Evaluation Report – Graz local activities

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PART A - Report summary

Graz is one of the five demonstration cities from the Trendsetter project – which is one of the four demonstration projects of the CIVITAS 1 initiative. From 2002 to 2005, Graz has implemented a range of projects in all 8 working fields of CIVITAS. This report describes the results of these measures.

As the measures are very diverse, it is not possible to give a concise overview of the results – it is easy to find under the subheadings in the various chapters.

On the whole, Trendsetter has been very successful in Graz. There were the usual problems and delays that come with a project of this size, but all measures have been implemented at least partly, most of them fully and some have even exceeded expectations.

In a chapter 13 in the end of the report, there is a whole range of recommendations that also stem from the experience and conclusions that could be made in the Trendsetter-Graz projects.

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.

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:

Effects on Emissions, Energy, and Mobility	Implementation time	Costs for cities
Small	Short	Low
Large	Medium	Medium
	Long	Large

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure
Time –implementation time

Areas	Categories	Emis-sions	Energy	Mobi-lity	Time	Inves-ment cost	Opera-tional cost
Convenient access to public transport	Integrated fares and smart cards	++	+	++	◕	$$$	$
	Increased public transport security	+	+	++	◔	$$$	$$
	Convenient and safe intermodality	+	+	++	◑	$$$	$$$
	Customer-friendly stops	+	+	+	◔	$$	$
	Dedicated bus lanes and priority at junctions	++	++	++	◑	$$	$
	New services for special needs	–	–	+	◔	$	$
	Quality management	+	+	++	◔	$$	$$
Trip planning for smartest choice	Real-time information helps staff and passengers	+	+	++	◕	$$$	$$
	Planning trips on the web	+	+	++	◕	$$	$
	Integrated public transport services	+	+	++	◑	$	$
Traffic management	Traffic management	++	++	++	◕	$$$	$$
Cycling	Cycling	++	++	+	◑	$$	$
Access restrictions	Zones favouring pedestrians makes cities attractive*	+	+	–	◑	$$	$
	Selective access restriction for heavy vehicles	++	++	–	◑	$	$
	Congestion charging	++	++	++	◕	$$$	$$$
Marketing attractive alternatives	Marketing	++	+	++	◕	$$	$
	Mobility management	+	+	++	◔	$$	$
Improved goods distribution	Consolidation of goods *	+	+	++	◑	$$	$
Clean vehicles and fuels	Biofuelled vehicles	++	+	–	◕	$	–
	Biofuel production	++	+	–	◑	$$	$

*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.

Evaluation level	Objectives	Responsibility
Measure Evaluation	Measure objectives	Measure leader
WP Evaluation	WP objectives	WP leaders
City Evaluation	City objectives	City coordination
TRENDSETTER Evaluation	TRENDSETTER objectives	TRENDSETTER Evaluation Manager
European Evaluation	CIVITAS objectives	METEOR, in cooperation with the Evaluation Liaison group

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.

Indicator based evaluation

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

Evaluation area	Indicator	Unit
Energy	*Energy use (total and renewable)*	*Joule/year*
Environment	*Emissions of fossil CO_2*	*Tons/year*
Environment	*Emissions of NOx*	*Tons/year*
Environment	*Emissions of PM*	*Tons/year*
Environment	*Noise levels*	*dB(A)*
Mobility	*No of trips*	*No or Qualitative 5-degree scale*
Mobility	*Travel time*	*Reduction in hours or %*
Mobility	*Quality of service*	*Qualitative 5-degree scale*
Mobility	*Acceptance*	*Qualitative 5-degree scale*

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.

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

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.

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

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

4 Overview of city

4.1 Local context (Description of city)

With nearly 240 000 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. Graz has a historic centre with many pedestrian precincts and large cycle traffic. It was the first city in Europe to implement a speed limit of 30 km for the entire city areas (except for major roads) and the first Austrian city to open a Mobility centre.

The City of Graz has a radial orientated public transport system with harmonised tariffs, uniform tickets and harmonised timetables for PT for the city and the whole province. Graz was the first city in Europe to implement a speed limit of 30 – official regulation for the entire city areas (except for major roads). The centre has many pedestrian precincts and the city administration put a lot of effort in promotion of cycle traffic. Graz was also the first Austrian city to open a Mobility centre. Graz also started to change the public bus fleet to the more environmental friendly bio-diesel fuel. The field of transport still holds a high potential for sustainable development.

The main problem Graz is facing is the rise of car use and a climatic situation that reacts specifically sensitive on air pollution. Due to a tendency of people moving their home from the city to the city outskirts. As a consequence thereof the environmental problems are rising. IT measures will be used to make public transport more user friendly and the services more attractive.

The map below shows the City of Graz.

4.2 Problems to be solved within city

The main problem Graz is facing the rise of car use due to a tendency of people changing their home from the city to the city outskirts. As a consequence thereof the environmental problems are rising.

Strolling Zones (5.3)

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.

Integrated pricing strategy for parking zones (6.4)

The parking measure in Graz aims at promoting cleaner vehicles in the city centre. Graz supports vehicles on petrol and diesel as long as the emissions of CO2 are below a threshold value.

In Graz, traffic flow has increased enormously during the last years, like in most other cities in Austria. Although Graz is well known for some of its more innovative mobility management practises, it has a particulate matters (PM10) problem. These particulate matters are mainly caused through combustion processes (industry, private households and cars). 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 supports the aim to reduce air pollution was to introduce lower parking tariff for low emission 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 the “cleaner” cars) and to motivate people to buy and use these lower emission vehicles.

Seamless linkage of modes (7.4)

- 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

Customer friendly stops for bus and tram (7.5)

To give adequate information at bus and tram stops in order to make the access to PT easier and more friendly.

New services and services for special customer groups (8.1)

- Bad PT service in times or areas of low demand (night/suburbs)
- Low usage of on demand taxi
- Accessibility for special target groups: disables and elderly

Increasing car occupancy (8.3)

- Congestion and delayed employees
- Increase car occupancy for connections outside of the city to areas with poor PT
- P&Pool lots are not available in Graz, and some people just gather at "wild lots" mostly to commute outside the city

Site level Mobility Management (8.4)

- Change the predominance of car usage for visitors to events
- Set the basis for later sustainable mobility choice (schools)
- Change current mobility behaviour (companies and schools)
- Influence parents and teachers via the children

Retail goods (9.2)

The measure in WP 9 has the objective to reduce congestion and emissions by consolidated transports in different ways

The main problems to be solved in the project 9.2 are the emissions, reduce the number of trips and stops and reduce the noise and energy use.

A reduction of the high number of vehicles of partly loaded trucks going into the city and urban area can reduce the noise, fine dust, emissions, congestion and costs. Another problem is the construction site for the department store in Graz, Kastner & Öhler, to which the goods are being consolidated. During the period of construction an alternative solution to the goods deliveries to the store is needed.

Innovations in bicycle transport (10.1)

- Lack of pretrip information for bikers
- Lack of shelters and bike lockers at PT stops
- bike routes are not optimally connected to form a bike network
- unknown weak points in the bike transport system

Taxi drivers as information multipliers for clean urban transport (10.4)

- 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.

Marketing/information and quality management (10.5)

- Prevent that the tendency of slight increase in PT usage of last year stops
- Make PT up to date, a positive experience
- No electronic access yet to get full-chain information from home to destination (only personal via mobility centre)
- Uncontrolled quality of transport operators which are spread all over the province of Styria; Create transparency of quality criteria

Awareness for speed reduction and less car use (10.6)

- Speeding cars create a risk for pedestrians & bikers
- The car still has a rather positive image compared to other modes

- Suboptimal information; overloaded and separate services

Integrated Mobility Centre (10.7)

- Location/Access: former location of the separate information centres not very well known, marketed through separate channels and inaccessible for disabled persons
- Lack of synergies between services of Mobil Zentral, GVB and Post-bus-lines and poor knowledge about them
- Better access to public transport (lowering the threshold)

Technical basis for an efficient customer focused operation and information (11.1)

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.

Dynamic Traffic Management System (11.3)

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.

Clean and user friendly bio-diesel bus fleet (12.3)

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

Bio-diesel taxi fleet and bio diesel service station (12.7)

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.

Optimisation of the bio-diesel collection system (12.8)
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 housholds, 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).

4.3 Local policies and actions on sustainable mobility

From the city council side there exists a clear transport policy decision. It is the concept of "Sanfte Mobilität" – gentle mobility. The decision has following guiding objectives.

- City of short distances
- Balanced distribution of means of transport
- Socially and environmentally compatible traffic
- Good accessibility of all destinations for all modes
- Grass roots planning and public participation-public awareness

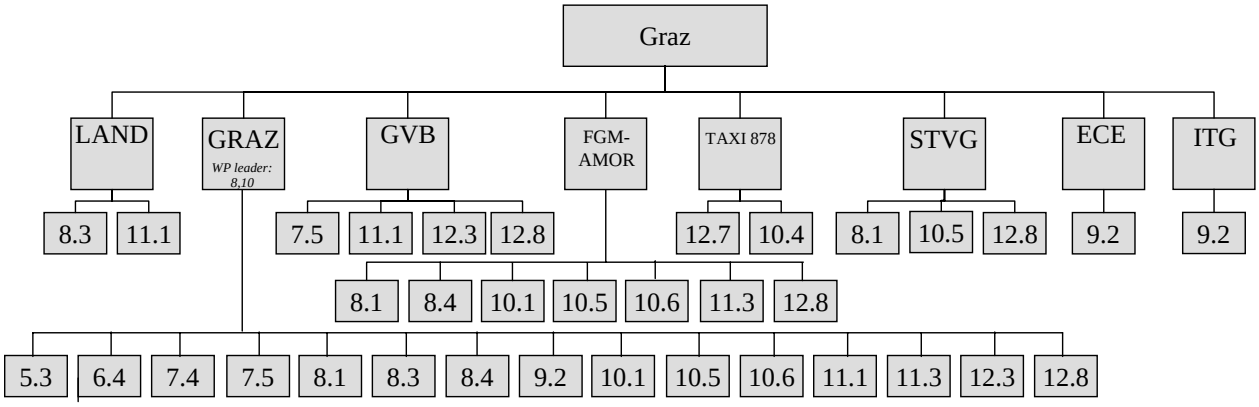
4.4 Trendsetter in Graz

Demo measures:

The partners in Graz have implemented eighteen different measures within Trendsetter.

Work Package	Group of Measure	Measure	Measure	Project owner	Other partners
WP5 Access Restrictions	Strolling zones	5.3	Implementation of strolling zones	Graz	
WP6 Integrated Pricing Strategies	Parking	6.4	Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles	Graz	
WP7 Public Passenger Transport	Information to passengers	7.5	Customer friendly stops for bus and tram	GVB	Graz
	PT intermodality	7.4	Seamless linkage of modes	Graz	
WP8 New Forms of Vehicle Use		8.1	New services and services for special customer groups	Graz	STVG and FGM-Amor
	Car pooling/sharing	8.3	Increasing car occupancy	Graz	LAND
	Awareness rising	8.4	Site level Mobility Management	Graz	FGM-Amor
WP9 New Concepts for the Distribution of Goods		9.2	Distribution of goods - Green city logistics	ITG	Styrialog and Graz
WP 10 Innovative Soft Measures	Bicycle measures	10.1	Innovations in bicycle transport	Graz	FGM-Amor
	Trip planning	10.5	Marketing/information and quality management	Graz	STVG and FGM-amor
	Awareness of clean transport and safety	10.6	Awareness for speed reduction and less car use	Graz	FGM-Amor
		10.4	Taxi drivers as information multipliers for clean transport	TAXI878	
	Awareness of clean transport and trip planning	10.7	Integrated Mobility Centre	GVB	
WP11 Integration of Transport Management	Traffic information	11.3	Dynamic traffic management system	Graz	FGM-Amor
	Improving PT traffic flow	11.1	Technical basis for an efficient customer focussed operation and information	GVB	Graz and LAND
WP12 Clean Public and Private fleets	Heavy vehicles	12.3	Clean and user friendly bio-diesel bus fleet	GVB	Graz
	Light vehicles	12.7	Bio-diesel taxi fleet and bio diesel service station	Taxi878	
	Clean fuel distribution	12.8	Optimisation of the bio-diesel collection system	Graz	GVB, FGM-Amor and STVG

The figure below illustrates the organisation in City of Graz:



Implementation of strolling zones (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 about to be done in the near future.

Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles (6.4)

City of Graz has introduced a new parking system that makes a differentiation between polluting and non-polluting vehicles. Non-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 and they will 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.

For getting the special tariff the drivers have to register their vehicle at the city council. There they receive a 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.

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 emission vehicles in the city centre, with reduced emission, noise levels and energy consumption as consequences.

Seamless linkage of modes (7.4)

One P&R lot was established at the end stop of tram 1 in Mariatrost. Before that, some cars parked wildly somewhere around that end stop. The usage of the lot is free of charge. It is linked by a tramway directly to the city centre of Graz. Frequency of service is roughly 7-10 minutes, travel time to the city centre is about 12 min, where the tram links to all other lines and the federal railway.

Another P&Pool lot was estabished for outbound traffic towards the North (Bruck an der Mur).

At the PT stops of Andritz and Liebenau, a better linkage between (local and regional) buses and trams was created by reconstructing the whole tram (end-)station.

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 11.1).

Customer friendly stops for bus and tram (7.5)

In Graz, there are 800 stops for bus and tram, most of which are not yet userfriendly. 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 pedestriam 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 later equipment with real-time information systems (Stelen).

Meetings with representatives of the disabled were held and various 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 equiped in a userfriendly way. The city assumes, that the individual disabled receives a training anyway 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

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).

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

"Retail goods", Graz (9.2)

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 particulates

In Graz a project to consolidate retail goods to a shopping centre was implemented in Trendsetter. The project aims to consolidate goods and was performed in two stages. The consolidation started with one (virtual) storage, using ecological trucks or other intermodal transporters (trams) to reduce the number of trips into the city and urban area.

In the first step of the project the project management company (ECE) was looking for commercial partners to establish the platform company Styrialog. 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). The company was established with the main goal to consolidate the existing flow of the goods of the shareholders. After founding the platform company a syndicate agreement had to be established to guarantee the confidentiality of information about customers of each partner.

The actual pilot project begun in the second stage, where ECE started the project with two big partners – ITG as forwarder, located with its warehouses at the southern city border and Kastner & Öhler as the biggest shopping centre of the city.

The project aims to improve exploitation of freight capacities and to reduce the number of trips and stops. This will lead to a reduction of emissions and a better urban environment.

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

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. It has proven a valuable and fairly simple awareness raising and speed reduction tool.

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 carsharing
- Raise the awareness and the knowledge of citizens about (intermodal) mobility options

Technical basis for an efficient customer focussed operation and information (11.1)
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).

Dynamic traffic management system (11.3)
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 data base 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 be 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 utilising the radio telegrammes of the on board computers of the GVB traffic management system, the traffic lights will be influenced in favour 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

Clean and user friendly bio-diesel bus fleet (12.3)

The collected used cooking oil is converted into biodiesel and provide the whole busfleet. The busfleet has also a optimum interior design, a better acustic 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, espesially for the disabled and other specific target groups.

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

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.

Bio-diesel taxi fleet and bio diesel service station (12.7)

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 TRENDSETTER 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.

Optimisation of the bio-diesel collection system (12.8)

- 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.

4.5 Description of local consortium

Measure	Person responsible for evaluation	Organisation
5.3	Jörg Kastelic and Gerhard Ablasser (CC)	FGM-AMOR and City of Graz
6.4	Jörg Kastelic and Gottfried Pobatschning (CC)	FGM-AMOR and City of Graz
7.4	Jörg Kastelic and Thomas Fischer (CC)	FGM-AMOR and City of Graz
7.5	Jörg Kastelic and Thomas Fischer (CC)	FGM-AMOR and City of Graz
8.1	Jörg Kastelic and Thomas Fischer (CC)	FGM-AMOR and City of Graz
8.3	Jörg Kastelic and Thomas Fischer (CC)	FGM-AMOR and City of Graz
8.4	Jörg Kastelic and Thomas Fischer (CC)	FGM-AMOR and City of Graz
9.2	Jörg Kastelic and Gerhard Ablasser (CC)	FGM-AMOR and City of Graz
10.1	Jörg Kastelic and Helmut Spinka (CC)	FGM-AMOR and City of Graz
10.4	Jörg Kastelic and Sylvia Loibner(CC)	FGM-AMOR and Taxi 878
10.5	Jörg Kastelic and Reinhard Hofer (CC)	FGM-AMOR and Steirischer Verkehrsverbund
10.6	Jörg Kastelic and Peter Kostka (CC)	FGM-AMOR and City of Graz
10.7	Karl-Heinz Posch and Gerhard Amtmann (CC)	FGM-AMOR and GVB
11.1	Jörg Kastelic, Thomas Fischer and Johann Müller(CC)	FGM-AMOR, City of Graz and GVB
11.3	Jörg Kastelic and Winfried Höpfl (CC)	FGM-AMOR and GVB
12.3	Jörg Kastelic and Johann Seiler (CC)	FGM-AMOR and GVB
12.7	Jörg Kastelic and Sylvia Loibner(CC)	FGM-AMOR and Taxi 878
12.8	Jörg Kastelic and Peter Gspaltl (CC)	FGM-AMOR and City of Graz

Contact info to the persons above can be found on www.trendsetter-europe.org.

4.6 Contact information

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PART C – Results and Analysis

5 Indicators

5.1 Indicators and results

The table below show which Trendsetter core indicators have been evaluated in Graz:

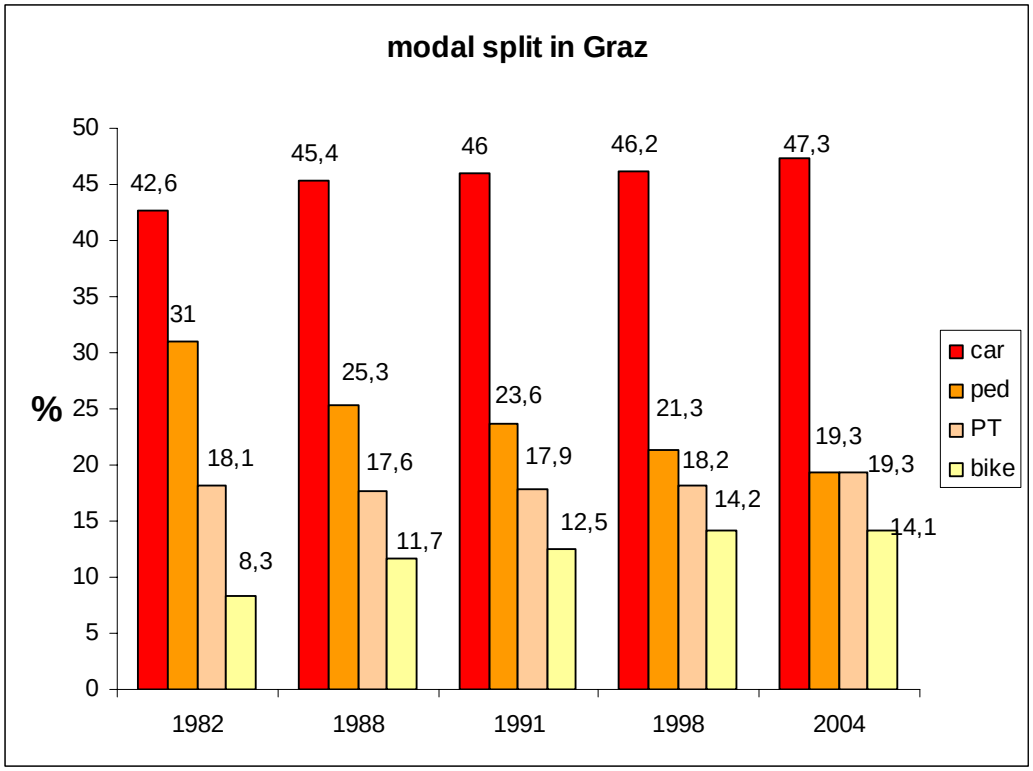
Evaluation	Indicator	5.3	6.4	7.4	7.5	8.1	8.3	8.4	9.2	10.1	10.2	10.3	10.4	10.5	10.6	10.7	11.1	11.3	12.3	12.7	12.8
Energy	Energy use (total and renewable)	X	X	X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	
Environment	Reduce emissions of fossil CO2	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	
	Reduce emissions of NOx	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	
	Reduce emissions of PM	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	
	noise level	X						X	X	X					X			X	X		
Mobility	No. of trips	X			X	X	X	X	X		X	X									
	Travel time			X						X	X	X		X			X	X			
	Quality of service	X		X	X	X					X	X		X			X	X	X		
	Acceptance	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X
Society	Awareness level					X			X					X		X					X
	Image of PT	X		X	X											X					
	Level of knowledge and acceptance			X												X					
	Level of satisfaction of customers on PT			X	X																
	Level of satisfaction on information about new PT			X	X																
	Level of satisfaction on new services			X	X																
	Quality of PT service			X	X																
Transport	Page imprint on web site						X			X	X	X		X							
	Modal split	X					X		X	X					X			X			
	Vkm							X	X	X											

5.2 Analysis of results on indicator level

Environment/Energy

		Reduce Co_2 emissions tonnes/year	Reduce NOx emissions tonnes/year	Reduce particulate matter tonnes/year	Energy TJ/year
5.3	Implementation of strolling zones	14,05	0,06	0,004	0,34
6.4	Integrated pricing strategy for parking zones	435	1,7	0,124	10,39
7.4	seamless linkage of modes	33	0,13	0,0094	0,79
7.5	customer friendly stops	13,26	0,05	0,0038	0,32
8.1	New services	330	1,31	0,094	7,89
8.3	increasing car occupancy	***	***	***	***
8.4	site level mobility Management	26	0,1	0	0,62
9.2	Retail goods	0,98	0	0,2	23,39
10.1	Innovations in bicycle transport	300	1,19	0,0856	7,17
10.4	taxi drivers as information multipliers	***	***	***	***
10.5	Marketing/Information and quality management	60	0,24	0,02	1,42
10.6	Awareness for speed reduction and less car use	268	1	0,08	6,39
10.7	Integrated Mobility Centre	3,2	0,01	?	0,07
11.1	technical basis for an efficient customer focussed operation/information	241	0,96	0,068	5,77
11.3	Dynamic Traffic Management System				
12.3	Clean and user friendly Bio-Diesel Bus fleet	4803	***	?	?
12.7	Bio diesel taxi fleet and bio diesel service station	93	***	?	?
12.8	Optimisation of the bio-diesel collection system	5600	0	2	?
	Sum	**12220,49**	**6,75**	**2,6888**	**64,56**

Modal split in Graz



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.

