet</td>
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<tr>
<td>Integration of Transport Management Systems (WP11)</td>
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<td>High Level Service Bus Routes</td>
<td>11.7</td>
</tr>
<tr>
<td>Clean Public and Private Fleets (WP12)</td>
<td>Heavy vehicles</td>
<td>Biogas Bus Fleets</td>
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<tr>
<td></td>
<td>Light vehicles</td>
<td>Clean Municipal Fleets</td>
<td>12.5</td>
</tr>
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<td>Clean Fuel distribution</td>
<td>Clean Fuel distribution</td>
<td>Analysis of the biogas experience</td>
<td>12.9</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Lille.
Pécs

The City of Pécs with 170,000 inhabitants is a middle-sized cultural, educational, commercial and health centre in Hungary, 40 km from the Croatian border. In the last decade the number of cars and the number of tourists and students have increased rapidly, creating a huge demand for parking spaces and public transport. In November 2000, the early Christian burial chambers in the city centre received UNESCO World Heritage status, providing the municipality with new tasks to protect and preserve the heritage.

The following measures have been implemented in Pécs within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure</th>
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</thead>
<tbody>
<tr>
<td>Access Restrictions (WP5)</td>
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<tr>
<td>Strolling zones</td>
<td>Strolling zones</td>
<td>Preparation of a new traffic and transport strategy</td>
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<tr>
<td>Integrated Pricing Strategies (WP6)</td>
<td>Parking</td>
<td>Establishment of a zone-model parking in the central city area</td>
<td>6.5</td>
</tr>
</tbody>
</table>

The map below shows the location of the parking-zones and the access restriction areas in Pécs.
Prague

The City of Prague is the capital of the Czech Republic and the country’s largest city with 1,300,000 inhabitants. On an average weekday, 44% of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 160 million passengers per year uses the public transport system in Prague.

Prague has a high concentration of both political and economic administration, industry, trade, education, research and tourism. This requires good traffic management. One of the biggest problems is the very fast increasing number of private cars. It has more than doubled since 1990. A new traffic policy promotes public transport, development of traffic infrastructure and regulation of car traffic, particularly in the city centre.

The following measures have been implemented in Prague within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure nr</th>
</tr>
</thead>
<tbody>
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<td>Access Restrictions (WP5)</td>
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<td>Widening of Environmental Zone for vehicles &gt; 6 tons</td>
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<tr>
<td>Public Passenger Transport (WP7)</td>
<td>PT intermodality</td>
<td>Linking different ways of public transport</td>
<td>7.7</td>
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<tr>
<td>Integration of Transport Management Systems (WP11)</td>
<td>Improving PT traffic flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.6</td>
</tr>
</tbody>
</table>

The map below shows the geographical context of measures in Prague.
The City of Stockholm is the capital of Sweden and the country’s largest city with 770,000 inhabitants. On an average weekday, over 600,000 passengers travel by public transport in the county of Stockholm. Of all travellers, 46% go by car, 23% use public transport, 29% are pedestrians and cyclists and 2% use other modes.

The biggest traffic problems include an increasing number of vehicles, congestion on many main roads, heavy duty traffic, limited rail track capacity and few cyclists. Moreover, there are problems with the air quality in inner city areas especially due to a high concentration of NOx and particulate matter. Noise levels are also high.

Stockholm is improving its transport system environmentally by substituting conventional vehicles with clean ones and making logistic services more effective. Better public transport and intelligent traffic information techniques are other important fields.