Society/Mobility/Transport

The following tables point out the most important results on indicator level. If available, additional results were described at the end of the tables. In the next chapter a comparison between various measures is done. **Because of different samples the comparison has to be interpreted carefully!**

Sample of survey in Graz:
In summer 2004 241 public transport users were asked about some trendsetter measures at the three stops Andritz, Puntigam and Mariatrost. It was not possible to ask all measures at once, so the measures were splitted in three groups.

n=78 Andritz
n=86 Puntigam
n=77 Mariatrost

Implementation of strolling zones (5.3)

5.3 Implementation of strolling zones		
Indicator	**Sample**	**Result**
Acceptance: usage of the measure	n=86 PT User	87%
Quality: satisfaction with the measure	n=86 PT User	71% of the user of strolling zones are satisfied with the strolling zone around the Kunsthaus average: 2,17 (1=very satisfied; 5= not satisfied)
Change of behaviour	n=86 PT User	31% of all interviewees are using the strolling zone more often then before

Integrated pricing strategy for parking zones (6.4)

6.4 Integrated pricing strategy for parking zones		
Indicator	**Sample**	**Result**
Awareness: knowledge of the measure	n=77 PT User	26%
Acceptance of the preference of lower parking costs for less polluting vehicles	n=77 PT User	61% of all interviewees approve the different parking rates
Number of registered cars		Within a certain time frame, 29 drivers of low emission vehicles were approved by the parking department.
Number of bought applications and tickets		Within the time frame (1.April 2004-1.December 2004) these drivers requested about 878 parking tickets.
Change of behaviour	n=77 PT User	30% of all interviewees assume that car users will be influenced by this measure (buying environmently friendly cars, parking outside the inner-city)

Seamless linkage of modes (7.4)

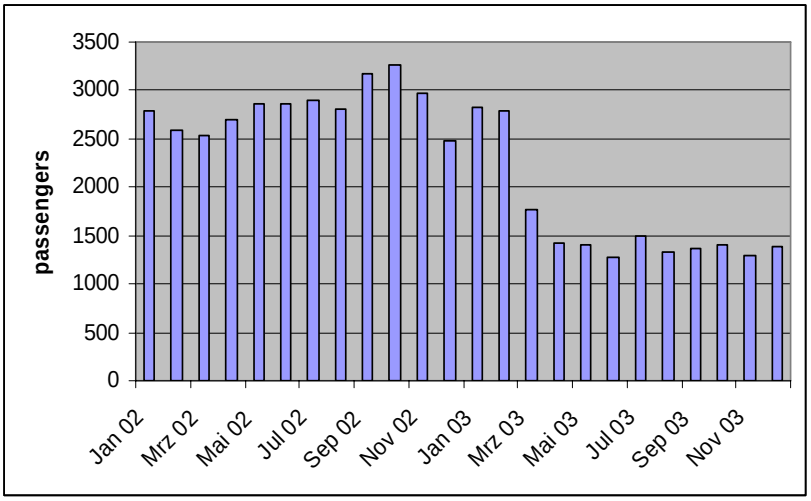
7.4 Seamless linkage of modes		
Indicator	**Sample**	**Result**
P&R		
Awareness P&R: knowledge of the measure	n=77 PT User	87%
Acceptance P&R: usage of the measure	n=77 PT User	45%
Acceptance P&R: increase attractiveness of PT	n=77 PT User	60% of all interviewees indicated, that the new P&R lot increases the attractiveness of PT
Quality of service P&R: satisfaction with the measure	n=77 PT User	81% of the P&R users are satisfied average: 1,7(1=very satisfied; 5= not satisfied)
Image: Important for a positive Image of PT	n=77 PT User	all PT users: average: 2,1 (1=very important; 5=irrelevant)
Change of behaviour P&R	n=77 PT User	66% of P&R users said, that P&R was a reason for them to use PT more often than before

Customer friendly stops for bus and tram (7.5)

7.5 Customer friendly stops for bus and tram		
Indicator	**Sample**	**Result**
Acceptance: increase attractiveness of PT	n=86 PT User	59% state, that the reconstruction of the new customer friendly stop in Andritz increases the attractiveness of PT
Quality: satisfaction with the measure	n=86 PT User	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

New services and services for special customer groups (8.1)

8.1 New services and services for special customer groups		
Indicator	**Sample**	**Result**
Night bus:		
Awareness: knowledge of the measure	n=69 PT Users, aware of Night buses	all 69 PT-Users are aware of the new Night bus (selective sample)
Acceptance: usage of the measure	Night Bus user in Graz	Peak use: 2003: 2773 users (week 18) 2004: 2457 users (week 21)
Acceptance: usage of the measure	n=69 PT Users, aware of Night buses	51% of interviewees of a survey of PT users used them already
Acceptance: increase attractiveness of PT	n=69 PT Users, aware of Night buses	59% of all interviewees indicated, that the night bus increases the attractiveness of PT
Quality of service: satisfaction with the measure	n=69 PT Users, aware of Night buses	82% of all interviewees say, they are satisfied with the service. average: 1.7 (1=very satisfied; 5= not satisfied);
Image: Important for a positive Image of PT	n=69 PT Users, aware of Night buses	80% of all interviewees consider the night buses as important for a positive image of PT average: 1,65 (1=very important; 5=not important)
Change of behaviour	n=69 PT Users, aware of Night buses	71% of night bus user had used taxis before the night bus was introduced. This points to a shift from taxi to PT.
Taxi Line Krottendorf		
Acceptance: usage of the measure	all users from jan 2002 to nov 2003	



New Bus Line 78/80		
Awareness 78/80 knowledge of the measure	n=86 PT User	84%
Acceptance: usage of the measure	n=86 PT User	47%
Acceptance: increase attractiveness of PT	n=86 PT User	68% of all interviewees indicated, that the buslines 78/80 increases the attractiveness of PT
Quality: satisfaction with the measure	n=86 PT User	68% of users of 78/80 are satisfied with the service average: 2,1 (1=very satisfied; 5= not satisfied);
Image: Important for a positive Image of PT	n=86 PT User	98% of all interviewees found such connecting lines important for a positive image of the PT provider average: 1,3 (1=very important; 5=not important)

Additional comments:

Night Buses: In the middle of the year 2004 the numbers of 2003 are not reached anymore. 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. Nevertheless, the city attributes this also to the non-existing marketing for the night buses. 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. 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: ca. 30% more than 4 times/month

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

Taxi line Krottendorf: The taxi line was well accepted. It is not known, why there was a sudden reduction in customers from March 2003 onwards. The home of the elderly explained, that it took up more and more immobile patients, but this wouldn't explain the sudden break.

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.

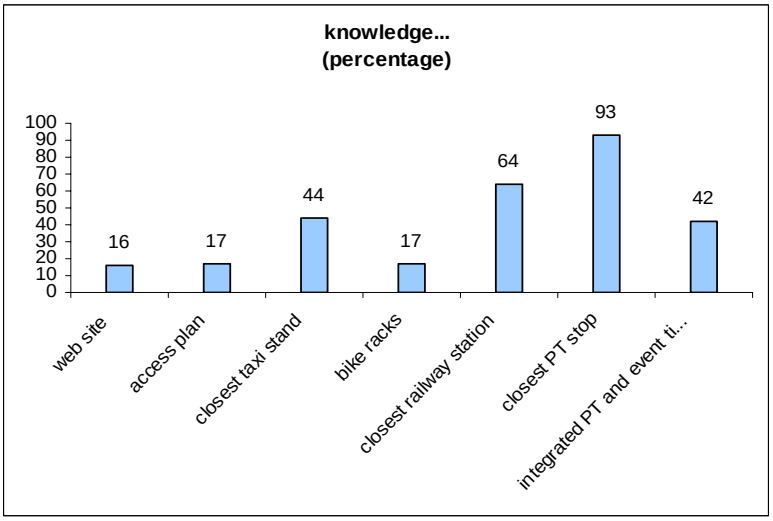
Due to the good experiences with this taxi line, the reformation of the PT network in Graz considers the replacement of low usage buslines by taxi lines.

Increasing car occupancy (8.3)

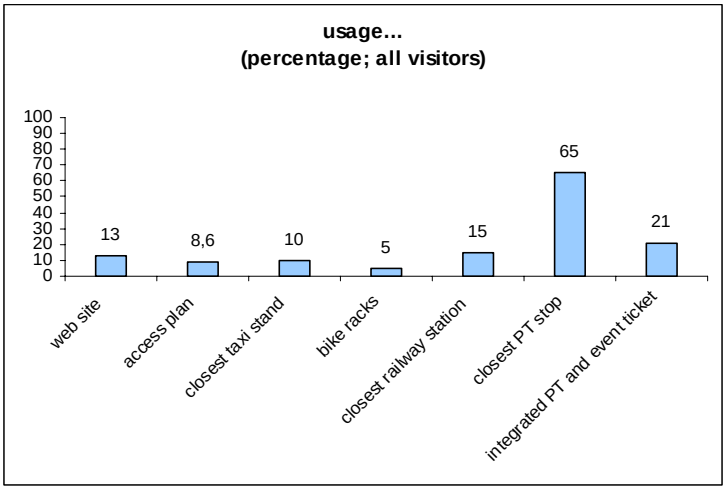
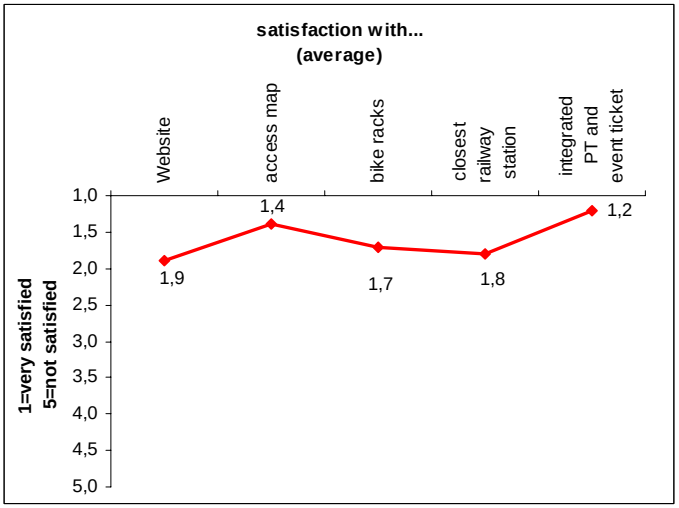
No results at the moment. An after survey is planned in June 05. Police will do controls and counts.

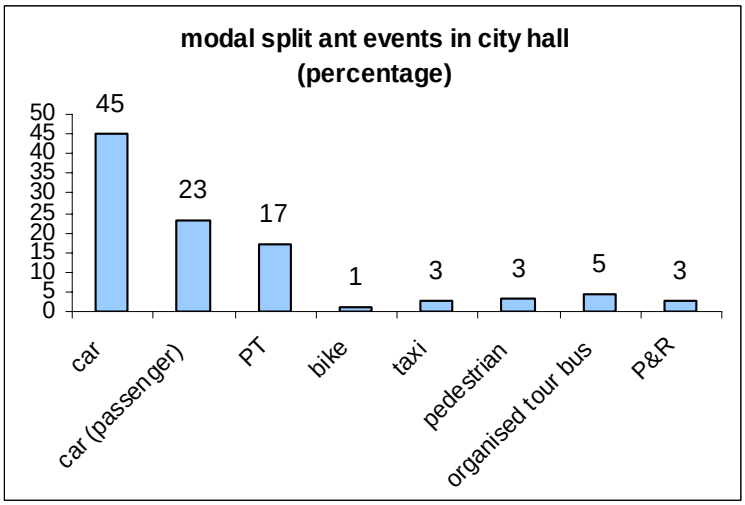
Site level Mobility Mangement (8.4)

8.4 Site level Mobility Management		
Indicator	**Sample**	**Result**
Events – city hall[1]		
Awareness: knowledge of the measures	n=502 visitors of city hall	



[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

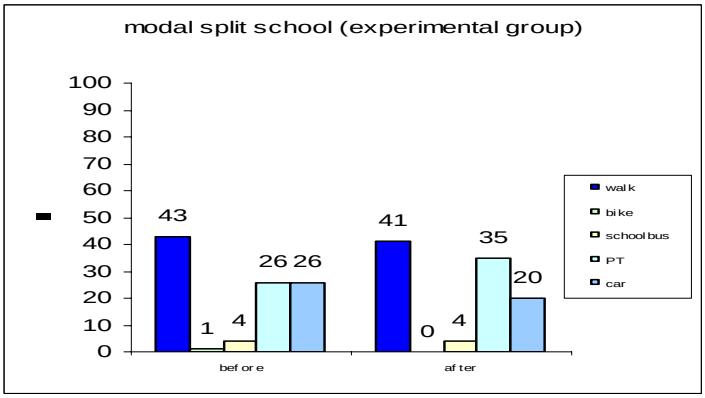
Acceptance: usage of the measures	n=502 visitors of city hall 
Quality of service: satisfaction with the measure	n=502 visitors of city hall, users of measures 
Modal split: at events in city hall	n=502 visitors of city hall

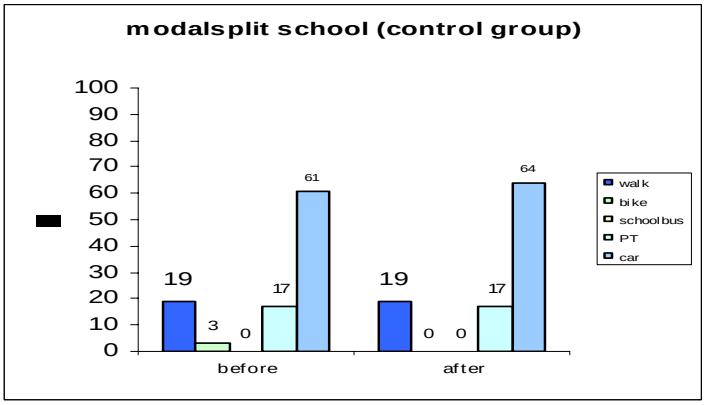


schools

Modal split at schools:

n=500 pupils





Companies

Mobility management in companies was implemented in two large companies. 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 due to financial problems. So single car would increase in favour 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.

Additional comments:
Events: It is astonishing, that the various measures in order to facilitate access are not even known by the visitors, and their usage is - accordingly - even lower.

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.

With a car occupancy of almost 2.3, the normal average is surpassed. At least, 15 % had considered to take PT, but chose the car as they wouldn't know how to get back (1/4), or because they found the car more convenient with respect to comfort and time tables.

Looking at the 17% PT users, 77% of those are not captives (they usually have access to a car). Their reasons to choose 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.

Schools: Almost 500 pupils participated in the school action to collect green miles.

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.

"Retail goods" (9.2)
The expected results from the project were a 70 % reduction of traffic mileage and corresponding reduction of emissions and energy. The indicator results above, shows that the number of vehicle kilometers was reduced with 56 % with corresponding reduction of emissions and energy use.

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. With a reduction of the vehicle fleet by half the potential of this system is very big. The cost savings as well as the environmental savings shows that this is a solution that should continue.

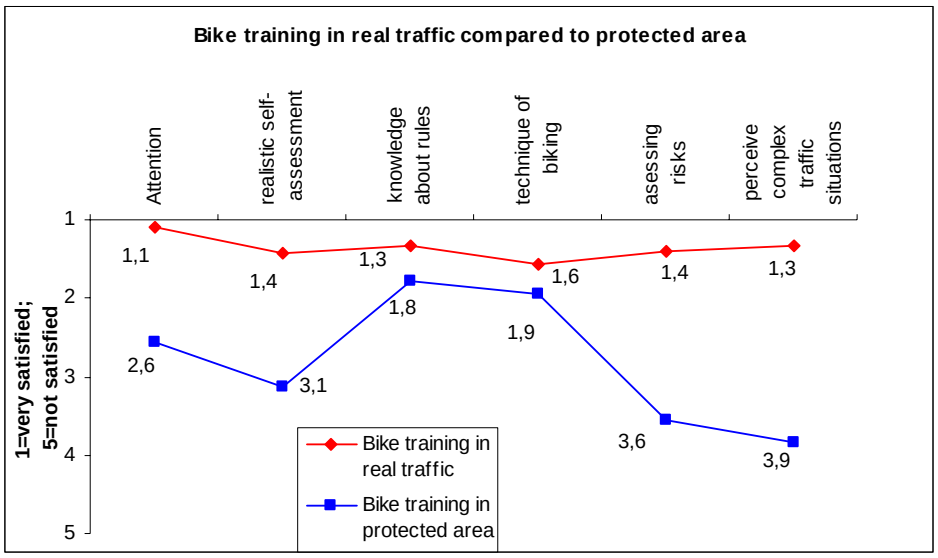
The “business-as-usual” scenario would be that nothing had happened at all. There would not have been a successful project if the cooperation between ITG and K&Ö would have worked out as well as it did.

Innovations in bicycle transport (10.1)

10.1 Innovations in bicycle transport		
Indicator	**Sample**	**Result**
B&R		
Acceptance: usage of the measure	B&R User n=78 PT User	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). 14% of all interviewees have already used the B&R in Andritz
Awareness: knowledge of the measure	n=78 PT User	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.
Acceptance: increase attractiveness of PT	n=78 PT User n=33 B&R User	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. Asking only the B&R users, another survey showed that for 70% PT has become more attractive
Image: Important for a positive Image of PT	n=78 PT User n=33 B&R User	After having received explanations about the function of B&R to the interviewees 35% said that B&R is important for a positive image of the PT operator. average: 3,03 Asking only the B&R users, another survey showed that 88% think that B&R is important for a positive image of the PT operator. average: 1,55 (1=very important, 5=not important)
Quality of service: satisfaction with the measure	n=78 PT User n=33 B&R User	Satisfaction of B&R User: average: 3.00 Satisfaction with the B&R facility in Andritz is comparably low. average: 2.81 (1=very satisfied; 5= not satisfied)
Change of behaviour	n=33 B&R User	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?")!
Bike Training		
Acceptance: usage of the measure	Teachers and directors of 40 primary schools in Graz	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).
Underpath		
Acceptance: usage of the measure	Counts at underpaths mitterstraße	260 bikes daily

Additional comments:
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.

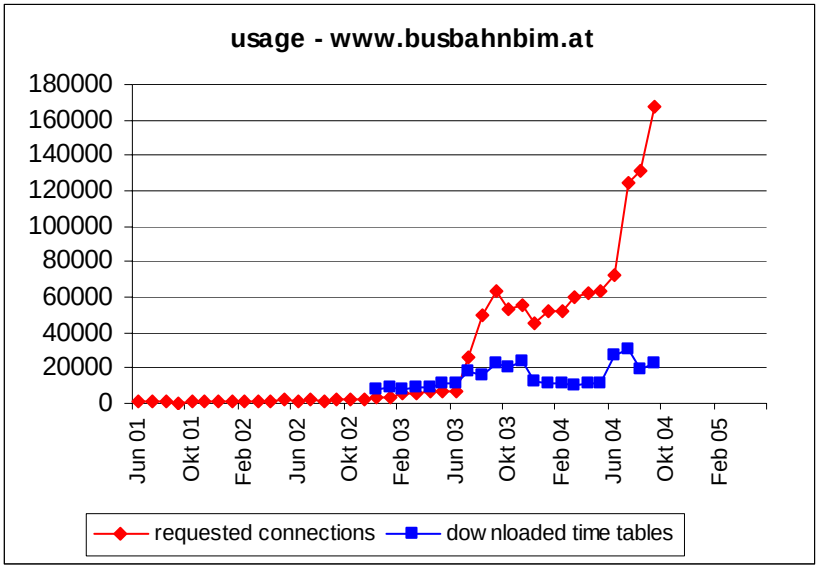
Several skills are to be improved by a bike training. The following graph shows, that on all relevant skills, the bike training in the real traffic situation is assessed better than the bike training in the protected area:



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)

10.5 Marketing/Information and quality management		
Indicator	**Sample**	**Result**
BusBahnBim – Internet route planner		
Awareness: knowledge of the measure	n=77 PT User n=1050 Styrians (2004)	56% 45%
Acceptance: usage of the measure	All users The access to BusBahnBim increased from 64.184 in September 2003 to 167.715 in September 2004. So this service is accepted and used. Since its first public promotion in July '03, the internet information has faced an ever increasing usage, as the following graph can show:  	
Acceptance: usage of the measure	n=77 PT User n=1050 Styrians (2004)	37% (28 persons) 18%
Acceptance: increase attractiveness of PT	N=77 PT User	A survey among young PT users (86% were younger than 36) in 2004 revealed, that 47% of all interviewees found that www.busbahnbim.at makes PT more attractive for them.
Quality of service: satisfaction with the measure	n=77 PT User n=1050 Styrians (2004)	83% of BusBahnBim users were satisfied average: 1.9 (1=very satisfied; 5= not satisfied) A survey among inhabitants of Styria (1050 interviewees, representative random sample) in march 2005 shows, that the satisfaction with busbahnbim increased from 90% in 2004 to 94% in 2005.
Image: Important for a positive Image of PT	n=77 PT User	all interviewees: average: 2,05 (1=very important; 5= not important)
Leisure ticket		
Awareness: knowledge of the measure	n=78 PT User n=1050 Styrians	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.
Acceptance: increase attractiveness of PT	n=78 PT User	47% of all interviewees found that the leisure ticket increases the attractiveness of PT for them
Acceptance: usage of the measure	n=78 PT User n=1050 PT User (2004)	12 % 7%
Quality of service: satisfaction with the measure	N=78 PT User	User of leisure ticket: average: 1.56 (1=very satisfied; 5= not satisfied)
Image: Important for a positive Image of PT	n=78 PT User	59% of all interviewees found such an offer important for a positive image of PT average: 2.3 (1=very important; 5= not important)

Additional comments:
BusBahnBim: A first peak 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 is also be due to the upcoming start of the school year.

Highlights from the survey Feb 2003/2004:

- Users are mainly pupils and students, higher income level persons under 50 and persons from Graz (in Graz every 3rd person has already used the service. Users are generally highly satisfied with the service.

Marketing – leisure ticket:
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.

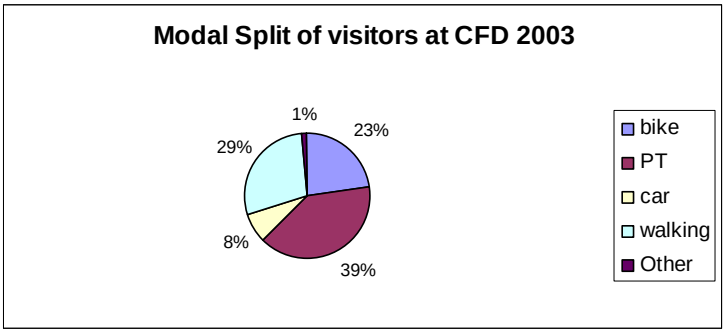
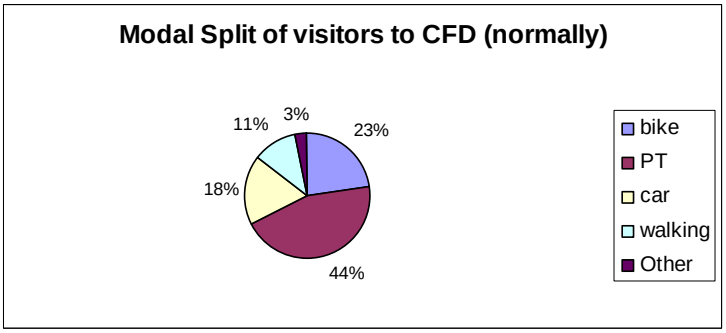
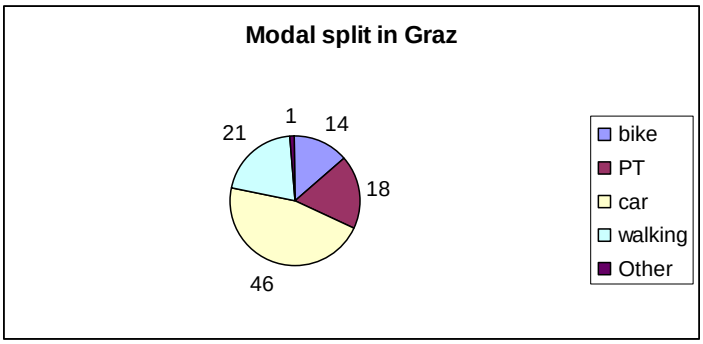
In general, success of marketing activities is hard to assess: sometimes it is even more successful, if there are just very small but pointed activities that raise a lot of interest. Sometimes it is difficult to find the right balance.

Highlights from the survey Feb 2003/2004:

- Although the „Freizeitticket“ – leisure ticket is being marketed with an own marketing line, it has not grown better known than 2003. 7% of the Styrians have already used the ticket, mainly with the family.

Awareness for speed reduction and less car use (10.6)

10.6 Awareness for speed reduction and less car use		
Indicator	**Sample**	**Result**
Car free day		
Awareness: knowledge of the	n=78 PT User	92%

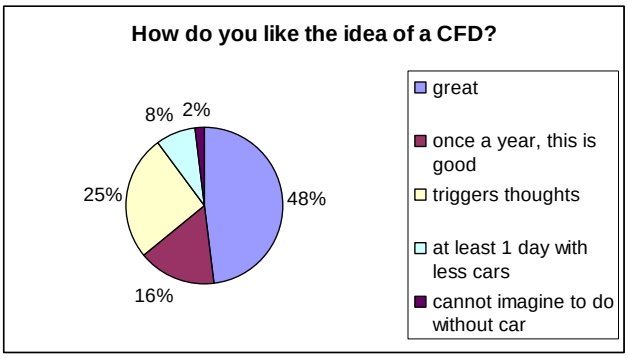
measure		
Acceptance: usage of the measure	n=78 PT User	10%
Transport: Modal Split	Comparing the modal split of the CFD visitors with their normal travel behaviour shows, that car usage and PT have been reduced in favour of walking.   However, comparing the modal split of the visitors to the normal modal 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: Modal split Graz  	
Speed control devices		
Awareness: knowledge of the measure	n=78 PT User	95%

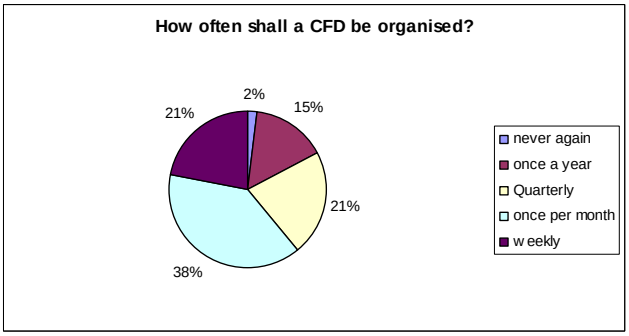
Speed 30

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.

Additional comments:
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 were 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:





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)

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%, in streets with a speed limit of 50 km/h to 8.7 %, thus reducing noise as well as accidents and the impacts of accidents (deadly especially for children in residential areas).

Integrated Mobility Centre (10.7)

Number of customers in person

Before: Average 2003: 1100/month
Average Jan-Jul 2004: 1100/month

After: Average Aug-Nov 2004: 2400/month (increase almost 120%)

Number of customers on phone

Before: Average 2002: 3000/month
Average 2003: 3100/month

After: Average Aug-Nov 2004: 3300/month (no real increase, mainly due to capacity problems in personnel)

Ticket sales

Before: Average 2003: 14.000 Euros/month
Average Jan-Aug 2004: 10.000/month trend: sales in decline

After: Average Sep-Oct 2004: 17.000/month (increase almost 70%)

Due to enormously increased competition from cheap flights, the trend of railway tickes sales was going down and would have declined further. The integrated mobility centre has achieved a reversal in the trend.

Business as usual:

The trend of the decline of ticket sales would have continued.

The continuous increase of the number of personal customers had been in the order of 10-20% per year. The integrated mobility centre achieved a quantum leap.

Number of phone calls: in the last two years, growth has been limited by capacity problems. It is clear, that personnel, that suddenly have to handle double the number of customers (that come in person), cannot handle more phone calls as well.

Technical basis for an efficient customer focussed operation and information (11.1)

11.1 Technical basis for an efficient customer focussed operation and information		
Indicator	**Sample**	**Result**
Quality of service: satisfaction with the measure	n=86 PT User	A survey among PT users revealed, that the satisfaction with reaching a bus/tram when having to change at a stop is ok. 53% of the interviewees are satisfied However, the average mark given is not too good: average: 2.6 (1=very satisfied; 5= not satisfied) But: 35% of the customers say that this has improved over the last year.

Dynamic Traffic Management System (11.3)

Measure 11.3 is not implemented yet, and has thereby not contributed to reduction of energy use or emissions yet.

Clean and user friendly Bio-Diesel Bus fleet (12.3)

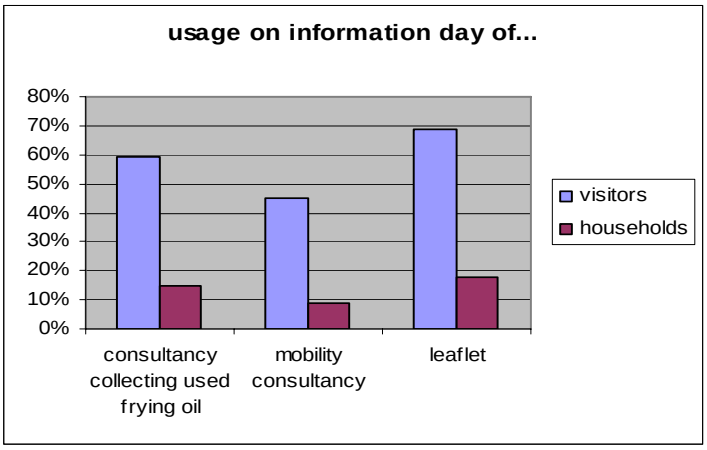
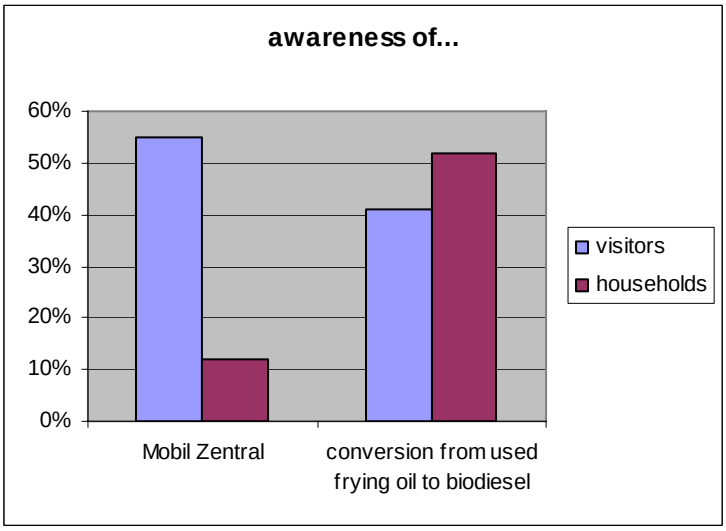
12.3 Clean and user friendly Bio-Diesel Bus fleet		
Indicator	**Sample**	**Result**
New userfriendly buses		
Awareness: knowledge of the measure	n=86 PT User	A survey among PT users found a high acceptance of the new user-friendly buses: 76% of the interviewees knew the new buses.
Image: Important for a positive Image of PT	n=86 PT User	93% of all interviewees found, that such buses are very important for a positive image of a PT operator. average: 1.3 (1=very important; 5= not important)
Change of behavior	n=86 PT User	22% of all interviewees said, that the customer friendly buses have been a reason for them to go by PT more often. 3 of them were actually mobility impaired people
Bio diesel buses		
Awareness: knowledge of the measure	n=86 PT User	51% of the the interviewees knew, that the PT fleet was switched to biodiesel.
Image: Important for a positive Image of PT	n=86 PT User	92% found that this was a good initiative, and 82% considered this important for a positive image of the PT operator average: 1.6 (1=very important; 5= not important)

Bio diesel taxi fleet and bio diesel service station (12.7)

The used method of measurement refers to the technical problems with the determinated bio-diesel. At the starting phase of the bio-diesel use 878 City Funk GmbH had intense feedback from the taxi service centre concerning the blocked fuel filters. Since the change to a new supplier for bio-diesel 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 example is suitable to visualise the important part in traffic.220 taxis produce a lot of CO_2 - and CO emissions. In consideration of the increasing traffic flow during the last few years the reduction of fossil fuel use represent 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 run with bio-diesel. 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 in the entire taxi fleet accompanied by training and education for taxi drivers had not been possible without the TRENDSETTER programme due to financial needs

Optimisation of the bio-diesel collection system (12.8)

12.8 Optimisation of the bio-diesel collection system		
Indicator	**Sample**	**Result**
Information day about collecting used frying oil and mobility (Mobil Zentral)		
Acceptance: usage of the measure	n=41 visitors of information day n=78 households	
Awareness: knowledge of the measure 3 month later	n=33 visitors of information day n=30 households	
Change of behaviour	n=33 visitors of information day n=30 households	After 3 month altogether 8% of all interviewees indicated that they started to collect used frying oil.
Quality of service satisfaction with PT	n=41 visitors of information day n=78 households	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.

Additional comments:
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.

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 overrepresent 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.

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.

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 month 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.

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.

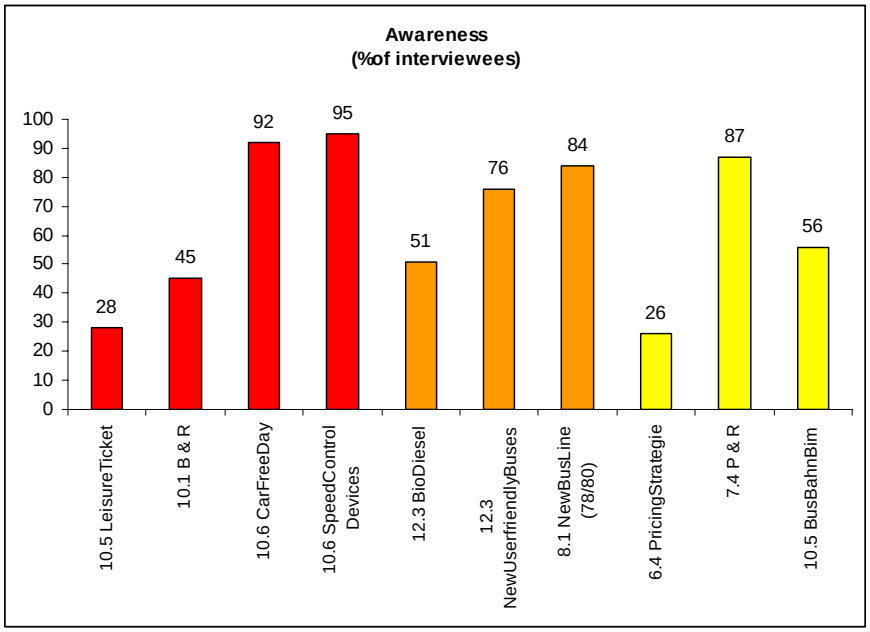
Comparison

In summer 2004 241 public transport users were asked about trendsetter measures at the three stops Andritz, Puntigam and Mariatrost. It was not possible to ask all measures at once, so the measures were splitted in three groups.

Thus a direct comparison has to be interpreted carefully!

Red	n=78	Andritz
Orange	n=86	Puntigam
Yellow	n=77	Mariatrost

Awareness:

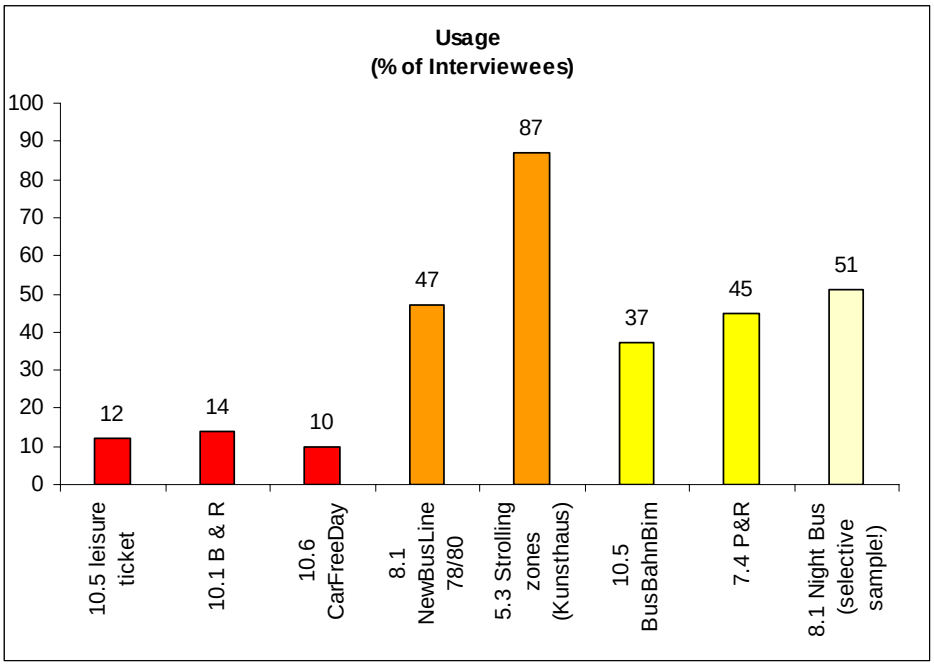


The graph above shows that the interviewees are aware of the measures. The speed control device is the most common measure (95% of the interviewees know about it).

The 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.

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

Usage



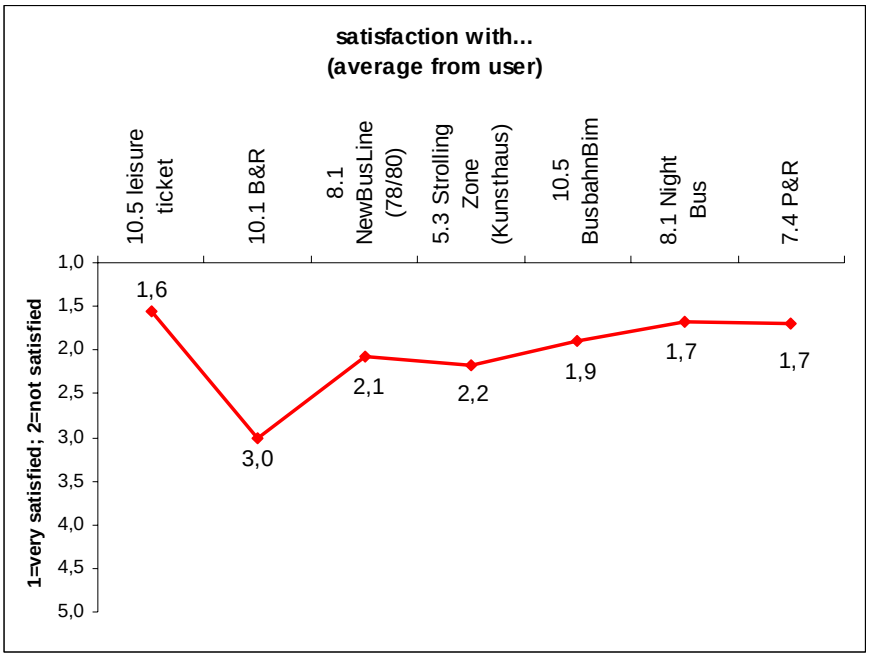
The sample of users of leisure ticket, Bike & Ride and CarFreeDay are very low, so extra surveys were made to get more information about satisfaction. The results are shown in the chapters and tables above.

Selective sample night bus: To get information about satisfaction with the night bus only persons who were aware of the night bus were interviewed.

It is not astonishing that the strolling zones (87% of interviewees) and the new bus line 78/80 (47% of interviewees) are the most used measures. The area around the Kunsthaus is a popular shopping area with a lot of bars and a place for events in summer.

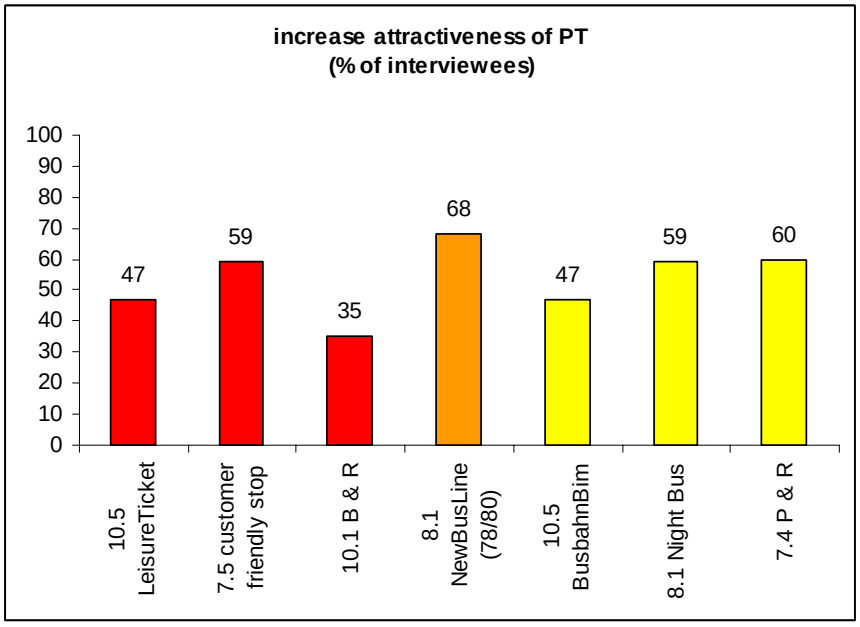
The new bus line 78/80 makes an area in the south of Graz accessible for captive riders.

Quality of service: satisfaction with the measure



The satisfacition with B&R facilities are very low. In an extra survey about B&R (n=33) the satisfaction with the B&R facilities in Andritz is also low: 2.8 on a scale from 1 very satisfied to 5 very dissatisfied. The reasons are: the B&R facility is too small, not visible, has a bad accessibility and no security.

Acceptance: increase of attractiveness of PT

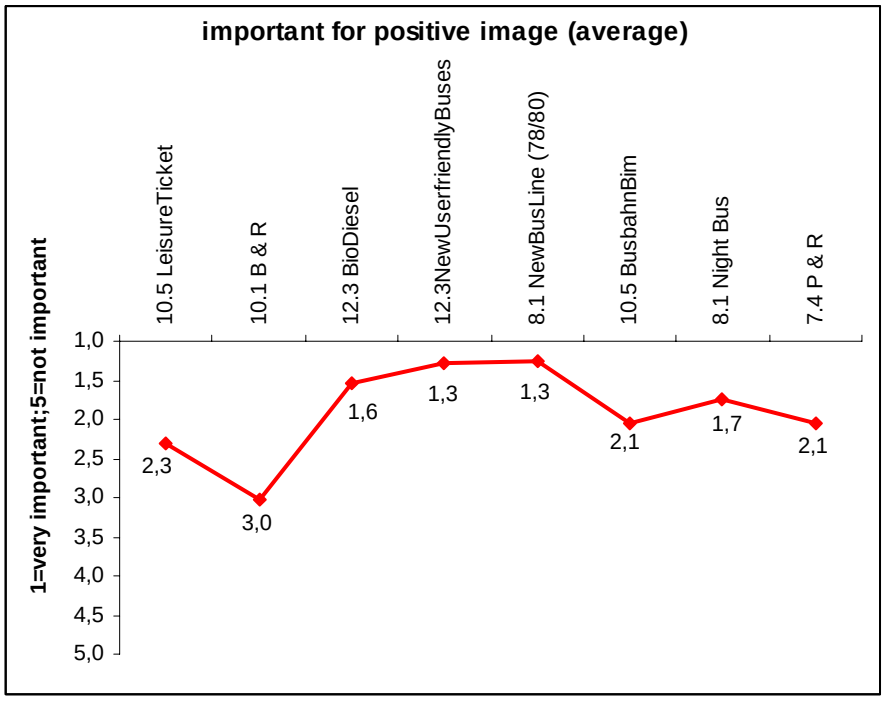


Compared to other measures, the new bus line is the highest contribution of a measure to raise the attractiveness of PT.

Its not astonishing that 68% of the interviewees indicated, that for them attractiveness of PT has been increased with the new busline. Now captive riders can reach Feldkirchen and a new shopping centre in Seiersberg easily.

For only 35% of the interviewees (PT user) the attractiveness of Public Transport increases because of the B&R place at the terminal station. Possibly B&R facilities were not associated with public transport. Whereas 70% of B&R users indicate, that with the new B&R facilities the attractiveness of PT increases.

Image: Important for a positive Image of PT



The low average of 3 for B&R shows, that public transport user sees no link from bike to public transport. Its striking that for users of B&R the facilities are more important for a positive image for PT: The average is 1.55.

6 Fulfilment of objectives

6.1 Achievement of city objectives

The achievement of the city objectives is presented and commented.

From the city council side there exists a clear transport policy decision. It is the concept of “Sanfte Mobilität” – gentle mobility. The decision has following guiding objectives.

- City of short distances
- Balanced distribution of means of transport
- Socially and environmentally compatible traffic
- Good accessibility of all destinations for all modes
- Grass route planning and public participation public awareness

TRENDSETTER will contribute to these objectives by meeting:

Environmental objectives:

- Reduction of fuel consumption of 4700t per year when the measures of TRENDSETTER are introduced.
- Reduction of transport related fossil CO2 emissions by 24.700t/year.
- Reduction of transport related emissions (HC 103t/y, NOx 69t/y, and particulate matters 8t/y)
- Duplication of the volume of collected edible oil in households

All reductions are calculated against the prevailing trend.

Safety goals:

- 3% reduction of the accidents with bodily injury within TRENDSETTER.
- 20% increase of compliance with speed regulations.

Mobility goals:

- 20% increase of participation of handicapped people in public transport.
- Break the trend of decrease of public transport use from the last three years.
- Increase of bicycle traffic of about 5% within TRENDSETTER.
- Increase of combined modes B&R and P&R of 25%.
- Reduction of car use for the home to school traffic of 20%

Awareness goals:

- Increasing level of satisfaction with the quality of PT of 15% (users)
- Increasing level of satisfaction with the quality of bicycle policy of 12% (users)
- To reach a recognition rate for edible oil collection actions of 70% of the households.

This will be done through a combination of measures aiming at a:

- 100% CO2 free bus fleet (biodiesel, unique in Europe). Combination of collection of waste (edible oil), mobility consultancy and supporting of sustainable modes
- At year 2005: 60% of the taxis in Graz run on locally produced biodiesel
- Increase in the use of public transport beyond the city boarders by introduction of new PT services.
- 50% increase in car occupancy with respect to commuters crossing the city boarders in Graz and a reduction of cars used for the ways to school by 2030 %
- Increase of bicycle use by implementing a bicycle quality plan (bike&ride, digital bicycle map, bicycle training, reduction of barriers).
- Reduction of environmental negative effects by encouraging social and environmental friendly modes (awareness campaigns).
- Reduction of congestion hours by keep the traffic flowing and by reduction of parking search traffic (traffic management system, guidance system).
- Improved logistics in inner urban freight transport.
- Improvement of collection system for edible oil for households and restaurants.
- Implementing of quality assurance for PT and improving the linkage of PT with other modes and PTstops.
- Increase of punctuality of Public Transport by prioritisation by using telematics for PT

6.2 Contribution to Trendsetter objectives

The contribution from the city to the Trendsetter objectives (High level, Demonstration and Scientific/Technical) is shown.

The Trendsetter project objectives derive from city-based objectives and the Civitas goals. The Trendsetter project objectives are characterised as:

- High level objectives
- Demonstration objectives
- Scientifical/technical objectives

To evaluate how the cities contribute to the Trendsetter objectives is one important task within the city evaluation.

High Level Objective

Trendsetters objectives are to ameliorate urban air quality, noise levels and congestion while supporting exceptional mobility and urban quality of life. Specifically, objectives are to:

Provide examples

- Provide input to European policymaking and promote a sustainable transport future in Europe (5.3, 6.4, 7.5, 8.3, 8.4, 9.2, 10.1, 10.4, 10.5, 10.7, 11.1, 12.7)

- Provide other cities with feasible best practice strategies to curb unsustainable traffic growth by using advanced mobility management schemes combined with clean vehicle fleets. (8.1, 8.4, 10.4, 10.5, 10.7, 11.1, 12.3)
- Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology. (10.4, 12.3, 12.7, 12.8)

Increase Mobility

- Promote the use of public transport and other alternatives to private cars (5.3, 7.4, 7.5, 8.1, 8.4, 10.1, 10.5, 10.6, 10.7, 11.1, 12.3, 12.7, 12.8)
- Demonstrate new ways to improve urban goods logistics and efficiency. (9.2)

Enhance Environment

- Reduce annual fossil C02 emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year. Graz achieved: 12.220 tonnes/year
- Reduce NOx emissions by 900 tonnes/year and particulate matter by at least 1800 tonnes/year Graz achieved: 7 tonnes/year)
- Reduce noise levels in demonstrating cities (5.3, 7.4, 7.5, 8.1, 8.3, 8.4, 9.2, 10.1, 10.5, 10.6, 10.7, 12.7, 12.8)

Save Energy

- Save over 850 TJ (≈ 20 300 TOE) energy per year Graz achieved: 65TJ/year

Graz contributes to all the high level objectives listed above.

Demonstration Objectives

Trendsetter will use large-scale demonstrations to reach the high-level objectives. The demonstration objectives for Graz are listed below.

Public transport bus fleets
97 bio diesel buses Graz achieved 134

Clean Light vehicles
120 taxis converted to bio-diesel. Graz achieved 63 taxis as of April 2005.

Vehicle infrastructure
1 new bio-diesel refuelling station. Implemented in Graz.

Transport and mobility management
1 Environmental restriction zones

1 Environmentally oriented Parking zones

2 Improved intermodal links. Implemented in Graz.

60 High customer friendly bus & tram stops. Implemented in Graz.

1 Logistic Centre. Implemented in Graz.

2 IT based logistic management systems. Partly implemented in Graz.

Scientific and Technical objectives

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice. The objectives on Trendsetter level are:

- Produce a total amount of 11 million Nm3 biogas by the end of the project.
- Reduce the commercial cost of biogas fuel by 20% in demonstrating cities
- Implement a complete biogas technology chain in Stockholm from production to end use
- Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm
- Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision) (7.5, 11.1, 11.3)
- Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows. (11.1)
- Evaluate the effectiveness and political acceptability of environmental zones
- Develop integrated city mobility plans integrating environmental protection, traffic and public health policies) (10.7, 10.1 partly)

7 Results on city level

7.1 Common Core Indicators on City Level

The TRENDSETTER common indicators will be evaluated within most measures. Since an overall objective of Trendsetter is to reduce energy use and environmental impact, with retained or increased mobility, the Trendsetter indicators concern energy, environmental impact and mobility. The common indicators are:

Energy

- Energy use (total and renewable)

Environment

- Emissions of NOx
- Emissions of fossil CO2
- Emissions of particulate matter
- Noise levels

Mobility

- No of trips per mode
- Travel time per mode
- Quality of service per mode
- Acceptance per mode

Energy use will be measured in terms of both total consumption and the consumption of renewable sources, allowing the calculation of both total energy savings as well as the share of renewable energy.