The following measures have been implemented in Stockholm within Trendsetter:

<table>
<thead>
<tr>
<th>Work Package</th>
<th>Group of Measure</th>
<th>Measure</th>
<th>Measure No.</th>
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<td>Public Passenger Transport (WP7)</td>
<td>Information to passengers</td>
<td>Increasing public transport passengers</td>
<td>7.1</td>
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<td>New Concepts for the Distribution of Goods (WP9)</td>
<td>Material logistic centre – to optimise freight deliveries at construction site</td>
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<td>Innovative Soft Measures (WP10)</td>
<td>Logistic centre for Old Town of Stockholm</td>
<td>9.3</td>
<td></td>
</tr>
<tr>
<td>Bicycle measures</td>
<td>Make bicycling attractive (e.g. information on the internet)</td>
<td>10.2</td>
<td></td>
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<tr>
<td>Trip planning</td>
<td>Creation of a travel web for optimal trip planning</td>
<td>10.3</td>
<td></td>
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<tr>
<td>Traffic information</td>
<td>Traffic monitoring and supervision</td>
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</tr>
<tr>
<td>Accessible road network (street)</td>
<td>Accessible road network (street) data</td>
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<tr>
<td>Improving PT Traffic Flow</td>
<td>More adaptive signal control in a bus priority system</td>
<td>11.5</td>
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<tr>
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<td>Clean and efficient heavy vehicles</td>
<td>12.1</td>
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<td>Light vehicles</td>
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<td>12.3</td>
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<tr>
<td>Clean municipal fleets</td>
<td>Nudging Clean Vehicles less expensive</td>
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<tr>
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<td>Web portal for drivers of clean vehicles</td>
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<td>Improved biogas refuelling infrastructure</td>
<td>12.14</td>
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<td>Clean fuel distribution</td>
<td>Improved biogas refuelling infrastructure</td>
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</table>

The map below shows the geographical context of measures in Stockholm.
## Appendix 3 – Wordlist

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCCI</td>
<td>Civitas Common Core indicators</td>
</tr>
<tr>
<td>CIVITAS</td>
<td>“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes</td>
</tr>
<tr>
<td>CO2</td>
<td>Carbon dioxide</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
</tr>
<tr>
<td>GHG</td>
<td>Green House Gas</td>
</tr>
<tr>
<td>ICT</td>
<td>Information Communication Technology</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>METEOR</td>
<td>Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.</td>
</tr>
<tr>
<td>MIRACLES</td>
<td>Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>NOx</td>
<td>Nitrogen oxides</td>
</tr>
<tr>
<td>P&amp;R</td>
<td>Park and Ride</td>
</tr>
<tr>
<td>PM10</td>
<td>Particulate matters, with diameter of less than 10 μm</td>
</tr>
<tr>
<td>PT</td>
<td>Public Transport</td>
</tr>
<tr>
<td>RKF</td>
<td>Resekortsföreningen I Norden -</td>
</tr>
<tr>
<td>SEK</td>
<td>Swedish kronor (1€=9.42 SEK 2005-06-14)</td>
</tr>
<tr>
<td>SL</td>
<td>Stockholm Transport</td>
</tr>
<tr>
<td>SMIRT</td>
<td>Syndicat Mixte pour l’Intégration Réseaux et des Tarifs</td>
</tr>
<tr>
<td>SNCF</td>
<td>Société Nationale des Chemins de fer Français</td>
</tr>
<tr>
<td>TELLUS</td>
<td>Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>TJ</td>
<td>TerraJoule</td>
</tr>
<tr>
<td>TOE</td>
<td>Tons of oil equivalent</td>
</tr>
<tr>
<td>TRENDSSETTER</td>
<td>Setting Trends for Sustainable Urban Mobility</td>
</tr>
<tr>
<td>Umweltjeton</td>
<td>Special coin for low pollution vehicles in Graz</td>
</tr>
<tr>
<td>UNESCO</td>
<td>United Nations Educational, Scientific and Cultural Organization</td>
</tr>
<tr>
<td>VIVALDI</td>
<td>Visionary and Vibrant Actions through Local transport Demonstration Initiatives – – A project within the CIVITAS I initiative.</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
The European project Trendsetter involves 50 individual projects, all of which aim to improve mobility, quality of life, air quality, and reduce noise and traffic congestion. Five European cities participate to ensure real impact, by setting good examples and encouraging others to follow.

Trendsetter is part of the Civitas project and is co-financed from the European union.
Read more about Trendsetter at www.trendsetter-europe.org.
Read more about the Civitas project at www.civitas-initiative.org