Environmental impact will be measured through the emission indicators (NOx, CO_2 and particulate matter) and noise levels.

Mobility is one of the three cornerstones of TRENDSETTER. Thus we need to evaluate whether mobility has increased, decreased or stayed the same. The mobility will be described using the four indicators stated above. Those indicators will be assessed quantitative or on a qualitative five degree scale (-- - 0 + ++). The mobility indicators should be used for applicable modes chosen from the modes PT, Cars, Delivery vehicles and Pedestrians/cyclists.

7.2 Potential up-scaling the measures

The following is taken from the measure level sheets.

Implementation of strolling zones (5.3)
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 microregions in Graz, as it turned out to be a successful method for citizens participation.

Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles (6.4)
Generally it will not be a big deal to implement this project in another city, as Graz was the guinea pig and is able to advise followers. 43 drivers of vehicles have registered so far, so still a high potential to go for. The number of registered vehicles has to be increased by a large scale awareness campaign of the city. During the introduction of the project an awareness campaign was conducted, which turned out to be the only one. Furthermore partnerships with car dealers have to be established to put the project on a higher basement.

Seamless linkage of modes (7.4)
The extension of the existing P&R facility in Mariatrost will be reconsidered - after the original suggestion of 500 new lots was not accepted, the chance is higher now for a bigger lot.

Customer friendly stops for bus and tram (7.5)
Of course, all PT stops should become accessible, and most of them should receive real-time information.

New services and services for special customer groups (8.1)
The taxi line is considered not as an upscaling but as a replacement for inefficient PT lines.

The nightbuses cover the whole city area, but might be further extended towards the suburbs if requested. However, the interest doesn't seem too big.

Increasing car occupancy (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: if only 5% of all cars would use those lanes, a 35% negative impact is expected especially at traffic signals: whereas buses are prioritised for a certain minimum time, this priority would then be shared by cars (either 1 bus or 2 cars can cross an intersection).

Some other roads were checked but would require a reconstruction, which is expensive and not always possible due to spatial constraints.

Site level Mobility Management (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. But it has to be considered that a certain amount of companies might be more appropriate for mobility management measures.

Within Europe, the transferability to similar type of companies can also be achieved very easily. The approach of information, awareness-raising measures and testing new behaviour can also be transferred to other trip purposes such as shopping etc.

To ensure the quality of the project various tools might be used, like internal or external workshops, experts and a steering group. A key to success might be a close work together between the company and external experts.

Mobility management can also be upscaled in general for events and schools.

"Retail goods", Graz (9.2)

Start of a pilot for the shops, financing € 4.000 /Shop, external consultant changes the logistics procedure for the shops. Existing suppliers deliver to the warehouse at the city border and do not deliver into the city. Bundling by ITG or call for bids to keep a neutral position.

Innovations in bicycle transport (10.1)

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

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.

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).

Taxi drivers as information multipliers for clean transport (10.4)
In Graz 878 City Funk GmbH is the largest taxi operator with more than 220 taxi drivers. All other taxi operators are much smaller than 878 and the battle between various competitors is hard. 878 has already tried to smooth the path for potential up-scaling when all taxi operators were informed about the project with an official letter of the Chamber of Commerce. But response was not that good as expected.

Marketing/information and quality management (10.5)
Busbahnbim

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. In 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.

As in Austria, privatisation and tendering is not yet far developed, of course, the system would provide a good basis for keeping a high level of quality in case the services would be contracted.

Awareness for speed reduction and less car use (10.6)
CFD: in Graz, it seems not realistic to close down a wider area in the inner city or in certain districts.

Intergrated 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.

Technical basis for an efficient customer focused operation and information (11.1)
The enlargement of the system by all transport operators in the region of Graz is already intended. All transport operators had been informed of the ongoing project at the very beginning of the project. Furthermore the system is prepared for enlargement.

Dynamic Traffic Management System (11.3)
The traffic management system will cover the whole city area. More traffic lights could be equipped to allow interference by PT - this will have to be decided after the system has been implemented

Clean and user friendly Bio-Diesel Bus fleet (12.3)
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.

Bio diesel taxi fleet and bio diesel service station (12.7)
The transferability of this project to other cities can be achieved easily. The approach of information and awareness-raising measures can also be disposed for other issues.

Optimisation of the bio-diesel collection system (12.8)
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.

7.3 Conclusions

Most of the measures will be upscaled locally and can also easily be taken over by other cities.

8 Economical aspects, cost benefit

8.1 Per measure

A general cost/benefit analysis cannot be made, for the following reasons:

- The measures are very diverse
- The costs involved are often only part of the total cost, and are not measured directly
- Many measures are intertwined
- The benefits are very diverse and often cannot be directly measured – most of the results that are measured can be read in the other chapters.

Therefore it was decided to provide only the manmonths invested within the framework of trendsetter in each workpackage (as planned and assessed after the third year), and to provide the essence of the benefits in a short statement per measure.

Implementation of strolling zones (5.3)
Invested manmonths for trendsetter: 37

The benefit is high:

- a qualitative upscaling of the city space,
- a much higher share of pedestrians

- less surface parking space and more underground parking space
- economic developments still need time, on the Freiheitsplatz an upswing of local gastronomy is already discernible.

Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles (6.4)

Invested manmonths for trendsetter: 21

The benefit is ambiguous:

- there are only 41 cars participating in the programme (August 05)
- the measure is not that well known
- however, it was a difficult, but first step towards rewarding less polluting and non polluting vehicles, and the city is sure to follow up on this path. As regulations from the EU will become tougher, there will be additional interest for the measure, which is now firmly in place

Seamless linkage of modes (7.4)

Invested manmonths for trendsetter: 25

The benefit is high.

- There is more park and ride traffic, the established parking spaces are well used.
- The link between bus and tram works much better
- The new tangential buslines have a high rate of acceptance and an adequate number of passengers

Customer friendly stops for bus and tram (7.5)

Invested manmonths for trendsetter: 22

The benefit is high

- A great number of stops were greatly improved
- Although there were many technical problems with the implementation of the real time information, in the end this has contributed to the positive image of public transport
- It has also contributed in increasing the number of public transport users against the trendline of a shrinking number.
- Communication with disabled persons has been improved and solutions are now taking their advice into account.

New services and services for special customer groups (8.1)

Invested manmonths for trendsetter: 21

The benefit is high

- The night bus system is very successful and has been firmly established as a system
- The two new busses to the hinterland have a high rate of acceptance and an adequate number of passengers
- The taxi line system also has a high rate of acceptance and an adequate number of passengers

Increasing car occupancy (8.3)
Invested manmonths for trendsetter: 10

The benefit is ambiguous:

- Usage rate of the HOV-bypass is low
- This is a first step towards the establishment of HOV-lanes and a policy favouring high occupancy vehicles
- The park and pool system has been expanded, but not to a great extent.

Site level Mobility Management (8.4)
Invested manmonths for trendsetter: 25

The benefit is high:

- Mobility management has been re-established as a policy tool in Graz - for schools, companies and events - and will in the future most probable be extended
- Significant reductions in car traffic and emissions have been achieved

"Retail goods", Graz (9.2)
Invested manmonths for trendsetter: 48

The benefit is high

- This was the first implementation of city logistics in Graz – a second one has already been implemented building on this experience, but independently of Trendsetter.
- The project has led to a significant reduction in emissions and trips

Innovations in bicycle transport (10.1)
Invested manmonths for trendsetter: 34

The benefit is high:

- The bicycle policy audit process has been firmly rooted in the city policy as a continuous process
- Facilities have been greatly improved: a digital bicyle map has been established, the number of B&R stands has been extended, the bicycle path network has been densified by new connections
- Bicycle training has been extended from just 12 schools to all pupils of the age group in all of the city – possibly the awareness programme with the highest long term impact

Taxi drivers as information multipliers for clean transport (10.4)
Invested man months for trendsetter: 23

The benefit is ambiguous:

- As there were a lot of technical problems to be solved, the educational programme was not so effective, as biodiesel got the image as "problematic" with many drivers
- Only in the last year of trendsetter, biodiesel started to be used on a much larger scale and the image changed – latest evaluations show that the impact is now more positive.

Marketing/information and quality management (10.5)
Invested manmonths for trendsetter: 38

The benefit is high:

- An efficient system of quality management has been installed and is working smoothly
- A growth in the number of public transport passengers has been achieved
- The door to door information system is reaching a high and continuously growing number of customers

Awareness for speed reduction and less car use (10.6)
Invested man months for trendsetter: 47

The benefit is high:

- Awareness of speed 30 has remained stable against the trend
- The installation and moving around of the automatic speed controls has proven to be highly effective in reducin12.7,1g both average and maximum speed
- The car free day has remained and evolved as a valuable awareness tool for the city.

(10.7)
Invested man months for trendsetter: 11

The benefit is high:

- The number of customers has been strongly boosted, recent counts (July 05) indicating a tripling of customers coming in person.

Technical basis for an efficient customer focused operation and information (11.1)
Invested man months for trendsetter: 57

The benefit is high:

- For the first time, the GVB have an effective real time control of the whole fleet
- With this technology, it is possible to implement step by step numerous innovation steps: e.g. PT-priorisation at traffic lights, avoidance of delays but also earliness, better disposition and coordination of rolling stock, optimum real time information for the customers
- GVB acquired a lot of knowledge about the implementation and operation of highly complex systems

Dynamic Traffic Management System (11.3)
Invested man months for trendsetter: 82

The benefit is as of yet unclear, as an evaluation has not yet been conducted.

- Results report (?)

Clean and user friendly Bio-Diesel Bus fleet (12.3)
Invested man months for trendsetter: 10

The benefit is high:

- Graz has become the absolute pioneer city for biodiesel usage in urban public transport busses: all busses are running on 100% biodiesel, there is no other city in Europe where this is the case
- Accordingly, emissions and CO2 balance have been improved
- Furthermore, independence from the high oil prices is achieved

Bio diesel taxi fleet and bio diesel service station (12.7)
Invested man months for trendsetter: 5

The benefit is ambiguous, but will probably grow overtime:

- As there were large problems and delays with the usage of biodiesel, the image has plummeted
- Only in the last few months, problems have been overcome, now biodiesel use is introduced on a larges scale and the image is clearly going up again, it is hoped that similar results as with the bus fleet can in the end be achieved

Optimisation of the bio-diesel collection system (12.8)
Invested man months for trendsetter: 38

The benefit is ambiguous:

- Travel awareness and collection results were quite positive
- The number of people reached by the intensive measure is rather small
- The more general collection system was very successful

8.2 Conclusions

Although high costs were involved, it is certain that this involvement payed off:

- A large number of innovative projects and practises has been introduced, tested and implemented
- Significant benefits for the environment, for the citizens and have been achieved,
- Graz has gathered a lot of experience in all these fields
- Most projects find a continuation and extension also after Trendsetter is over

9 Synergies between measures

9.1 Overview of synergies within the city

(incl synergies within Trendsetter measures as well as with other measures/actions within the cities)

The synergies are quite simple:

- The measures 7.4, 7.5, 8.1, 8.4, 10.5, 10.7, 11.1 and 11.3 have all supported public transport and these measures have reinforced each other.
- The measures 10.4, 12.3, 12.7, 12.8 have all supported biodiesel use and these measures have reinforced each other
- The further synergy was through the trendsetter worpackages 2, 3 and 4, through which management, evaluation and dissemination of all measures was bundled, and through which there was also a higher level of working together between the various city departments and the other involved organisations.

9.2 Conclusions

A package of measures designed to improve traffic within a city is much more effective than single, isolated measures.

10 Dissemination activities

10.1 Overview of dissemination activities

The Public Relations department of the city of Graz has announced several Trendsetter activities on the city website. A local Trendsetter folder, which stresses objectives of the project and different measures, was translated into German. Furthermore, a local Trendsetter folder was distributed at various events, action days and meetings. The German Trendsetter-Graz website was being updated continuously (especially sections like measure description and news). Articles about Trendsetter appeared in local newspapers and in the monthly local magazine (distributed to every household). Various measures of Trendsetter or the Trendsetter project itself were presented at the international European Conference of Mobility Management in Lyon, Intertraffic in Amsterdam and conferences in Groningen and La Rochelle. An internal Trendsetter-Graz newsletter was disseminated to all local partners. GVB busses are labelled with the Trendsetter logo and the address of the German Trendsetter-Graz website. Within the framework of exhibitions and action days, Trendsetter stands were installed to get general public informed about objectives of the project. Trendsetter was presented to representatives (majors, city councillors) of over 200 Austrian cities. There was a big celebration and press conference for the opening of the integrated mobility centre.

10.2 Assessment of the dissemination activities

In general, the separate measures and the accompanying EU-support have been transmitted quite well. It has not been possible to establish the brand-names Trendsetter and CIVITAS, both are not very well known in the general public, only among persons really working in the various projects and among politicians and many of the employees of the involved organisations.

11 Assessment of all measures

Measure	**Implementation** (as planned/partly /not implemented	**Fulfilment of measure objectives** (yes/partly/no)	**Contribution to city objectives** (yes/no)
Implementation of strolling zones (5.3)	As planned	yes	yes
Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles (6.4)	As planned	yes	yes
Seamless linkage of modes (7.4)	Partly	yes	yes
Customer friendly stops for bus and tram (7.5)	As planned	yes	Yes
New services and services for special customer groups (8.1)	Partly	yes	Yes
Increasing car occupancy (8.3)	Partly	Partly	no
Site level Mobility Management (8.4)	As planned	Yes	Yes
Distribution of goods - Green city logistics (9.2)	As planned	Yes	Yes
Innovations in bicycle transport (10.1)	As planned	Yes	Yes
Taxi drivers as information multipliers for clean transport (10.4)	Partly	Partly	Yes
Marketing/information and quality management (10.5)	As planned	Yes	yes
Awareness for speed reduction and less car use (10.6)	As planned	Yes	yes
Integrated Mobility Centre (10.7)	As planned	Yes	yes
Technical basis for an efficient customer focussed operation and information (11.1)	As planned	Yes	yes
Dynamic traffic management system (11.3)	As planned	Yes	yes
Clean and user friendly bio-diesel bus fleet (12.3)	As planned	Yes	yes
Bio-diesel taxi fleet and bio diesel service station (12.7)	Partly	Yes	yes
Optimisation of the bio-diesel collection system (12.8)	As planned	yes	yes

PART D - Conclusions and Recommendations

12 Lessons to consider for replication and take-up by other cities

Important experiences, based on descriptions in chapter Barriers and driver: Success factors and Worst practice can be highlighted as well.

12.1 Technical issues

See chapter 13 below.

12.2 Synergies

A package of measures designed to improve traffic within a city is much more effective than single, isolated measures.

12.3 Political and Administrative issues

See chapter 13 below

12.4 Economical issues

See chapter 8.

13 Recommendations to decision makers

Public transport measures:

1. Increase of public transport and P&R needed, to meet the increased need of PT and show the citizens how revenues are spent
2. It must be clear how the revenues will be spent, to get acceptance by politicians and citizens
3. Strong political commitment needed
4. Long-term planning needed
5. Citizens must experience the present traffic situation as a problem
6. Information and involvement is crucial
7. Investigate legal issues early in process (for example tax or charge)
8. High level of service – important that users easily can find a point of sale.
9. Implementation of a new system is legally very complex
10. There are successful examples in Europe – use them!
11. 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
12. Politicians need to see alternative costs for achieving shift to other transport modes/Clean vehicles
13. New organisations might be needed to be able to work efficiently with the parking issues in a city (examples from Pecs and Graz)
14. Information is needed to get both awareness and acceptance for the implemented measures
15. Support from the media is vital. Important to involve them early in the process.
16. The passenger strive for as few interchanges as possible
17. Smooth and well planned interchanges vital (in time and geography)
18. PT must be accepted by all social classes. Offer service and comfort also to the middle class, middle aged man
19. Real time information systems increase the experienced safety. If you know that the bus arrives in 10 minutes, it is possible to stay in a safer area until it arrives
20. Information and free trials successful to receive new customers. Newly moved are a priority target group
21. Vital to know if the new passengers are former bikers, pedestrians or motorists
22. Open hearings a possibility
23. Time is needed to create new habits
24. Public transport trip planning is a cheap measure with big value for travellers – increases the number of PT passengers

Logistics measures:

25. A well defined area, with evident problems is an important prerequisite
26. Location of logistic centre crucial
27. Make sure the city is ready to help the contractor to meet, administration, legal issues, politicians
28. Communication with all actors is vital.
29. The suppliers loose the direct contact with their clients. The drivers become very important.
30. The contractors are important for success (create demand for participating, prerequisites, good examples etc)

Bicycle measures:

31. Health and safety arguments more efficient than environmental arguments. Savings of time and money also of more interest than environment in many cases
32. Continuously increase infrastructure for cyclists (sheltered and theft protected cycle racks, bicycle training for children) to ensure an increase of cyclists
33. Put effort into increasing infrastructure for cyclists (sheltered and theft protected cycle racks
34. The demands for safe and secure parking places for bikes, close to commuter trains and bus depots have increased.

Traffic management system measures:

35. Give priority to traffic signal control systems.
36. Traffic management systems are recommended in larger cities where different sub-systems need to be coordinated.
37. Obvious bottlenecks should be eliminated before implementing TMS
38. Invest in TMS when you make other big road investments
39. PT and commercial fleet owners are pioneers and benefit directly from supervising their fleets. Road administrations do not have the same incentive. Technical competence concerning TMS are often low. Co-operation necessary.'
40. Systems requiring more accessible data raises 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.
41. Important to structure the organisation and the co-operation between actors
42. The city administration and leadership needs to have an open mind for synergies with other authorities. Monitoring, data exchange, control and operation policies need to be synchronised for best flexibility.
43. Bus priority could be started in small scale. A few crossings will be enough.
44. Cities should demand re-use of output from earlier projects, since it is a way of saving money, resources and time.

Clean vehicle measures:Start with buses and municipal fleet

45. Political process may be hard – new co-operations and new tasks for municipal departments. Interdisciplinary thinking necessary
46. Use your procurement power! Cheaper vehicles and fuels.
47. Co-operation with other cities and national level often necessary to get sufficient numbers of vehicles to receive procurement power

Next step – involve Companies – necessary!

48. Start with big fleet owners – taxi, delivery companies etc
49. Infrastructure is crucial and today insufficient in many cities
50. Co-operate with the whole chain: producers, distributors, vehicle sellers, maintenance providers, operators
51. Establish a network of active users of clean vehicles
52. Incentives are needed, incentives related to parking and access are specifically effective
53. National incentives are extremely helpful, act to receive them
54. Sticks are needed?
55. Use your procurement power! Require transport services to be clean
56. Subsidies may be needed initially
57. Information, information, information!
58. Long term perspective – in incentives, infrastructure, all communication with stakeholders

Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

Work Package	Subgroups	No	Measure	City
WP5 Access Restrictions	Environmental Zones	5.1	Widening of the Environmental Zone	Stockholm
		5.2	Widening of Environmental Zone for vehicles > 3.5 tons	Prague
		5.6	Congestion charging	Stockholm
	Strolling zones	5.3	Implementation of strolling zones	Graz
		5.4	Establishment of a car-free zone in the inner city	Pecs
		5.5	Preparation of a new traffic and transport strategy	Pecs
WP6 Integrated Pricing Strategies	Smart Card Systems	6.1	Smart card systems and integrated ticketing	Stockholm
		6.2	Smart card systems and integrated ticketing	Lille
	Parking	6.3	Reduced parking fees to promote clean vehicles	Stockholm
		6.4	Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles	Graz
		6.5	Establishment of a zone-model parking in the central city area	Pecs
WP7 Public Passenger Transport	Information to passengers	7.1	Increasing public transport passengers	Stockholm
		7.5	Customer friendly stops for bus and tram	Graz
	Public transport safety	7.2	Public transport safety	Lille
	PT intermodality	7.3	Intermodal local/regional transport interchanges	Lille
		7.4	Seamless linkage of modes	Graz
		7.6	Park and Ride facilities	Lille
		7.7	Linking different ways of public transport	Prague
WP8 New Forms of Vehicle Use		8.1	New services and services for special customer groups	Graz
	Car pooling/sharing	8.2	Company mobility plan in the administration fleet	Lille
		8.3	Increasing car occupancy	Graz
	Awareness rising	8.4	Site level Mobility Management	Graz
		8.5	Urban Mobility Plan	Lille
WP9 New Concepts for the Distribution of Goods		9.1	Material logistic centre – to optimise freight deliveries at construction site	Stockholm
		9.2	Distribution of goods - Green city logistics	Graz
		9.3	Logistic centre for Old Town of Stockholm	Stockholm

Work Package	Subgroups	No	Measure	City
WP 10 Innovative Soft Measures	Bicycle measures	10.1	Innovations in bicycle transport	Graz
		10.2	Make bicycling attractive (B&R information on the Internet)	Stockholm
	Trip planning	10.3	Creation of a visitor web for optimal trip planning	Stockholm
		10.5	Marketing/information and quality management	Graz
	Awareness of clean transport and safety	10.6	Awareness for speed reduction and less car use	Graz
		10.4	Taxi drivers as information multipliers for clean transport	Graz
WP11 Integration of Transport Management Systems	Traffic information	11.2	Traffic monitoring and supervision	Stockholm
		11.3	Dynamic traffic management system	Graz
		11.4	Accessible road network (street) data	Stockholm
	Improving PT traffic flow	11.5	More adaptive signal control in a bus priority system	Stockholm
		11.6	More adaptive signal control in a bus priority system	Prague
		11.7	High level service bus routes	Lille
		11.1	Technical basis for an efficient customer focussed operation and information	Graz
WP12 Clean Public and Private fleets	Heavy vehicles	12.1	Clean and efficient heavy vehicles	Stockholm
		12.2	Biogas bus fleets	Lille
		12.3	Clean and user friendly bio-diesel bus fleet	Graz
		12.6	Waste collection with biogas-vehicles	Stockholm
	Light vehicles	12.4	Clean municipal fleets	Stockholm
		12.5	Clean municipal fleets	Lille
		12.7	Bio-diesel taxi fleet and bio diesel service station	Graz
		12.11	Making Clean Vehicles less expensive	Stockholm
		12.13	Increasing clean vehicle use in private company fleets	Stockholm
		12.14	Web-portal for drivers of clean vehicles	Stockholm
	Clean fuel distribution	12.8	Optimisation of the bio-diesel collection system	Graz
		12.9	Analysis of the biogas experience	Lille
		12.10	Improved biogas refuelling infrastructure	Stockholm

Appendix 2 – Wordlist

Acronym	Explanation
CCCI	Civitas Common Core indicators
CIVITAS	“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes
CO2	Carbon dioxide
EC	European Commission
GHG	Green House Gas
ICT	Information Communication Technology
IT	Information Technology
METEOR	Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.
MIRACLES	Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS- – A project within the CIVITAS I initiative.
NOx	Nitrogen oxides
P&R	Park and Ride
PM10	Particulate matters, with diameter of less than 10 µm
PT	Public Transport
RKF	Resekortsföreningen I Norden -
SEK	Swedish kronor (1€=9.42 SEK 2005-06-14)
SL	Stockholm Transport
SMIRT	Syndicat Mixte pour I’Integration Reseaux et des Tarifs
SNCF	Société Nationale des Chemins de fer Français
TELLUS	Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.
TJ	TerraJoule
TOE	Tons of oil equivalent
TRENDSETTER	Setting Trends for Sustainable Urban Mobility
Umweltjeton	Special coin for low pollution vehicles in Graz
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIVALDI	Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.
WP	Work Package

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 – Lille Local activities

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1. City of Stockholm, Environment and Health Administration
2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
6. Spedition- und Internationale Transport GmbH
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

This report details the implementation and the evaluation of the demonstration work undertaken in Lille.

It details the work done in Lille, 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.

GENERAL BACKGROUND OF PUBLIC TRANSPORT IN LILLE METROPOLIS

Lille Metropole, with a population of 1,2 million people, divided into 85 communes and with 600,000 people living on its Belgian side, has become a base for distribution in the centre of Northern Europe and a major route to traffic travelling north-south and east-west across Europe.

From the first "mongy" tram to the VAL automated underground railway, it has over time built up a strong transport network, organised to provide continuity over the whole territory and serve the most outlying areas.

Lille Metropole is responsible for the urban public transport system in its territory. Out of its total budget of FRF 8 billion, more than one third is spent on transport. The public of the Lille Metropolis enjoys a very ample choice of methods of transport (3rd largest network of services in France). In particular, these include the driver-less metro system (known as the «VAL», 45 km), a «no step to carriage » tramway system (19 km), 38 bus routes and 42 main rail routes (including 8 which cross the border with Belgium).

The main problem facing the Lille Metropole after a period of substantial investment in its transport infrastructures is how to best develop the links between its inter-urban and international transport services so that development is sustainable. The final objective of this policy, benefiting from a large political support, is to double passenger levels from 100 to 200 million between 1998 and the year 2015.

In order to achieve this objective, the Urban Community is currently running two major programmes already approved by the Lille Metropole Council, as well as a landmark project in co-operation with its institutional partners, the local population of Lille Metropolis, user associations and regional companies:

The Urban Mobility Plan (*Plan de Déplacements Urbains*, PDU), a means of planning and co-ordination to make all the region transport networks can work effectively together (including provision for inter-modal facilities). Approved in 2000, this plan has to be implemented in stages until 2015

The gradual replacement of the entire bus fleet by buses that run on biogas and/or natural gas in order to have a 100% clean public transport system .

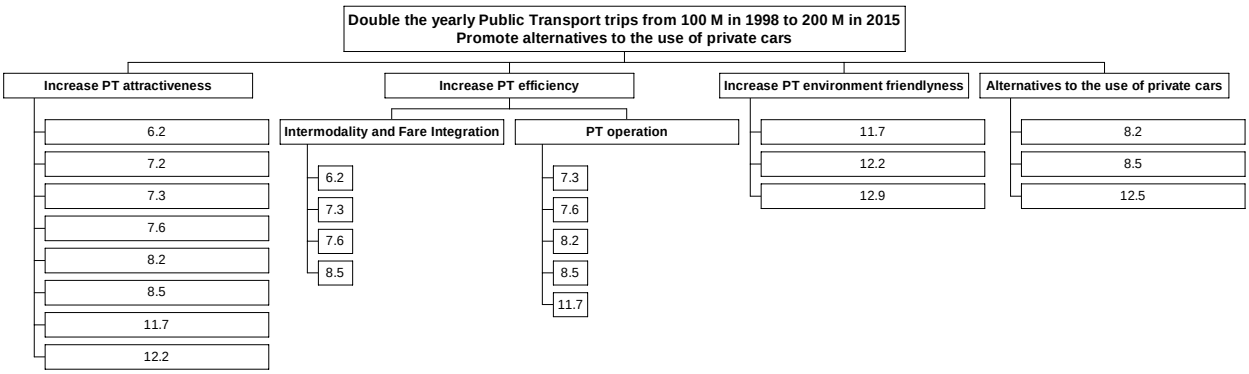
The Trendsetter Project permitted Lille Metropole to be enriched by the partner's experience and to boost the several projects foreseen in the framework of the Urban Mobility Plan and the biogas development, in line with the CIVITAS objectives.

MAIN TOPICS ADDRESSED BY LILLE IN TRENDSETTER

Lille participation in Trendsetter is essentially organised around the main objective of significantly increase – i.e. double – the use of public transport in the Metropolis.

This is structured in 4 main sub-objectives, as described below:

Objectives vs. Tasks in Lille



Obviously, some measures contribute to several objectives

INCREASE PUBLIC TRANSPORT ATTRACTIVENESS

Public transport attractiveness is of course a major element to substantially increase the use of public transport use.

Three main directions are followed to support this objective:

1. Fare integration and ticketing: give the customer an easy and understandable fare environment, and supply the right ticketing tools to support it. At the same time, this facilitates the operators in its efficiency.
2. Improve infrastructure and quality, through higher security, improved intermodality and better level of services as well as environmental friendly buses
3. Improve planning and planning implementation

Lille Metropolis coordinated 8 measures in this direction:

TS Group of measures	Measure N°	Measure description
Smart Card Systems	6.2	Smart card systems and integrated ticketing
PT safety	7.2	Public Transport Safety
PT intermodality	7.3	Intermodal local/regional transport interchanges
	7.6	Park & Ride facilities
Car pooling/sharing	8.2	Company Mobility Plan in the administration fleet
Awareness raising	8.5	Urban Mobility Plan
Improving PT traffic flow	11.7	High Level Service Bus Routes
Heavy vehicles	12.2	Biogas Bus Fleets

INCREASE PUBLIC TRANSPORT EFFICIENCY

The increase in the use of public transport is tightly related to the efficiency of the operations, and customer benefits shall also match operators interests.

In this sense, efficiency is closely liked to three main aspects:

1. Fare integration and ticketing: give the customer an easy and understandable fare environment, and supply the right ticketing tools to support it. At the same time, this facilitates the operators in its efficiency.
2. Improve infrastructure and quality, through higher security, improved intermodality and better level of services
3. Improve planning and planning implementation, including at the detailed local level

Two groups of measures contribute to those objectives:

INTERMODALITY AND FARE INTEGRATION

These measures support the seamless travel approach benefiting both PT users and operators:

TS Group of measures	Measure N°	Measure description
Smart Card Systems	6.2	Smart card systems and integrated ticketing
PT intermodality	7.3	Intermodal local/regional transport interchanges
	7.6	Park & Ride facilities
Awareness raising	8.5	Urban Mobility Plan

PUBLIC TRANSPORT OPERATION

These measures concentrate on the improvement of PT operation efficiency

TS Group of measures	Measure N°	Measure description
PT intermodality	7.3	Intermodal local/regional transport interchanges
	7.6	Park & Ride facilities
Car pooling/sharing	8.2	Company Mobility Plan in the administration fleet
Awareness raising	8.5	Urban Mobility Plan
Improving PT traffic flow	11.7	High Level Service Bus Routes

INCREASE PUBLIC TRANSPORT ENVIRONMENT FRIENDLYNESS

This objective relates to bringing a positive environmental impact of the Public Transport operations, paying in particular attention that increase of public transport results in an improved environmental situation.

Group of measures	Measure N°	Measure description
Improving PT traffic flow	11.7	High Level Service Bus Routes
Heavy vehicles	12.2	Biogas Bus Fleets
Light vehicles	12.5	Clean Municipal Fleets
Clean Fuel distribution	12.9	Analysis of the biogas experience

ALTERNATIVES TO THE USE OF PRIVATE CARS

In order to have attractive public transport modes, alternatives to the use of private cars shall be provided.

Group of measures	Measure N°	Measure description
Car pooling/sharing	8.2	Company Mobility Plan in the administration fleet
Awareness raising	8.5	Urban Mobility Plan
Light vehicles	12.5	Clean Municipal Fleets

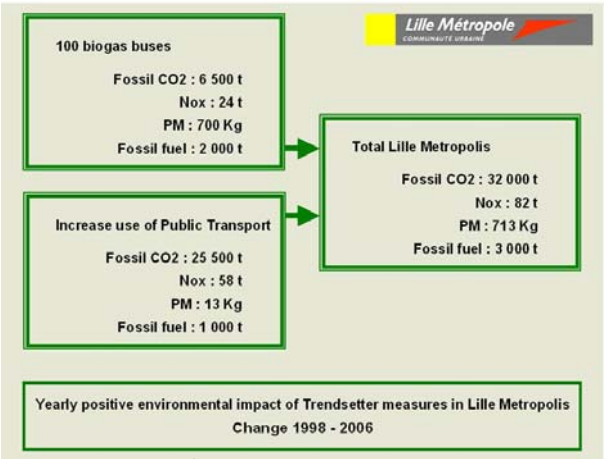
MAIN CONCLUSIONS OF THE WORK PERFORMED IN LILLE METROPOLIS

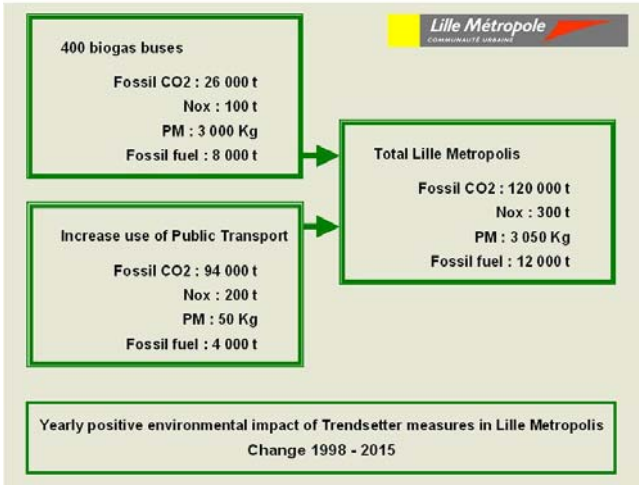
The measures in Lille reached their objectives (in most of the cases totally and in the cases where it was partial, full achievement f the objectives will be reached in the next months after completion of Trendsetter) and can be used as basis for examples and for replication to other cities.

The integration of the 10 measures in Lille leads to 2 main aspects in terms of environment impact :

- Supplying environmental friendly fuel – 4 Mm3 per year of biogas produced from waste and sludge – is allowing to save fossil fuel and to reduce emissions
- Ensuring the adequate modal split from private car to public transport, as a consequence of the integration of all the measures in Lille, allows a further reduction in fossil fuel use and in emissions

The diagrams below summarise the situation, in 2006 and in 2015 when the goal of doubling the number of PT trips from the 1998 situation will be reached. They show the achievement of Lille Metropolis goals and a very substantial contribution of Lille to the objectives of Trendsetter:





The measures provide also an excellent approach to some major strategic and methodological issues in Lille:

- Supporting the long-term vision of doubling the public transport trips between 1998 and 2015. At this stage, a strong increase above 30% has been observed during Trendsetter timeframe.
- Allowing to implement the strategy of the Urban Mobility Plan (PDU) with operational measures
- Validating the budgetary models
- Showing the importance of the strong political support
- Benefiting from political stability and consensual environment.

The work done allowed the practical implementation and demonstration of pioneering actions , stressing the following important prerequisites for a successful deployment of such initiatives:

- Well structured plans, involving all major stakeholders, are essential to prepare implementation
- Measures are mainly complementary, and isolated implementation is many times less effective than a coherent, simultaneous, deployment allowing full benefit from the complementarities
- Some visibility on intermediate results is important to support long term decision making.

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

- 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

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:

- 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.

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:

- land
- construction
- fiscal
- employment
- environment
- …

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.

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:

Effects on Emissions, Energy, and Mobility	Implementation time	Costs for cities
Small	Short	Low
Large	Medium	Medium
	Long	Large

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure
Time –implementation time

Areas	Categories	Emis-sions	Energy	Mobi-lity	Time	Inves-ment cost	Opera-tional cost
Convenient access to public transport	Integrated fares and smart cards	++	+	++	◕	$$$	$
	Increased public transport security	+	+	++	◔	$$$$	$$
	Convenient and safe intermodality	+	+	++	◑	$$$$	$$$$
	Customer-friendly stops	+	+	+	◔	$$$	$
	Dedicated bus lanes and priority at junctions	++	++	++	◑	$$$	$
	New services for special needs	–	–	+	◔	$	$
	Quality management	+	+	++	◔	$$$	$$
Trip planning for smartest choice	Real-time information helps staff and passengers	+	+	++	◕	$$$	$$
	Planning trips on the web	+	+	++	◕	$$$	$
	Integrated public transport services	+	+	++	◑	$	$
Traffic management	Traffic management	++	++	++	◕	$$$$	$$
Cycling	Cycling	++	++	+	◑	$$$	$
Access restrictions	Zones favouring pedestrians makes cities attractive*	+	+	–	◑	$$$	$
	Selective access restriction for heavy vehicles	++	++	–	◑	$	$
	Congestion charging	++	++	++	◕	$$$$	$$$$
Marketing attractive alternatives	Marketing	++	+	++	◕	$$$	$
	Mobility management	+	+	++	◔	$$$	$
Improved goods distribution	Consolidation of goods *	+	+	++	◑	$$$	$
Clean vehicles and fuels	Biofuelled vehicles	++	+	–	◕	$	–
	Biofuel production	++	+	–	◑	$$$	$

*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.

Evaluation level	Objectives	Responsibility
Measure Evaluation	Measure objectives	Measure leader
WP Evaluation	WP objectives	WP leaders
City Evaluation	City objectives	City coordination
TRENDSETTER Evaluation	TRENDSETTER objectives	TRENDSETTER Evaluation Manager
European Evaluation	CIVITAS objectives	METEOR, in cooperation with the Evaluation Liaison group

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.

Evaluation area	Indicator	Unit
Energy	*Energy use (total and renewable)*	*Joule/year*
Environment	*Emissions of fossil CO_2*	*Tons/year*
Environment	*Emissions of NOx*	*Tons/year*
Environment	*Emissions of PM*	*Tons/year*
Environment	*Noise levels*	*dB(A)*
Mobility	*No of trips*	*No or Qualitative 5-degree scale*
Mobility	*Travel time*	*Reduction in hours or %*
Mobility	*Quality of service*	*Qualitative 5-degree scale*
Mobility	*Acceptance*	*Qualitative 5-degree scale*

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.

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

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.

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

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

3.4 Specific Lille Objectives within Trendsetter

The City objectives of Lille are:

- 85% clean public transport journeys in year 2005
- Rise of 21% in PT passenger travels from 1998 to 2005
- The clean vehicles fleets will permit to substantially cut pollution

Trendsetter will contribute to the objectives by:

Increasing biogas production and usage:

- increasing massively the biogas production (locally from waste and sewage treatment) up to 3 M Nm3 per year by 2005
- 128 new clean busses in Lille Metropole fleet replacing diesel busses, adaptation of the bus depots and lines and construction of a new compression unit
- 120 new clean vehicles in the staff pool and a new compression unit

Encouraging public transport use by introducing a combination of new infrastructure that improve quality and incentives:

- 1 new High service Bus Route
- 2 Intermodal interchanges points
- development of a pricing scheme for all PT, an integrated ticketing and specifications for a smart card system
- increased PT safety and reliability
- increase intermodality between the different PT means and between private cars / PT
- development of an efficient co-operation between all PT authorities (local consortium)

company mobility plan for LMCU staff, development of a comprehensive approach on the metropolitan level between the requirements of mobility (cars, public transport and freight transport).

4. Overview of Lille activities

4.1 Description of the Metropolis of Lille

Lille Metropole, with a population of 1,2 million people, divided into 85 communes and with 600,000 people living on its Belgian side, has become a base for distribution in the centre of Northern Europe and a major route to traffic travelling north-south and east-west across Europe.

From the first "mongy" tram to the VAL automated underground railway, it has over time built up a strong transport network, organised to provide continuity over the whole territory and serve the most outlying areas.

Lille Metropole is responsible for the urban public transport system in its territory. Out of its total budget of FRF 8 billion, more than one third is spent on transport. The public of the Lille Metropolis enjoys a very ample choice of methods of transport (3rd largest network of services in France). In particular, these include the driver-less metro system (known as the «VAL», 45 km), a «no step to carriage » tramway system (19 km), 38 bus routes and 42 main rail routes (including 8 which cross the border with Belgium).

The main problem facing the Lille Metropole after a period of substantial investment in its transport infrastructures is how to best develop the links between its inter-urban and international transport services so that development is sustainable. The final objective of this policy, benefiting from a large political support, is to double passenger levels from 100 to 200 million between now and the year 2015.

In order to achieve this objective, the Urban Community is currently running two major programmes already approved by the Lille Metropole Council, as well as a landmark project in co-operation with its institutional partners, the local population of Lille Metropolis, user associations and regional companies:

The Urban Mobility Plan (*Plan de Déplacements Urbains*, PDU), a means of planning and co-ordination to make all the region transport networks can work effectively together (including provision for inter-modal facilities). Approved in 2000, this plan has to be implemented in stages until 2015

The gradual replacement of the entire bus fleet by buses that run on biogas and/or natural gas in order to have a 100% clean public transport system in 2006.

The Trendsetter Project permitted Lille Metropole to be enriched by the partner's experience and to boost the several projects foreseen in the framework of the Urban Mobility Plan and the biogas development, in line with the CIVITAS objectives.

4.2 Problems to be solved in Lille

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.

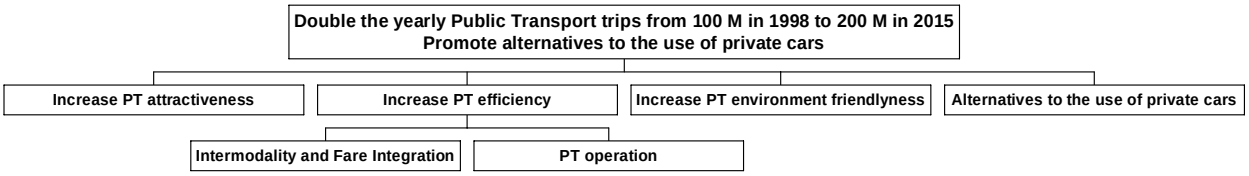
- The Urban Mobility Plan (PDU) adopted by LMCU in June 1999 which aims to limit pollution of the cities by supporting the development of the alternative modes.

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).

This leads to the specific objectives structure, in which the Trendsetter activities are integrated: the objective of doubling public transport use from 1998 to 2015 is supported by an increase in public transport attractiveness, by improved efficiency, through environment friendliness and the provision of credible and efficient alternative to the use of private cars:

Objectives organisation in Lille



4.6 Trendsetter in Lille

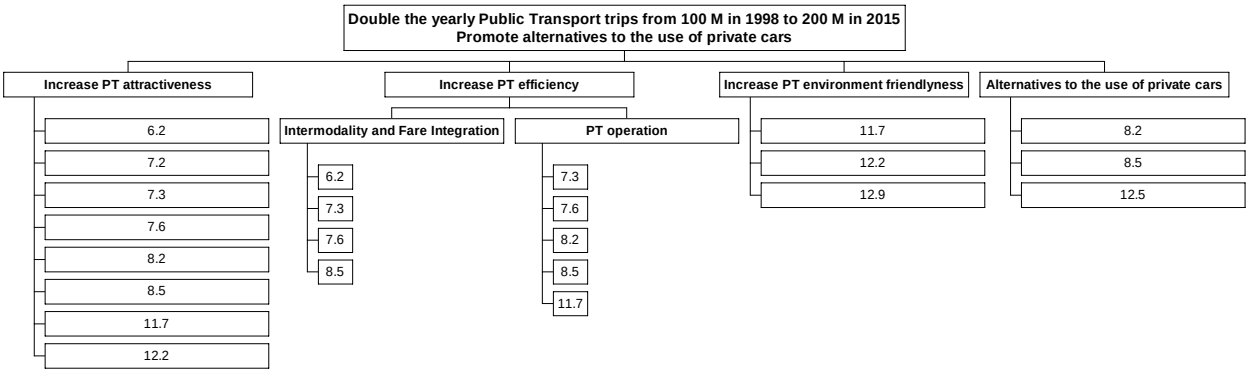
The partners in Lille will implement ten different measures within Trendsetter, described in detail in the Inception Report and in subsequent documents:

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

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.

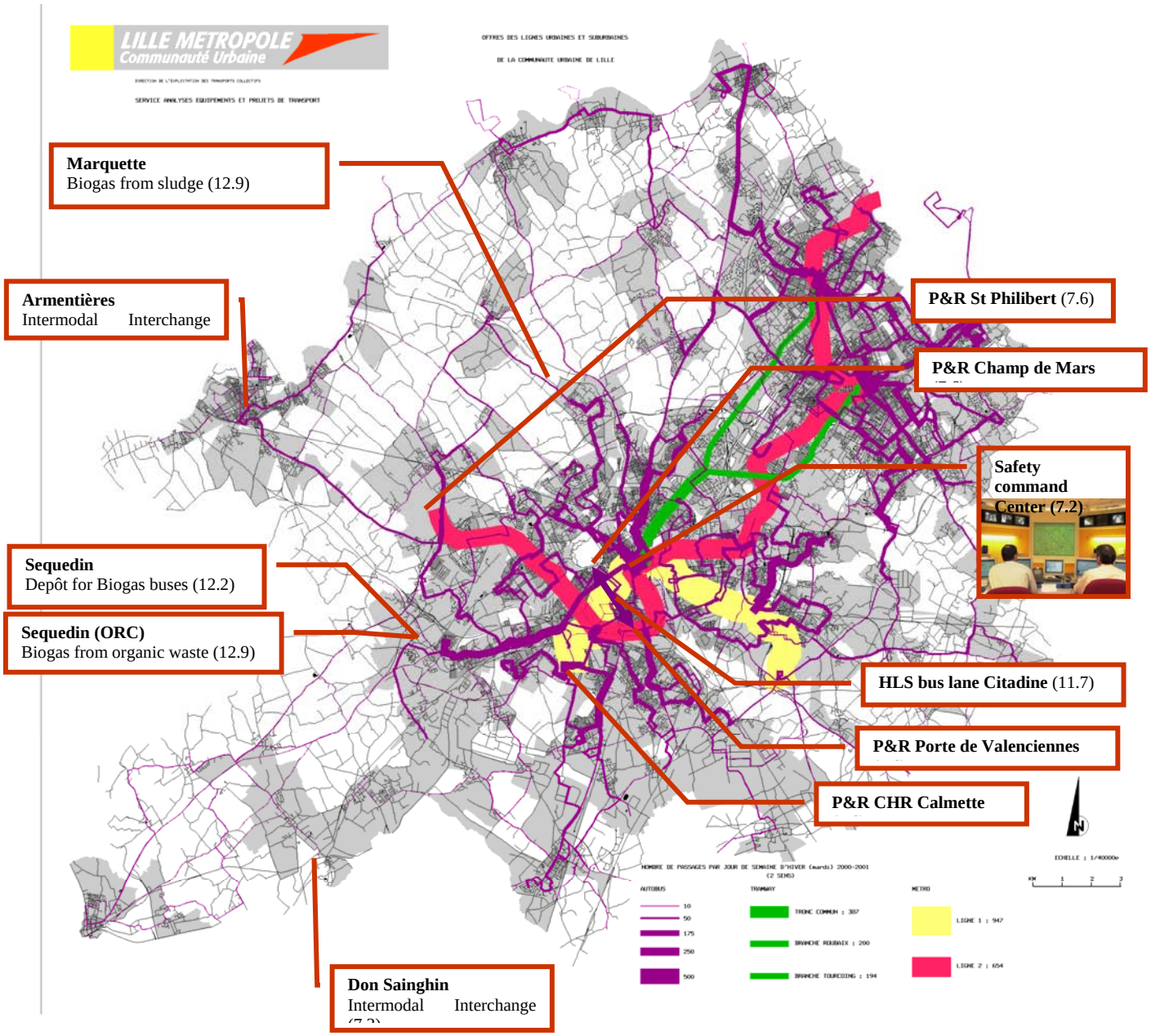
The figure below illustrates the organisation of the measures according to the high level objectives of the Lille Metropolis (one measure may address several objectives)

Organisation of Tasks in Lille according to objectives



Picture 2 Organisation of measure according to the high level objectives in Lille Metropolis

4.4 Geographical context in Lille



This map shows the density of traffic on the various PT modes (except train) in beginning 2001, and the geographical implementations of the various measures.

(Measures not mentioned are covering the whole Metropolitan area)

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.

4.5 Description of the local consortium

There are two partners within Trendsetter Lille, as described in the accepted Inception Report:

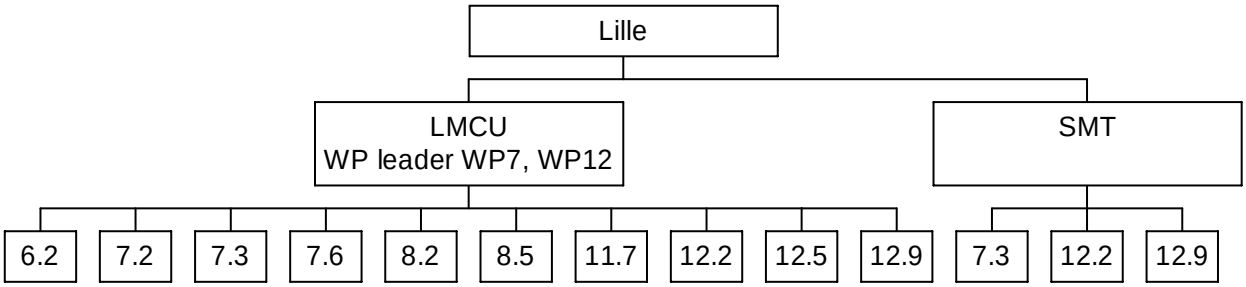
- Lille Metropole (LMCU)
- Syndicat Mixte des Transports (SMT)

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), …

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 Départment of Nord.

Lille operational organisation



Picture 3 Organisation in City of Lille.

4.7 Measure descriptions

Each measure is shortly described below:

Measure 6.2 Smart card systems and integrated ticketing

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 solutions to be selected and implemented.

This fare integration, together with the intermodal interchange strategy, will allow a large promotion of Public Transport solutions and, beyond these, the increased use of Public Transport in the Metropolis.

An excellent co-operation between Lille Metropolis, the Nord/Pas-de-Calais Area Area, Transpole and the SNCF made it possible to study concrete measures in favour of fare integration. Since the end of 2002, many meetings took place, of the studies were carried out and the documents were finalized.

The new fare range of Transpole is now applied since September 1, 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.
Now, the technical proposals for a 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 (PT)
- Improve attractiveness of PT

Innovative aspects include in particular payment of fares within all public transports (& P+R) with the same Smart Card.

Main problems to be solved by the measure 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 the complexity of decision making.

Measure 7.2 Public transport security

To efficiently attract customers to the Public Transport, the adequate levels of security must be put in operation and made visible to the public, as this issue is viewed as a major element of Public Transport attractiveness.

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.

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.

Measure objectives are:

- Improve security in Public Transport (PT)
- Ameliorated the public opinion of public transport security &safety
- Improve attractiveness of PT

Innovative aspects 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

The multimodal interchanges 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 improving 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).

The project of multimodal interchange in Armentières aims to relocalise functionally and spatially the site while bringing quality and comfort and while being supported by the tremendous opportunity that Lille metropolis is the third French river port and the fourth freight airport as well as the most dense railway network France after Paris.

On Don Sainghin the objective is to requalify and emphasize "country" spaces in order to improve the accessibility of the users and to solve the problems of wild occupation of public space.

The involved actors are very numerous: organizing authorities of transport (Lille metropolis Urban Community + Nord/Pas-de-Calais Area Area + Department of North), conveyors (the SNCF, RFF, Transpole), towns of Armentières and Chappelle d' Armentières.

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 Flandres 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 valorisation 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 include:

- 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 7.6 Park and Ride facilities

The Park & Ride facilities are placed in the same specific legal context as for the intermodal interchanges, and is complementary to those :

- 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 improving 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).

A network of park & ride facilities, with specific spaces for the 2 wheelers in most cases, will allow to keep the cars away from the city and to facilitate direct access to public transport. 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 nine 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.

Measure 8.2 Company Mobility Plan in the administration fleet

The plan of urban displacements (PDU) adopted by LMCU in June 2000 has as a stake to durably slow down the growth of the motor vehicle traffic in incentive the population to be joined again with collective transport or quite simply to practise walk and the bicycle.

The residence to work trip by car is a significant share of displacements in peak hour.

The employers have thus an essential role to encourage the employees to choose alternative modes vs. cars.

LMCU thus wished to open the way and to be used as example by implementing a company mobility plan (PDE) since the beginning of the year 2002.

This PDE relates to all 2000 Community agents and includes/understands various elements:

- improvement of the pedestrian and bicycle routes to the accesses of the hotel of community,
- the development of the car sharing,
- the financial support at the level of 50% of the cost of the urban and sub-urban public transport season tickets (paid by LMCU).

This measure has the following specific objectives:

- Improve car pooling in Lille Municipal fleet
- Favour the two-wheelers
- Increase the use of public transport

The interest for company mobility plans is now adopted by many other organisations in the region: Regional Authority (Conseil Régional), Department Authorities (Conseil Général), private companies such as "La Mondiale" insurances, etc.

Measure 8.5 Urban Mobility Plan

The measure is implemented according to a methodology defined in the main urban mobility plan (PDU)

- To implement locally the PDU through "micro-PDU" charter: The "micro-PDU " charter proposes actions to implement locally actions to allow reaching the objectives of the Urban Mobility Plan. Recommendations of this charter will apply in the projects of urban development thus that in the projects of adjustment of public spaces and of road system. It is annexed to the PDU.
- Pilot studies will initiate the "micro-PDU" steps: the studies will be carried out by the Lille metropolis to validate working methodologies associating more closely to projects urban development strategies and mobility by all modes. These studies will conclude on a generalization of these procedures within the Lille metropolis

The micro-PDU of the Weppes area came from a requirement to further investigate the operational modalities of the local mobility.

The objectives of the micro-PDU are threefold :

- To undertake a global urban analysis of the Weppes area and realise a mobility diagnostic;
- To highlight the main issues and malfunctions and express the requirements of the local authorities, in coherence with the mobility plan objectives ;
- Propose a list of actions and supporting initiatives.

The work is articulated in 3 phases :

- **Phase n°1 . Diagnostic** : this first phase allows an evaluation of the starting situation in terms of urban development and mobility ;
- **Phase n°2 . Orientations** : this phase defines the objectives to be met to cope with the difficulties identified in the previous phase ;
- **Phase n°3 . Propositions** : operational improvement scénarii are proposed and ranked according to importance and applicable time frame

The PDU has a comprehensive approach combining:

- City planning, transport/mobility and environmental protection and
- The different requirements on mobility (cars, public transport and freight transport)

The Micro PDU detail local implementations of the PDU at commune level.

Measure 11.7 High Level of Service Bus Routes

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 complementarity with the existing operations including TER (regional trains), the subway and the tram.

The intervention on the roadway system (bus corridors and/or bus hoppers with priority) constitutes a necessary condition to put in synergy with the implementation of this network.

For CITADINE, the stakeholders are the elected officials and the technicians of the urban community of Lille, the cities, the conveyor. For the high level service bus lanes CHRB. Calmette – Wattignies, we have in addition the General Council of North, the Regional hospital complex, the SORELI (charged with the Eurasanté file).

The CITADINE was brought into service since September 22, 2004. The three others lines are under study and could be brought into service at the end of 2007; a corridor drunk was already created street of the Gunners (beginning of the lane Lille-Marcq en Baroeul).

The objective of these lines (12 on the whole) is to anticipate a more ambitious project: the tram-train. In Trendsetter, 4 lines are started:

- The CITADINE: Since September 22, 2004, it circulates partly in an own site running against the main traffic. It connects 3 relay parks (Park & Ride, cf. measure 7.6) and makes it possible to its users to very quickly reach the centre town of Lille by avoiding congestions. The shuttle circulates with gas buses (respect of the quality of the air, no emission of black smoke, no smells, no particles, twice quieter than a traditional bus) and operates from Monday to Saturday, except public holidays, 7H00 to 20H, and until 22H30 the days of football matches. During the first 6 months, within the framework of a promotional campaign, car parks and shuttle were free. Since January 17, 2005, the drivers and passengers parked on these paying park & ride lots can use the shuttle free.
  After a reduction of traffic in accordance with the installation of the access control of the park & ride facilities, the traffic on the shuttle was stabilized and even progressed again. During its free start-up phase, Citadine transported 14.000 travellers daily, today the shuttle transports approximately 12.000 travellers daily.
  The construction on the road system for the creation of a bus corridor against the direction of general circulation on a broad boulevard was a condition necessary to the installation of this new line, but a condition difficult to implement taking into account a historical context related to this old boulevard. These actions, constitute a first stage, will be followed soon by creation of a second corridor in the other direction and a new traffic organization on the sector.

- High Level of Service Bus Lane Lille CHRB.Calmette, Wattignies: The object of this new line as a double corridor on own site way on the whole of the route is to ensure performance and regularity of travel times within the framework of the Urban Mobility Plan (PDU), to bring a quality connection with the Regional Hospital complex, the future Eurasanté pole and the heart of the Lille agglomeration, to support the alternative modes, to bring certain a urban requalification with objectives of environmental improvement, to make existing installations safer.
  The file, which was the subject of a preliminary public dialogue in September 2004, had to be completely re-examined insofar as on the commune of Wattignies the population did not accept suggested installations. In order to prepare public investigation and in order to obtain acceptance from police (procedure which follows the preliminary dialogue), new proposals were made to the city: reorganisation of the bus corridor, removal of the park & ride on the commercial zone, prolongation of the line towards the town centre and to the train stop of the neighbour commune.
  The public investigation is envisaged during the 1st half of 2005, triggering the detailed studies of the project and land acquisitions.

- High Level of Service Bus Lane Comines – Ronchin: This line longest of the 12 is envisaged (25 km). It will cross 7 communes and will anticipate the tram-train between Commines and Lille. Its installations will adapt to the various layouts of the premises crossed for which it will not be always possible to be exclusively on own site, but specific installations at crossroads, in order to prioritise the buses, are envisaged. The study of the line is treated section by section. That which is most advanced locates on the commune of Ronchin. In preoccupations of common identity and a development compared to the lines of standard bus, a landscape study was undertaken on this section in order to be used as a basis of reference for the remainder of the line, but also for the 11 others high level of service bus lines. The engineering and design department in charge of this work completed its study at the end of February 2005.
- High Level of Service Bus Lane Lille-Station Lille Flandres/La Madeleine/Marcq in Baroeul.

  The axis to be treated is located on the route of bus line 4. It begins at the Station Lille Flandres (interchanges between network the SNCF main lines, the regional train network TER, the tram and two subway lines) and finishes in Marcq in Baroeul, via SNCF railway station of La Madeleine. This line crosses high density living zones (collective and individual housing). In the crossing of La Madeleine, it serves a significant commercial zone. While crossing La Madeleine and Marcq in Baroeul, because of reduced road space availability, a priority at the crossroads is organised with access corridors. At Lille, in entry of the town centre, refitting of bus corridors were executed (street of the Cannoniers) in order to ensure the maximum regularity on a highly saturated axes.

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 :

- implemented 167 gas/biogas buses (50% of the bus fleet).
- Purchased a new dual CNG and biogas compression station for the buses.
- Built a new bus depot and modified certain lines (detectors, ventilation system, lighting), in order to guarantee bus operation and maintenance safety.

Infrastructure investments are 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 has evaluated 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 12.5 Clean Municipal Fleets

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 Metropole 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 (liquefied 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 12.9 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 started in Nov 2004 and construction will be finished by 2007. This will increase the biogas production to 3,6 M Nm^3 per year. 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.

PART C – Results and Analysis

5. Indicators based analysis of the achievements in Lille

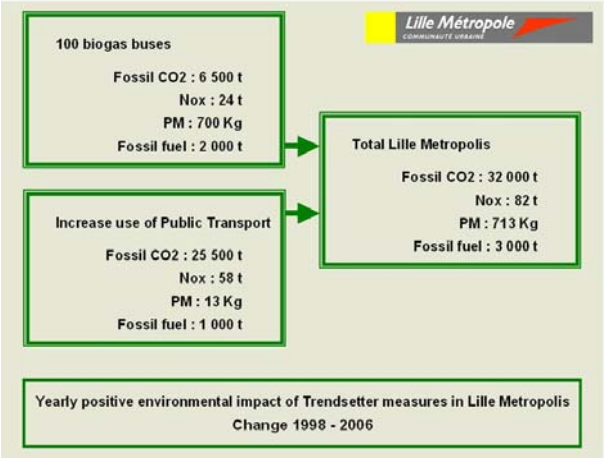
Results of the indicator-based evaluation of the Trendsetter Common Core Indicators and the WP common indicators are presented in an integrated way and are analysed in the various measures.

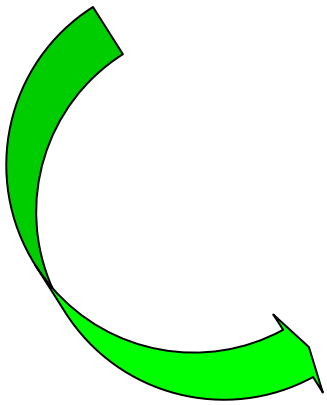
5.1 Global indicators and results at Lille Metropolis level

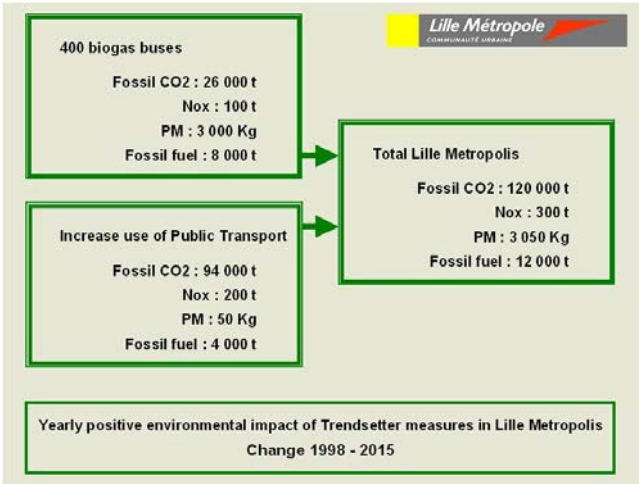
The integration of the 10 measures in Lille leads to 2 main aspects in terms of environment impact :

- Supplying environmental friendly fuel – biogas produced from waste and sludge – is allowing to save fossil fuel and to reduce emissions
- Ensuring the adequate modal split from private car to public transport, as a consequence of the integration of all the measures in Lille, allows a further reduction in fossil fuel use and in emissions

The diagrams below summarise the situation, in 2006 and in 2015 when the goal of doubling the number of PT trips from the 1998 situation will be reached. They show the achievement of Lille Metropolis goals and a very substantial contribution of Lille to the objectives of Trendsetter:







5.2 Indicators and results at measure level

Measure 6.2 Smart card systems and integrated ticketing

There is no specific indicator to the fare integration - ticketing. The most relevant measurement relates to the total use of the Public Transport modes.

The modal share of Collective Transport in Lille metropolis (all modes including walk) passed from 7,5% in 1998 to ca. 10% in 2005, for the moment in conformity with the objective of the PDU which is to pass to 14,6% in 2015.

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 (comparisons below are made between 2002 and 2005, unless otherwise stated)

1. <u>The feeling of security on the network</u>:

- 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 months ago** (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.

<u>3. Solutions always perceived like effective:</u>

- 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). Construction is now due to start in 2006 and completion is expected in 2007.

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 7.6 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

	Porte de Val.	Norexpo	Champ de Mars	Total 3 parkings
Capacité	330	370	1500	2200
Moyenne journalière	22	48	511	581
Taux d'occupation / capacité	7%	13%	34%	26%

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:

	4 Cantons	CHR B Calmette	ST Philibert	Les Prés	Portes des Postes	Portes d'Arras	TOTAL
Capacité	600	300	350	150	80	100	**1580**
Fréq moy 1er sem 05	424	228	229	154	79	67	**1181**
Taux de remplissage	71%	76%	65%	103%	99%	67%	**75%**
Evolution / 1er sem 04	+18%	+49%	+258%*	+10%	-9%**	+3%	**+36%**

This relates to the following historical records:

	4 Cantons	CHR B Calmette	St Philibert	Les Près	Porte des Postes	Porte d'Arras	*Total*
1998	203						**203**
1999	236	172*	40*	48*	121*		**617**
2000	254	160	41	72	91		**618**
2001	266	153	56	96	93	17	**681**
2002	265	156	65	117	105	37	**745**
2003	306	136	65	130	111	49	**797**
2004	356	178	107	137	81	61	**920**
2005	424	228	229	154	79	67	**1181**

Measure 8.2 Company Mobility Plan in the administration fleet

the assessment concerning the two wheels is established as follows:

4 electric scooters in circulation, including one on the site of Ronchin.

23 bicycles distributed in the following way:

2 on the site of Ronchin

2 with the PC of the boulevard of Freedom

2 on the site of Ramadier

17 with the hotel of community (13 are used in trip from residence to work)

the assessment concerning the car sharing is established as follows:

To date, an organization of Car sharing of several types is in place.

For the trip residence to work:

Daily car sharing:

- 1 group of 4 people
- 2 groups of 2 people

For the lunch break trips to CUDL:

System set up in all the external units.

For the sports activities of the ASC midday:

System is in place for the sections athletism, swimming and aquagym.

Regular car sharingsTuesday and Thursdays for the section athletism: a majority of groups made up of 2-3 people.

Regular car sharings Mondays and Wednesdays for the section swimming: a majority of groups made up of 2 people.

Regular car sharings Mondays, Tuesday and Fridays for the section aquagym: an average of 10 people leaves each Monday.

For the trips of the social committee:

An action of incentive to the car sharing is carried out for each voyage, since January 2001.

For the days of strike of public transport:

A campaign assistance to transport is installation in the event of strike, 2 to 3 vehicles on average are used in car sharing these days there.

For the meetings and training sessions outside LMCU:

A campaign of car sharing is in place for each formation outside, 2 to 3 vehicles on average are used in car sharing with each formation.

the assessment relating to the refunding of the season tickets for collective transport is established as follows:

In December 2004: 244 employees LMCU were concerned for an amount of 6500 €, split in:

- 123 subscriptions with the urban network Transpole
- 113 subscriptions with network the SNCF-TER
- 8 Transpole subscriptions + TER (Ticket Plus)

the initiative taken by LMCU made it possible to convince a certain number of communities or companies to implement a similar step.

In 2004 more than 600 subscribers to the network of Transpole are concerned on a total staff complement of almost 5000 paid. With the installation of the payment on the parks Citadine relay of new companies subscribed to the step to date 8400 paid can profit from the assumption of responsibility partial on the whole of the cost of the subscription collective transport by the employer, approximately 15% of them took a subscription at Transpole.

Other steps are established to continue on this way. A briefing of the trade unions representative of the world of work on the PDE is on envisaged April 1 2005 under the presidency of the Vice-president of the CUDL delegated to collective transport.

Measure 8.5 Urban Mobility Plan

The activity under this measure relates essentially to the process of establishment of a micro Urban mobility plan, referring to the metropolitan main mobility plan

An example of Micro Mobility Plan for the area of Weppes is presented as a deliverable.

Measure 11.7 High Level Service Bus Routes

Assessments have been made as follows:

- For CITADINE, one could measure the evolutions of the frequentation and the variation before/after "exemption from payment". Concerning travel times of course a comparison before/after is not possible because the route did not exist. However, one can estimate a gain of 20% by the presence of the corridor against the main traffic flow, knowing however that the commercial speed there remains low insofar as the other users do not have yet the reflex to check if a bus circulates. It should be noted that no significant accidents took place since the startup of this corridor.
  On the other hand, when the second corridor will be brought into service (in the direction of general circulation), comparisons will be carried out.
- For CHRB.Calmette and Comines-Ronchin: some sections will use existing sections of other existing lines (those will be redistributed within the framework of a new service plan feeding into the high level of service bus lanes), comparison of travel time will be possible.
- For all the lines investigations on satisfaction and comfort are expected.

As a whole, one can estimate a gain from 20 to 30 % over travel times if (condition necessary to the success) 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.

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 12.5 Clean Municipal Fleets

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
- Analyse exhaust fumes

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

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

6. Fulfilment of Lille Objectives

6.1 Fulfilment of objectives for each measure

Measure 6.2 Smart card systems and integrated ticketing

Work has been done as initially described.

- The integrated ticketing favours will increase intermodality between the different PT.
- The Smart Card system will favour intermodality between PT, but also between PT, cars and two-wheels. The car convenience parking fees (see Measure 7.6) will also be charged on the Smart Card. Furthermore, the PT attractiveness will increase.

In the long run, this system will enable PT Operators to charge the client according to the length of his travel. Moreover, the local authority and the PT Operator will get more information on the use of public transport.

Milestones and deliverables	**Yes/No**
D 6.2.1 Implementation study for a Smart Card system in Lille Metropole	YES
M 6.2.1 A pricing scheme for all PT means in Lille Metropole	YES
M 6.2.2. Integrated ticketing	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.

Objectives are fully met and this measure is expected to contribute significantly to the rise of PT use in Lille Metropolis

The quantifiable targets for the measure are:	**Yes/No**
Shorter intervention time in case of emergency situations	YES
Better image of Public Transport	YES
Contribution to LMCU objective of 30% increase in PT passenger travels in year 2004.	YES

Milestones and deliverables	**Yes/No**
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

The quantifiable targets for the measure are:	**Yes/No**
Less car use will lead to decrease in pollution.	YES
Stimulus of PT (see LMCU objective of 30% increase in PT passenger travels in year 2004)	YES

Milestones and deliverables	**Yes/No**
D 7.3.1 Summary of Implementation studies on 2 intermodal exchange points	YES
M 7.3.1 Two (2) new intermodal interchanges	NO
D7.3.2 Global evaluation study on Lille PT Measures	YES

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.

Objectives have been largely exceeded

The quantifiable targets for the measure are:	**Yes/No**
1,100 new parking places	YES
Less cars- and thus less pollution in Lille Metropole	YES
Contribution to Lille objective of a rise of 30% in PT travels in year 2004.	YES

Milestones and deliverables	**Yes/No**
M7.6.1 Establishing of 4 new car/Bicycle parks	YES
D7.6.2 Global evaluation study on Lille PT Measures	YES

Measure 8.2 Company Mobility Plan in the administration fleet

- Improve car pooling in Lille Municipal fleet
  This objective is partially achieved. Time is needed to create new habits
- Favour the two-wheelers
  This objective is achieved
- Increase the use of public transport
  This objective is achieved

The quantifiable targets for the measure are:	**Yes/No**
2 200 people (Lille Metropole staff) aware of transport “bad habits” and of the existence of car-pooling and car-sharing schemes in Lille Metropole	YES
All the staff are members of the car sharing system;	YES
20% of the staff users of the car pooling system	NO
Measurable modal shift of staff from car to public transport	YES

At this stage, the car sharing is not reaching the expected success. This action is somewhat in competition with the modal shift towards the use of Public Transport, which has proved more attractive.

Milestones and deliverables	Yes/No
M 8.2.1 Set up of a study group, a Intranet Website	YES
M 8.2.2 Set up of PT incentives	YES
M 8.2.3 Introduction of 120 new clean vehicles in the staff fleet (see Measure 12.6)	Partial
D 8.2.1 Internal evaluation of the Company Mobility Plan	YES

M8.2.3 is only partially reached due to the lack of availability of clean vehicles on the market.

Measure 8.5 Urban Mobility Plan

Objectives of the measure are fulfilled: the methodology is validated and an example of micro mobility plan is delivered.

The quantifiable targets for the measure are:	Yes/No
PDU, a guiding planning document, defines the conditions for a sustainable transport development at the Lille Metropole level;	YES
One “micro” planning document (“micro PDU”) for a specific site of the Metropole	YES
Mid-term reports of the PDU’s Committees	YES

Milestones and deliverables	Yes/No
D 8.5.2 An example of “micro” Urban Mobility Plan (internal study)	Yes
M 8.5.1 Mid-term reports of the Urban Mobility Plan Committees	Yes

Measure 11.7 High Level Service Bus Routes

The following objectives have been met:

- To make public transport more attractive, through a higher commercial speed, regularity, comfort, a broader amplitude of operation, a more constant offer according to types' of days.
- To reduce the use of the private car

The quantifiable targets for the measure are:	Yes/No
The average speed of buses on dedicated lanes will increase; this will make urban buses more efficient and attractive to users.	YES
New signal technology for public bus transport will have considerable benefits to energy consumption, acceleration of the bus traffic and the attractiveness of buses to the bus users.	YES

Milestones and deliverables	Yes/No
D.11.7.1 Four implementation studies on one High level service bus route (11.7, 7.2, 7.3, 7.6)	YES
M.11.7.1 One new High service buses route	YES

Measure 12.2 Biogas Bus Fleets

All the objectives have been achieved.

The quantifiable targets for the measure are:	Yes/No
128 new (bio)gas buses	YES
Adaptation of the bus depots and lines to (bio)gas buses (Sept 2005)	YES
A new compression station (Sept 2005)	YES
Pollution reduction by 2005 for the clean vehicles fleet	YES
Bus noise level reduction	YES

Milestones and deliverables	Yes/No
M 12.2.1 65 new gas buses	YES
M 12.2.2 23 new gas buses	YES (21)
M 12.2.3 40 new gas buses	YES
M 12.2.4 Adaptation of the depot and lines to gas buses	YES
M 12.2.5 Construction of a new depot for the buses	YES
M 12.2.6 New compression station	YES
D 12.2.1 Technical study evaluating the technical and environmental aspects of the biogas experience (subcontracting)	YES

Measure 12.5 Clean Municipal Fleets

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:	Yes/No
220 clean vehicles in the 500 staff vehicle fleet	Partial
Study of the costs per km and the reliability of the new gas and electric vehicles.	YES
Pollutant emissions monitoring with the help of the official national laboratory on behalf the Ministry of Transport and a government association for environment.	YES

Milestones and deliverables	Yes/No
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	Partial (84 vehicles)
M 12.5.2 Procurement of a new compression unit	NO (delayed)

Measure 12.9 Analysis of the biogas experience

The quantifiable targets for the measure are:	Yes/No
Before Trendsetter local biogas production was 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 2007
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	Yes/No
M 12.9.1 A new big organic waste plant	YES in 2007
D 12.9.1 Global evaluation of the experience of biogas production from waste and sewage treatment	TES

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, measures from Lille address these objectives as follows:

Measures / **High level objectives**	6.2 Smart card systems and integrated ticketing	7.2 Public transport security	7.3 Intermodal local/regional transport interchanges	7.6 Park and Ride facilities	8.2 Company mobility plan in the administration fleet	8.5 Urban mobility plan	11.7 high level of service bus routes	12.2 Biogas bus fleets	12.5 Clean Municipal Fleets (Lille)	12.9 Analysis of the biogas experience
Provide examples										
Provide input to European policy making and promote a sustainable transport future in Europe	Y	Y	Y	Y	Y	Y	Y	Y	Y	N
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	Y	Y	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.	N	N	N	N	N	Y	N	Y	Y	Y
Increase Mobility										
Promote the use of public transport and other alternatives to private cars	Y	Y	Y	Y	Y	Y	Y	Y	N	N
Demonstrate new ways to improve urban goods logistics and efficiency.	N	N	N	N	N	N	N	N	N	N
Reduce noise levels in demonstrating cities	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Enhance Environment (direct contribution)										
Reduce annual fossil C02 emissions by 5% in demonstrating cities, approximately 75 000 tonnes per year.	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Reduce NOx emissions by 900 tonnes/year	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Reduce particulate matter by at least 1800 tonnes/year	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Reduce noise levels in demonstrating cities	N	N	Y	Y	Y	Y	Y	Y	Y	Y
Save Energy (direct contribution)										
Save over 850 TJ (≈ 20 300 TOE) energy per year	N	N	Y	Y	Y	Y	Y	Y	Y	Y

Demonstration objectives / Measures	6.2 Smart card systems and integrated ticketing	7.2 Public transport security	7.3 Intermodal local/regional transport interchanges	7.6 Park and Ride facilities	8.2 Company mobility plan in the administration fleet	8.5 Urban mobility plan	11.7 high level of service bus routes	12.2 Biogas bus fleets	12.5 Clean Municipal Fleets (Lille)	12.9 Analysis of the biogas experience
Public transport bus fleets										
128 biogas buses (Lille)								Y		
Leasing of 56 gas diesel buses (Euro 4 standard), conversion of 41 diesel buses for operation on bio-diesel (Graz)										
Clean vehicles and infrastructure										
320 new clean vehicles (biogas, electric, electric-hybrid, ethanol) in city fleets (Stockholm and Lille)									Y	
5 new biogas refuelling stations (4 Stockholm, 1 Lille)								Y	N	
7 biogas waste freighters (Stockholm)										
120 taxis converted to bio-diesel (Graz)										
100 clean vehicles in private company fleets (Stockholm)										
300 substituted clean vehicles in company fleets (biogas, electric, electric-hybrid, ethanol)									Y	
26 clean and efficient heavy vehicles (buses, lorries and/or refuse trucks)										
Transport and mobility management										
1 High level service bus lane (Lille)							Y			
2 Bus priority signal systems (Stockholm, Prague)										
4 Environmental restriction zones (Stockholm, Prague, Graz and Pecs)										
3 Environmentally oriented Parking zones (Graz, Pecs, Stockholm)										
1 Smart Card system in full scale (Stockholm)										
4 Improved intermodal links (Graz, Lille)			Y							
60 High customer friendly bus and tram stops (Graz)										
Approximately 1100 P&R parking places in 4 P&R facilities (Lille)				Y						
1 Logistic Centre including 8 clean vehicles (Euro 4 standard)										
2 IT based logistic management systems										
Several IT-based transport information systems and traffic management systems	Y									

Scientific and technical objectives focus on testing the feasibility of various innovative technologies and policies in practice:

Measures **Scientific & Technical objectives**	6.2 Smart card systems and integrated ticketing	7.2 Public transport security	7.3 Intermodal local/regional transport interchanges	7.6 Park and Ride facilities	8.2 Company mobility plan in the administration	8.5 Urban mobility plan	11.7 high level of service bus routes	12.2 Biogas bus fleets	12.5 Clean Municipal Fleets (Lille)	12.9 Analysis of the biogas experience
Produce a total amount of 11 million Nm^3 biogas by the end of the project.										Y
Reduce the commercial cost of biogas fuel by 20% in demonstrating cities								Y		
Implement a complete biogas technology chain in Stockholm and Lille, from production to end use								Y	Y	Y
Evaluate the feasibility and effectiveness of using electric hybrid lorries for urban goods transport in Stockholm										
Test the use of ICT solutions such as smart cards systems, bus signal systems, traffic control and supervision	Y									
Evaluate the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.							Y			
Evaluate the effectiveness and political acceptability of environmental zones										
Develop integrated city mobility plans integrating environmental protection, traffic and public health policies		Y			Y	Y				

The organisation of the measures to reach the specific Lille objectives is

Lille Objectives / Measures	6.2 Smart card systems and integrated ticketing	7.2 Public transport security	7.3 Intermodal local/regional transport interchanges	7.6 Park and Ride facilities	8.2 Company mobility plan in the administration	8.5 Urban mobility plan	11.7 high level of service bus routes	12.2 Biogas bus fleets	12.5 Clean Municipal Fleets (Lille)	12.9 Analysis of the biogas experience
Lille Metropolis objectives (set before Trendsetter)										
• 85% clean public transport journeys in year 2005	Y	Y	Y	Y	Y	Y	Y			
• Rise of 21% in PT passenger travels from 1998 to 2005	Y	Y	Y	Y	Y	Y	Y			
• The clean vehicles fleets will permit to cut pollution:										
- reduction of fossil CO_2 emissions up to 41,000 t/ yr by 2005								Y	Y	Y
- reduction of NOx emissions up to 850 tons a year by 2005								Y	Y	Y
- reduction of particulate matters up to 26 tons a year by 2005								Y	Y	Y
- reduction of 50% of the bus noise level.								Y	Y	Y
Objective of Trendsetter contribution to the Lille Metropolis objectives:										
<u>Increasing biogas production and usage:</u>										
• increasing massively the biogas production (locally from waste and sewage treatment) up to 3 M Nm3 per year by 2005										Y
• 128 new clean busses in Lille Metropole fleet replacing diesel busses, adaptation of the bus depots and lines and construction of a new compression unit								Y		
• 120 new clean vehicles in the staff pool & a new compression unit									P	
Encouraging public transport use by introducing a combination of new infrastructure that improve quality and incentives:										
• 1 new High service Bus Route							Y			
• 2 Intermodal interchanges points			Y							
• development of a pricing scheme for all PT, an integrated ticketing and specifications for a smart card system	Y									
• increased PT safety and reliability		Y								
• increase intermodality between the different PT means and between private cars / PT			Y	Y						
• development of an efficient co-operation between all PT authorities (local consortium)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
• company mobility plan for LMCU staff, development of a comprehensive approach on the metropolitan level between the requirements of mobility (cars, public and freight transport).					Y	Y				

7. Achievements and potential up-scaling of the results in Lille

7.1 Achievements and potential up-scaling of each measure

Measure 6.2 Smart card systems and integrated ticketing

Expected work has been realised (cf. deliverable « Implementation study for a smart card system in Lille Metropole »).. No deviations from expected plans were made.

Up-scaling will take place through the effective implementation of the ticketing system based on contactless smart cards

Measure 7.2 Public transport security

A Local Safety Plan, signed in 1998, implementation, which started before Trendsetter, has been completed in Lille Metropolis during the Trendsetter Project. The human presence will be strengthened in all means of transport in the PT system. Technical, information, supervision and co-ordination facilities will be installed. These measures, which will increase the security in the system, have been planned for the period 2000-2006 at a cost of 40 Million Euros.

By the end of 2004, the following was done:

- a GPS-type radio contact system will be installed in the transport operator emergency vehicles (emergency call-out buses and car) and at the Police, in order to shorten emergency call-out times (max. 10 minutes)
- a localisation service of the buses will be implemented, which will permit the security services to intervene earlier, improve the operating system and the information to the users (inside buses and at stations).

This localisation is also used for the bus priority at junctions (see Measure 11.7.).

The effects of the Local safety Plan implementation will be evaluated in the global evaluation study on Lille TP Measures (11.7, 7.2, 7.3, 7.6) financed by the Trendsetter Project.

The measure has been implemented in full scale in Lille Metropolis. Up scaling will include videosurveilliance in the vehicles.

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). Construction 2006 - 2007

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, …).

Delay on the project are mainly due to the high number of stakeholders coming from different environments (public, private, local territorial authorities): it is necessary that all agree.

Delays also relate to the regulations on labour, safety and health which impose the constitution of a follow-up committee

Delays are also incurred in relation to problems of property and land transfer (in particular on costs) between SNCF/RFF and the communes

In the future, several poles are envisaged on the 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 which will be an accelerator for the project.

Measure 7.6 Park and Ride facilities

The measure has been implemented on 9 parkings. This represents no deviations as compared to the plans

The success is high and, in certain cases, saturation is expected rapidly.

Multi level parks can be envisaged.

Measure 8.2 Company Mobility Plan in the administration fleet

Lille Metropole Company Mobility Plan is a set of coherent measures, aiming at substituting as much as possible the use of private cars by all other alternative means for the work-related travel (home/work commuting, travel during working time) :

- The car-pooling system will be enhanced and enlarged.
- Car-pooling (sharing rides) will also be encouraged by starting up a study group, an Intranet Website, and a "people connection service" to help car-poolers identify each other.
- A set of incentives for public transport use for work-related travel will be set in place (reduced fare)
- A pool of clean vehicles: electrical and gas vehicles (see Measure 12.6), electric scooters and bicycles will be at the staff's disposal.
- Set up of a new secured bicycle stand

In the framework of the Trendsetter project, an internal study, made by the Company Mobility Plan Study Group, evaluated the number of people using the system and check that new users will become true customers in the long run (new habits).

The initiative taken by LMCU made it possible to convince a certain number of communities or companies to implement a similar step.

In 2004 more than 600 subscribers to the network of Transpole are concerned on a total staff complement of almost 5000 paid. With the installation of the payment on the parks Citadine relay of new companies subscribed to the step to date 8400 paid can profit from the assumption of responsibility partial on the whole of the cost of the subscription collective transport by the employer, approximately 15% of them took a subscription at Transpole.

Other steps are established to continue on this way. A briefing of the trade unions representative of the world of work on the PDE is on envisaged under the presidency of the Vice-president of the CUDL delegated to collective transport.

Measure 8.5 Urban Mobility Plan

A micro mobility plan for the Weppes area was produced as an example for further implementations.

The measure is being replicated in other local environments of the Lille metropolis

Measure 11.7 High Level Service Bus Routes

LMCU performed implementations studies including technical, financial and legal specifications for four high service routes. The studies include

- CITADINE
- Lille CHRB.Calmette, Wattignies
- Comines-Ronchin
- Lille-Station Lille Flandres/La Madeleine/Marcq in Baroeul

Implementation and introduction of one high level of service bus route : the CITADINE, was performed. The effects of the route are a part of the overall evaluation of public transport measures in Lille.

The measure is formally on line with the contractual plans.

Some deviations from initial objectives are described here:

For CITADINE, the intention was a start-up for the "day without my car" of September 22, 2003. That was the case, but the totality of installations were not finished for the following reasons:

- delay in the procedures for the access control
- delay in intervention on part of the site belongingto the army
- delay in the establishment of the cash management and ticketing in respect to security instructions for the transfers of funds

For CHRB Calmette – Wattignies, slight delay to take account of the remarks of population in the new project.

For Lahns Comines-Ronchin, which will be in service in September 2007, delay in the decisions of the municipalities on:

- layouts
- the choice of installations requiring a significant modification of certain roadway systems even a new design on the traffic organization of the sector.
- suppression of parking (loss of earnings for the commercial activity)

For Lahn Lille – Marq en Baroel, a part (rue des Cannoniers) is operational.

12 High of Level Service Bus Lines are planned in the Lille metropolis mobility plan

Measure 12.2 Biogas Bus Fleets

On the 01/01/05, 86 new gas buses have been put in service in Lille metropolis. The total fleet of gas buses, at this date is 127 gas buses on a total fleet of 311 vehicles.

The first prototype of gas bus, aged of 15 years, have to be stopped because of the age its tanks. This first gas bus put in service in France ran 300 000 KM on gas.

40 new buses (EEV 5 standards) have been order and will be delivered between November and December 2005. A call for tender has been launched in 2004 on the base of 150 vehicles on the next 3 years.

The entire gas buses fleet in Lille metropolis, run over 13 million of km per year.

The construction on a new bus depot started in September 2004. It will be in service in November 2005. This depot is designed to park and maintain 150 gas buses (100 standards, 50 articulated)

This new depot is built in front of the next organic recovery context which will produce mass quantity of biogas (see 12-9).

In the hart of this depot is built one of the biggest compression unit in Europe. This compression unit will be the first one in Europe that will compress natural gas and biogas. This unit and its cost are included in measure 12-9.

Audit of lines have been made and will be made to verify the compatibility of the route to the safe used of gas buses or to adapt them.

The measure followed initial plans.

The SMT already decided to continue the renew of the entire fleet of buses with gas vehicles. In 2010, over 400 buses will run on gas.

The decision was also take to built a 3rd depot dedicated to gas buses. This one will be in service in September 2007 and will also include an important dual compression unit for CNG and biogas.

On the base of this successful story, Lille Metropolis also works on the development of garbage trucks running with gas.

Measure 12.5 Clean Municipal Fleets

Evolution and state of the clean vehicle fleet of LMCU is as follows:

In 2001: 32 electric vehicles

76 vehicles with the GNV

In 2002: 32 electric vehicles

118 vehicles GNV

In January 2003: 34 electric vehicles

122 vehicles GNV

In January 2004: 34 electric vehicles

157 vehicles GNV

Concerning gas vehicles, a technical follow-up is ensured, concerning mainly, consumption, the analysis of exhaust fumes, sound measurements…

To achieve the goal of at least 120 new clean vehicles, it was envisaged the purchase of small vehicles type Renault Twingo, Peugeot 106 or others of this type. The difficulties encountered with the manufacturers, following the changes of standards, to obtain the vehicles adapted to our needs, did not enable us to develop our own clean vehicle fleet wished.

In parallel, in view of this lack of new vehicles, the installation of a compressor plant as envisaged in the project was not justified any more. This project is not given up, but deferred until obtaining the right amount of gas vehicles.

Measure 12.9 Analysis of the biogas experience

Implementation study on Organic Recovery Centre (O.R.C.) have been made. This study include a comparison of different valorisation of raw biogas : electricity production, heat production, compressed methane fuel.

Based on this study, Lille Metropolis politicians decided, in 2004, to choose the methane fuel valorisation way.

The expected results of this demonstration will be a plant with capacity for:

- 100,000 tonnes of biological waste per year;
- raw biogas production of 5.2 million Nm3/year (700 Nm3/h) with a methane content between 55 and 65%;
- the highest potential volume of upgraded gas in Europe from one plant using 2 units at 600Nm3/h;
- forecast production of 480 Nm3/h of upgraded biogas,
- sufficient capacity for 100 busses (working from the bus depot next to the plant) saving 4.2 million litres of diesel per annum;
- Residual matter treated to produce 34,000 t/year of compost for farms in the region.

The O.R.C. building started in November 2004 and will be finished by early 2007.

The construction of the bus depot located in front the future ORC started in May 2004. This infrastructure unclose the compression and distribution unit which will compress the biogas and the natural gas from 20 bars to 250 bars. This unit should be the first one which can compress biogas and natural gas in the same box.

The bus depot and the compression unit will be operational in November 2005.

The prolonged consultations with politicians and the public led to a delay in the start of the Organic Recovery Centre construction. The construction of the new biogas plant started in the first week of November 2004 and is seen as a major break-through for an innovative clean fleets management. Although the plant will not be finalised before the end of 2006, adequate experiences can be provided with fuelling PT buses through an existing pilot plant which produces biogas from sewerage sludge. This pilot plant will be rebuilt into a full production unit in the next years.

The biogas plan is at this stage the largest in Europe, and definitely a demonstrator of ambitious objectives that can be designed in the area.

7.2 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.

8. Economical Aspects, Cost Benefit

8.1 Per measure

Measure 6.2 Smart card systems and integrated ticketing

The economical analysis of the impact of the measure is detailed in the deliverable " Implementation study for a smart card system in Lille Metropole"

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 7.6 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 8.2 Company Mobility Plan in the administration fleet

The economical aspects of this measure cannot be separated from oits political and environmental impact at several levels:

- Incentive of the use of public transport
- Environmental friendly approach of car sharing and use of bicycles

Measure 8.5 Urban Mobility Plan

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.

Measure 11.7 High Level Service Bus Routes

The implementation of this type of lines does not involve a major change of the tendencies, but it is a part of the 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 reduce the negative environmental impact.

Positive economic effects on the companies in the area of the project are assessed.

Strong economic impacts for the communities because this type of project requires heavy operational and investment budgets, as well as possible requests for subsidies

Measure 12.2 Biogas Bus Fleets

Lille metropolis is able to prove 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 12.5 Clean Municipal Fleets

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 12.9 Analysis of the biogas experience

The biogas selling price will be stuck to the natural gas price.

On this base it have been calculated the methane fuel production is economically competitive compared to other biogas valorisation (electricity, heat).

On this base LMCU and SMT have proved 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)

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:

- land
- construction
- fiscal
- employment
- environment
- …

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 6.2 Smart card systems and integrated ticketing

Work in collaboration with the SMIRT on the regional projects of fare integration and ticketing will positively complement this measure in the future.

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 many others, to cover the major intermodal nodes of the metropolis.

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 8.2 Company Mobility Plan in the administration fleet

Continuation of efforts will improve results in the long run.

Measure 8.5 Urban Mobility Plan

The micro PDU approach will be expanded to other sites

Measure 11.7 High Level Service Bus Routes

The implementation of high level of service bus routs must be done in conjunction with the other construction initiatives ans in respect and coherence with other initiatives and local urban specificities

Measure 12.2 Biogas Bus Fleets

No particular actions that are not implemented in Trendsetter are required to supplement Measure 12.2

Measure 12.5 Clean Municipal Fleets

No particular actions that are not implemented in Trendsetter are required to supplement Measure 12.5

Measure 12.9 Analysis of the biogas experience

At this stage, the measure has fulfilled ist full objectives in particular due to its integration in a broader plan for sustainable and environmental friendly public transport environment

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 Dissemination activities

Measure 6.2 Smart card systems and integrated ticketing

6.2	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits
4	Workshop on Intermodality, Fare integration and ticketing	Promote the solutions developed at Lille to an invited audience	Lille, Oct 2004	Operators and stakeholders in advanced ticketing systems	104 participants to the workshop from all over Europe	Finalisation of the intermodality, fare integration and ticketing strategy in Lille	Workshop report	Organisation by Lille

Measure 7.2 Public transport security

7.2	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits
4	Conference on CLS at the occasion of Trendsetter Steering Committee		Praha (CZ) May 2003					

Measure 7.3 Intermodal local/regional transport interchanges

7.3	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits

Measure 7.6 Park and Ride facilities

7.6	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits

Measure 8.2 Company Mobility Plan in the administration fleet

The initiative taken by LMCU made it possible to convince a certain number of communities or companies to implement a similar step.

8.2	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits

Measure 8.5 Urban Mobility Plan

The measure is being replicated in other local environments of the Lille metropolis

8.5	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits

Measure 11.7 High Level Service Bus Routes

11.7	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits

Measure 12.2 Biogas Bus Fleets

12.2	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits
4	Participation to an ACCESS seminar	Promote Trendsetter and 12.2 Exchange of info on domain	Oct 2002 Barcelona (SP)	Operational staff of European cities	Ca. 100 persons Ca. 40 cities	Seminar proceedings Specific clean bus documents Diffusion by Access	Seminar proceedings Specific clean bus documents	Participation to event organised by access
5	CIVITAS Workshop at National conference Sustainable development	Promote Trendsetter and Lille participation at national & European level	June 2003 Lille (FR)	National audience of • cities • national administrations • Academia	Workshop: ca. 50 persons Conference : ca. 3 000 Persons	Publications at regional and national level of proceedings and press coverage by specialised publications	Proceedings Trendsetter documentation Press releases	Organisation of the workshop
6	TRENDSETTER Project meeting – specific seminar after the project Steering Committee	Dissemination of the Lille Bio-Gas results to Hungarian cities and to the Trendsetter consortium	Pecs (HU) 13 & 14 October 2003	Hungarian cities and Trendsetter consortium	50	General communication with attendees	Proceedings including presentations	Contribution to the seminar organised by Pecs

Measure 12.5 Clean Municipal Fleets

12.5	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits

Measure 12.9 Analysis of the biogas experience

12.9	Description of Dissemination activity	Aim	Date & Place	Target Audience	N° of reached persons	Actions resulting	Documentation from activity	Own engagement
1	General communication with the press	Maintain a continuous stream of communication with the professional community	Various at regular intervals	Local and national press		Continuous follow-up	Press releases	Direct contacts with the specialised and general press
2	Permanent link with the Lille Metropolis web site	Promoting the advanced actions from Trendsetter at regional level and raise interest from stakeholders and public	Continuous	General Public and, to a lesser extent, stakeholders in transport	Audience of the Metropolis web site	n.a.	Web pages	Maintenance of the web pages and the link
3	Permanent dissemination to contacts in particular with cities and industry at local and national levels	Promote the solutions developed at Lille towards an efficient implementation environment	Continuous	cities and industry at local and national levels		n.a.	General documents from Lille and from Trendsetter	Availability for contacts and visits
4	EUROCITIES conference on waste management							
5	CLEAN CITIES	Presentation of the complete biogas value chain in Lille	May 1-4 2005 Palm Springs, USA	cities and industry at international level	Several 100			

11. Political and Administrative Aspects

11.1 Overview of major political and administrative aspects influencing the measures

Measure 6.2 Smart card systems and integrated ticketing

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)

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 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 7.6 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 8.2 Company Mobility Plan in the administration fleet

The implementation of this measure is made very progressively, but is already convincing other stakeholders to be involved in similar plans.

Measure 8.5 Urban Mobility Plan

This measure allows a smooth implementation of complex political and administrative decisions through a stable methodology to approach issues from the local level

Measure 11.7 High Level Service Bus Routes

The tcsp is not only any more one means of travel : it is 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.

Political aspects include positive impact on:

- To put in coherence the documents of city planning
- Image, valorisation of the agglomeration and the cities crossed by the lines.
- Strong implication of the town halls (police powers of the mayor)

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 include a public survey (enquete publique) that have been organised in spring 2004.

Measure 12.5 Clean Municipal Fleets

A coherent policy on clean vehicles, at national and European levels, is required to allow the car suppliers to develop the appropriate range and make them available to the markets.

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.

11.2 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

11.3 Comparison and conclusions

The political and administrative issues mentioned for each measure are in fact directly applicable for all sites, at various levels.

12. Assessment of All Measures

	Implementation (as planned/partly /not implemented)	**Fulfilment of measure objectives** (yes/partly/no)	**Contribution to Lille Metropolis objectives**
6.2 - Smart card systems and integrated ticketing	As planned	Yes	1
7.2 - Public Transport Safety	As planned	Yes	1,2,4
7.3 - Intermodal local/regional transport interchanges	As planned	Yes	(1), (2), 3, 4, (5)
7.6 - Park & Ride facilities	Exceeded plans	Yes	(1), (2), 3, 4, (5)
8.2 - Company Mobility Plan in the administration fleet	As planned	Yes	(1), (2), 3, 4, (5)
8.5 - Urban Mobility Plan	As planned	Yes	1,2,3,4,5
11.7 - High Level Service Bus Routes	As planned	Yes	1, (2), (3), 4
12.2 - Biogas Bus Fleets	As planned	Yes	(4), 5
12.5 - Clean Municipal Fleets	Partly implemented	Partly	5
12.9 - Analysis of the biogas experience	As planned	Yes	5

Contribution to Lille 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

Measure 6.2 Smart card systems and integrated ticketing

The context is characterized by the multiplicity of the actors on the level of the Organizing Authorities (Lille Métropole, Nord/Pas-de-Calais Area Région, Département of North, other AO) and on the level of the operators (Transpole, the SNCF, other companies private)

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 7.6 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 8.2 Company Mobility Plan in the administration fleet

Drivers include a complete support service to the employees for the use of PT, which was found interesting by several organisations.

Barriers include the long time necessary to change habits of people.

Measure 8.5 Urban Mobility Plan

This measure is essentially driven by political and administrative authorities, who are the main drivers for its implementation.

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.

Measure 11.7 High Level Service Bus Routes

- Technical and administrative issues:
  - the high level of service bus routes will circulate in own site with innovative vertical signalisation, unusual for car drivers
  - impose the respect of bus corridors
- Financial issues:
  - 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.
  - Fears of the shops of loss of turnover during construction work
- Political issues:
  - the continuity of the file is sometimes subordinated to the agreement of the mayors who debate the conditions of installations affecting the parking.
- Land issues:
  - Acquisitions of private land to be negotiated
  - projects to be carried out in coherence with general urban reorganization with scattered deadlines

Accelerator: the planning of high level of service bus lanes 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.

Measure 12.2 Biogas Bus Fleets

An efficient implementation of a biogas fleet with the ambition of converting the whole bus fleet to this energy source can only be taken with a complete view on the technical, environmental and economical aspects.

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 12.5 Clean Municipal Fleets

Barriers:

- Availability of vehicles on the market

Drivers:

- High acceptance of clean vehicles
- Economic viability of gas vehicles

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

14 Lessons to Consider for Replication and Take-up by Other Cities

14.1 General description of replication potential for each measure

Measure 6.2 Smart card systems and integrated ticketing

The co-operation between the various actors is a more important issue than the purely technical aspect of the project.

Measure 7.2 Public transport security

Replication of this measure shall be considered on a case to case bases, 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 ves security in validating investments
- Political : set up the legal framework for cooperation between all teh stakeholders involved- PT operator, police and justice

Measure 7.3 Intermodal local/regional transport interchanges

It is necessary to manage in priority the transfer of property, if grounds is to be acquired. In the case of the interchanges, the only ground available was next to the site. There is not an other choice; these grounds thus have a great value on which it is very difficult to negotiate.

Measure 7.6 Park and Ride facilities

Political willingness is at the basis of such extensive plans for Park & Ride

Measure 8.2 Company Mobility Plan in the administration fleet

The internal mobility plan is now implemented since a sufficient time to incentive new behaviours: e.g. the use of bicycles is rising and the measure impacts now permanently ca. 15% of the workforce of LMCU.

It is expected that this continue to increase.

The interest for company mobility plans is now adopted by many other organisations in the region: Regional Authority (Conseil Régional), Department Authorities (Conseil Général), private companies such as "La Mondiale" insurances, etc.

Measure 8.5 Urban Mobility Plan

The micro PDU approach is fully replicable in other environments having designed a complete mobility plan at regional level, in order to implement it with a coherence starting from the local level

Measure 11.7 High Level Service Bus Routes

- To implement a consistent and systematic communication flow with the citizens, and explain the long term benefits as opposed to the short term problems
- To manage the problems of land acquisitions as early as possible
- To involve the municipalities by explaining the project as clearly as possible, and by specifying the economic impact, the valorisation of the employment poles, the savings in travel time, etc…
- It is convenient to accompany the project by a project by a complete urban planning
- To make quality implementations outlining the new lines and their stops as compared to the other traditional lines.

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.

Measure 12.5 Clean Municipal Fleets

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 12.9 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.

14.2 Technical issues

There are no particular technical issues which show critical 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 6.2 Smart card systems and integrated ticketing

Smart cards are a tool towards seamless travel and integrated ticketing solutions among public transport operators.

Measure 7.2 Public transport security

Feeling of security and safety is a major driver for the attractivity 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 7.6 Park and Ride facilities

Important political willingness is necessary to incentive mode change frm private car to public transport

Measure 8.2 Company Mobility Plan in the administration fleet

Important political willingness is necessary to incentive mode change from private car to alternative means of transport.

Measure 8.5 Urban Mobility Plan

The micro PDU approach is fully replicable in other environments having designed a complete mobility plan at regional level, in order to implement it with a coherence starting from the local level

Measure 11.7 High Level Service Bus Routes

These implementations many times require important modifications of the local organisation of local life. Important political willingness is necessary to incentive mode change from private car to public transport.

Measure 12.2 Biogas Bus Fleets

The biogas bus technology is now stable enough to justify the complete conversion of a city or region fleet to biogas, provided that this is inserted in a local strategy including also the control of the gas sources, (and preferably dual source of bio and natural gas) and the adequate infrastructure at depot and gas delivery levels.

Measure 12.5 Clean Municipal Fleets

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 12.9 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.

15.2 General recommendations from the demonstrations in Lille

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

Lille Metropolis has set up ambitious goals aiming at doubling the number of trips in public transport from 1998 to 2015 and curbing the use of private cars in the Metropolis, and successfully used Trendsetter to optimise and accelerate this implementation.

Based on this experience, once a city has defined its objectives in sustainable public transport development within a structured plan, it is therefore expected that the European Commission plays a role in supporting, incentivating and co financing (through subsidies as well as tax exemptions) various key elements:

- Infrastructure such as telematics systems, road infrastructure or the production and distribution of alternative fuels
- 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

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 allows demonstrations that 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
- Build on the image of collective programmes, which is normally high and positive.

Last but not least, the EC may have a key role in informing on the positive results such as obtained in Lille Metropolis, spreading the message that these advanced achievements ARE POSSIBLE AND ECONOMICALLY INTERESTING

Appendix 1 – List of documents produced and available at Lille Metropolis

The following documents are official deliverables of Trendsetter produced by Lille, and can be obtained from the contacts listed at Lille Metropolis together with complementary information (when appropriate through a confidentiality agreement).

LILLE METROPOLIS DELIVERABLES	
D 6.2.1	**Implementation study for a smart card system in Lille Metropole**
D 7.3.2	**Global evaluation study on Lille TP Measures**
D 7.3.1	**Summary of Implementation studies on 2 intermodal exchange points in Lille**
D 8.2.1	**Internal evaluation of the Company Mobility Plan Lille**
D 8.5.2	**An example of "micro" Urban Mobility Plan in Lille**
D 11.7.1	**Implementation studies on 1 High level bus route in Lille**
D 12.2.1	**Evaluation of the experience of a biogas buses fleet**
D 12.5.1	**Internal Evaluation on the clean vehicles experience**
D 12.9.1	**Global evaluation of biogas production from waste and sewage treatment**

Appendix 2 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

Work Package	Subgroups	No	Measure	City
WP5 Access Restrictions	Environmental Zones	5.1	Widening of the Environmental Zone	Stockholm
		5.2	Widening of Environmental Zone for vehicles > 3.5 tons	Prague
		5.6	Congestion charging	Stockholm
	Strolling zones	5.3	Implementation of strolling zones	Graz
		5.4	Establishment of a car-free zone in the inner city	Pecs
		5.5	Preparation of a new traffic and transport strategy	Pecs
WP6 Integrated Pricing Strategies	Smart Card Systems	6.1	Smart card systems and integrated ticketing	Stockholm
		6.2	Smart card systems and integrated ticketing	Lille
	Parking	6.3	Reduced parking fees to promote clean vehicles	Stockholm
		6.4	Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles	Graz
		6.5	Establishment of a zone-model parking in the central city area	Pecs
WP7 Public Passenger Transport	Information to passengers	7.1	Increasing public transport passengers	Stockholm
		7.5	Customer friendly stops for bus and tram	Graz
	Public transport safety	7.2	Public transport safety	Lille
	PT intermodality	7.3	Intermodal local/regional transport interchanges	Lille
		7.4	Seamless linkage of modes	Graz
		7.6	Park and Ride facilities	Lille
		7.7	Linking different ways of public transport	Prague
WP8 New Forms of Vehicle Use		8.1	New services and services for special customer groups	Graz
	Car pooling/sharing	8.2	Company mobility plan in the administration fleet	Lille
		8.3	Increasing car occupancy	Graz
	Awareness rising	8.4	Site level Mobility Management	Graz
		8.5	Urban Mobility Plan	Lille
WP9 New Concepts for the Distribution of Goods		9.1	Material logistic centre – to optimise freight deliveries at construction site	Stockholm
		9.2	Distribution of goods - Green city logistics	Graz
		9.3	Logistic centre for Old Town of Stockholm	Stockholm

Work Package	Subgroups	No	Measure	City
WP 10 Innovative Soft Measures	Bicycle measures	10.1	Innovations in bicycle transport	Graz
		10.2	Make bicycling attractive (B&R information on the Internet)	Stockholm
	Trip planning	10.3	Creation of a visitor web for optimal trip planning	Stockholm
		10.5	Marketing/information and quality management	Graz
	Awareness of clean transport and safety	10.6	Awareness for speed reduction and less car use	Graz
		10.4	Taxi drivers as information multipliers for clean transport	Graz
WP11 Integration of Transport Management Systems	Traffic information	11.2	Traffic monitoring and supervision	Stockholm
		11.3	Dynamic traffic management system	Graz
		11.4	Accessible road network (street) data	Stockholm
	Improving PT traffic flow	11.5	More adaptive signal control in a bus priority system	Stockholm
		11.6	More adaptive signal control in a bus priority system	Prague
		11.7	High level service bus routes	Lille
		11.1	Technical basis for an efficient customer focussed operation and information	Graz
WP12 Clean Public and Private fleets	Heavy vehicles	12.1	Clean and efficient heavy vehicles	Stockholm
		12.2	Biogas bus fleets	Lille
		12.3	Clean and user friendly bio-diesel bus fleet	Graz
		12.6	Waste collection with biogas-vehicles	Stockholm
	Light vehicles	12.4	Clean municipal fleets	Stockholm
		12.5	Clean municipal fleets	Lille
		12.7	Bio-diesel taxi fleet and bio diesel service station	Graz
		12.11	Making Clean Vehicles less expensive	Stockholm
		12.13	Increasing clean vehicle use in private company fleets	Stockholm
		12.14	Web-portal for drivers of clean vehicles	Stockholm
	Clean fuel distribution	12.8	Optimisation of the bio-diesel collection system	Graz
		12.9	Analysis of the biogas experience	Lille
		12.10	Improved biogas refuelling infrastructure	Stockholm

Appendix 3 – Wordlist

Acronym	Explanation
CCCI	Civitas Common Core indicators
CIVITAS	“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes
CO2	Carbon dioxide
EC	European Commission
GHG	Green House Gas
ICT	Information Communication Technology
IT	Information Technology
METEOR	Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.
MIRACLES	Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS- – A project within the CIVITAS I initiative.
NOx	Nitrogen oxides
P&R	Park and Ride
PM10	Particulate matters, with diameter of less than 10 µm
PT	Public Transport
RKF	Resekortsföreningen I Norden -
SEK	Swedish kronor (1€=9.42 SEK 2005-06-14)
SL	Stockholm Transport
SMIRT	Syndicat Mixte pour I’Integration Reseaux et des Tarifs
SNCF	Société Nationale des Chemins de fer Français
TELLUS	Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.
TJ	TerraJoule
TOE	Tons of oil equivalent
TRENDSETTER	Setting Trends for Sustainable Urban Mobility
Umweltjeton	Special coin for low pollution vehicles in Graz
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIVALDI	Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.
WP	Work Package

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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 – Pécs local activities

June 2006

Trendsetter Report No 2005:14

Trendsetter External Deliverable No 4.4d

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
6. Spedition- und Internationale Transport GmbH
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

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PART A - Report Summary

This report summarises the participation of the City Pécs in the Trendsetter project. Besides Pécs, four other cities, namely Stockholm, Graz, Lille and Prague have participated in the project. Pécs participated in the Trendsetter project with 3 measures / actions in order to provide better traffic facilities in the central areas of the city in the context of environment protection and increased mobility. Pécs, as the smallest Trendsetter city has experienced and learned a lot from the project on the levels of environment protection, mobility management, traffic/transportation planning. In addition to these the project had started a paradigm change in city transportation development in Pécs and as a new member state city Pécs had received significant know-how transfer from the international partners both on the scientific aspects of the Civitas Initiatve and on the level of international partnerships and project management. Regarding the results and achievements in Pécs, most of the measures have achieved their objectives. Minor parts of the project and some measures have been delayed due to unforeseen technical problems. The measures have been evaluated regarding emissions, energy consumption and mobility to fulfilments, economical aspects, synergies, dissemination activities, up-scaling possibilities, different kind of barriers and drivers. At the end of the report, recommendations to decision makers are listed.

<u>The explicit measure titles of Trendsetter in Pécs are</u>:

- Establishment of a car-free zone, extension of strolling-zone and bicycle road network in Pécs (Measure 5.4)
- Preparation of a new traffic and transportation strategy, Pécs (Measure 5.5)
- Introduction of a zone-modell parking system in Pécs (Measure 6.5)

The activities fulfilled within the Trendsetter project in the city of Pécs have contributed to the development of city traffic on three levels: on the one hand it had supported the realization of different traffic / transportation development projects, which have restructured inner city traffic in Pécs. These results can be measured and justified on quantitative basis: a car-free zone, an access restriction zone have been introduced, numerous new parking facilities, places have been established, several streets have been closed for private cars, etc. On the second level Trendsetter has contributed to the overall aims of the municipality considering environment protection: the actions have measurable results in emission reduction, energy consumption reduction and as an overall result of the measures, congestion has decreased in the central areas. The third – and without doubt, the most significant – result of Trendsetter, is that it has resulted a paradigm change in city development in Pécs: in the last years city transportation / traffic development has become one of the first priorities of the

decision-makers, as it has been realized, that significant results in environment protection can be achieved relatively quickly and with relatively low costs by improving, developing the city traffic infrastructure and management structures. The new traffic and transporation strategy (Measure 5.5) have been integrated later to the Pécs ’tasks’, as Pécs has realized during the implementation of the project, that as a former ’follower city’ the experiences and the knowledge of the Civitas Cities should be integrated into the planning of the future activities of the city.

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.

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:

Effects on Emissions, Energy, and Mobility	Implementation time	Costs for cities
Small	Short	Low
Large	Medium	Medium
	Long	Large

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure
Time –implementation time

Areas	Categories	Emis-sions	Energy	Mobi-lity	Time	Inves-ment cost	Opera-tional cost
Convenient access to public transport	Integrated fares and smart cards	++	+	++	◕	$$$	$
	Increased public transport security	+	+	++	◔	$$$$	$$
	Convenient and safe intermodality	+	+	++	◑	$$$$	$$$$
	Customer-friendly stops	+	+	+	◔	$$$	$
	Dedicated bus lanes and priority at junctions	++	+++	++	◑	$$$	$
	New services for special needs	–	–	+	◔	$	$
	Quality management	+	+	++	◔	$$$	$$
Trip planning for smartest choice	Real-time information helps staff and passengers	+	+	++	◕	$$$$	$$
	Planning trips on the web	+	+	++	◕	$$$	$
	Integrated public transport services	+	+	++	◑	$	$
Traffic management	Traffic management	++	+++	++	◕	$$$$	$$
Cycling	Cycling	++	+++	+	◑	$$$	$
Access restrictions	Zones favouring pedestrians makes cities attractive*	+	+	–	◑	$$$	$
	Selective access restriction for heavy vehicles	++	+++	–	◑	$	$
	Congestion charging	++	+++	++	◕	$$$$	$$$$
Marketing attractive alternatives	Marketing	++	+	++	◕	$$$	$
	Mobility management	+	+	++	◔	$$$	$
Improved goods distribution	Consolidation of goods *	+	+	++	◑	$$$	$
Clean vehicles and fuels	Biofuelled vehicles	++	+	–	◕	$	–
	Biofuel production	++	+	–	◑	$$$	$

*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.

Evaluation level	**Objectives**	**Responsibility**
Measure Evaluation	Measure objectives	Measure leader
WP Evaluation	WP objectives	WP leaders
City Evaluation	City objectives	City coordination
TRENDSETTER Evaluation	TRENDSETTER objectives	TRENDSETTER Evaluation Manager
European Evaluation	CIVITAS objectives	METEOR, in cooperation with the Evaluation Liaison group

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.

2.1 Indicator based evaluation

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

Evaluation area	**Indicator**	**Unit**
Energy	*Energy use (total and renewable)*	*Joule/year*
Environment	*Emissions of fossil CO_2*	*Tons/year*
Environment	*Emissions of NOx*	*Tons/year*
Environment	*Emissions of PM*	*Tons/year*
Environment	*Noise levels*	*dB(A)*
Mobility	*No of trips*	*No or Qualitative 5-degree scale*
Mobility	*Travel time*	*Reduction in hours or %*
Mobility	*Quality of service*	*Qualitative 5-degree scale*
Mobility	*Acceptance*	*Qualitative 5-degree scale*

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.

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

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.

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

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

4 Overview of the City of Pécs

4.1 Objectives – Pécs

The City of Pécs has a number of overall objectives regarding, e.g. improving air quality, improving environmental living circusmtances, reducing the use of fossil energy and noise. The city-based objectives for Pécs are listed below. In the framework of the project Pécs has identified the following objectives to be targeted and met in the three measures of Trendsetter:

- To reduce emissions through decreased traffic in the central areas of Pécs (-20 to 100% depending on the exact location of the zone)
- To reduce the traffic of freighters in the city centre by 95%
- To decrease the average time of parking in the centre (-20% to 30%)
- To reduce the air and noise (-3%) pollution in the centre
- To provide better living and working environment, better circumstances for tourists

To provide better conditions to preserve and protect the UNESCO World Heritage sites

4.2 Local context

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. The transition period resulted in a huge demand for private car parking spaces and public transportation as, the number of cars and the number of tourists and students increased rapidly. In November 2000 the early Christian burial chambers received the UNESCO World Heritage title, providing new tasks for the municipality in the field of heritage protection and preservation.

Pécs is involved in the following workpackages in the framework of the Trendsetter project:

Workpackage	Group of measure	Measure code	Measure title	Responsible project partner
WP5 Access Restrictions	Strolling zones	5.4	Establishment of a car-free zone in the inner city of Pécs	Pécs Municipality
WP5 Access Restrictions	Strolling zones	5.5	Preparation of a new traffic and transportation strategy	Pécs Municipality
WP6 Integrated	Parking	6.5	Establishment of	Pecs Property

Pricing Strategies			a zone-modell parking system in the central city area	

4.3 City of Pecs (Pecs Municipality)

The mission of the municipality is to provide all necessary services for its citizens on the local level. The Hungarian Government in the framework of the Law on Local Governments states that certain tasks are obligatory for the municipalities and certain are voluntary. Providing public transportation for the citizens is a voluntary task, and providing environmentally friendly transportation methods is a completely pioneering activity in Hungary.

The Municipality of Pecs is the leading contractor on behalf of the Hungarian partners, it is responsible for the implementation of the whole project in Pecs. The local partner is a company owned by the municipality with the special role of providing certain services for the public. Project management, administration, implementation is led by the municipality, the local partners will work under strict control of the municipality. The personnel of the City Development Department and the European Development Office will be in charge for the implementation of the project.

Picture No. 1.: The inner city of Pécs

Source: Municipality of the City of Pécs

Pecs Municipal Operations and Property Management Company (Pecs Property)

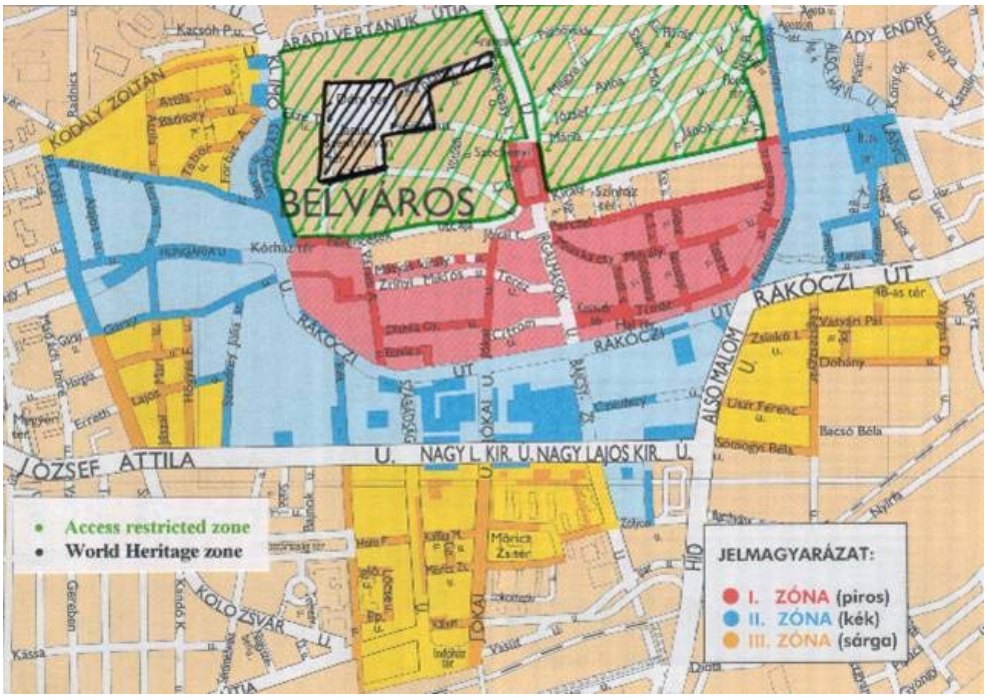
The company was established with the mission of providing the best and most effective services for the public in the field of municipality-related services. This

means that the utilisation of the property of the city, the utilisation of the revenues for development, the management of these services are provided by the company, under strict control of the General Assembly of the City of Pecs. In the letter of foundation the municipality guaranteed, that all profit generated by the company will located for service development of the city. As the establishment of the parking concept and the utilisation of public area in the territory of the city are among the tasks of the Pecs Property Co., they will be responsible for the implementation of the parking concept. The detailed plans of establishment are ready and the company will be responsible from the call for tenders until the official starting of the system. As a municipality owned company, they will work under strict municipality control and all necessary support will be given for them for the successful implementation. In the framework of the institution system of the company there is a separate unit for the establishment of the parking concept, they will provide the necessary personnel and equipment for the implementation.

Apart from the partners, the following stakeholders have been integrated into the implementation of the measures in order to guarantee the success of Trendsetter:

- politicians
  - national level (Ministry of Environment)
  - regional level (Baranya County Council, South Transdanubian Regional Development Council)
  - city level (representatives of the parties and fractions)
- goods distribution companies
- taxi companies
- public transport passengers
- drivers of company vehicles
- NGO (For Our Environment Public Foundation, Bicycle Association of Pecs, etc.)

Picture No. 2: Parking-zones and the access restriction areas in Pécs



Source: Municipality of the City of Pécs

4.4 Description of the measures

In the framework of the Trendsetter project three measures are implemented in Pecs, which are linked closely to each other, out of which 5.4 aims the establishment of a car-free zone. As a result of the rapidly growing number of cars during the last decade congestions became an everyday phenomenon of life in the centre of Pecs, which results in air pollution, noise pollution and a significant deterioration of living and re-creating conditions. In addition to this in 2002 the inner city of Pécs – remains from the Early Christian period – were awarded with the UNESCO Cultural World Heritage title. This significant recognition requires further preventive actions, which serves the long term sustainability of these universal cultural values.

In the framework of measure 5.4 a **car-free zone was established in the city centre** around the UNESCO protected sites, named World Heritage Zone. This zone is completely closed for private cars, only the local residents – who actually live here – are permitted to access this area, their realtives and physically handicapped people may apply for permission from the municipality. (Car users must approve that they use the car for the benefit of the disabled relative in each occasion for the municipal police controlling the area permanently.) It is not possible to purchase access permission based on any other reasons in this area.

The zone is established with the ordinary use of traffic tables, signs and in certain cases the roads are blocked by jet polls and other built elements. The municipal police controlls access each day, the heavy penalty supports meeting the objectives. As complementary actions a 30 km/h speed limit is introduced in the whole city centre and an access limitation of freighters over 6 tons.

The car-free zone is accompanied by two other types of zones in the centre: inside the area of the medieval town wall a limited access area is introduced, which is closed for private cars without municipal access permission. (It is easier to apply – in certain cases purchase – these permissions in this area, than in the World Heritage Zone.) Around the city wall – still in the city centre – a zone-model parking system is introduced, which contribute to the municipal control over the number of cars visiting the centre of Pécs.

Measure 5.4 integrates the complete process of the introduction of these zones as planning, argumentation-debate, implementation and evaluation of the actions.

Measure 5.5 was originally not included in the Trendsetter measures. During the implementation of the project it was realized by Pecs, that all infrastructure developments and planning activities miss innovation and our existing plans and strategies do not give answers and solutions for the problems of traffic in the 21st century and the **need for a new traffic and transportation staretgy** has been identified. After the changes in the 1990's, Pecs prepared the traffic and transportation strategy for the next 20 years. Due to the unexpected growth in the number of private cars and never seen traffic conjunctions, the strategy lost its validity. It was realized only within Trendsetter, that there is a perspective in

alternative fuel use for PT; there are opportunities to establish a fixed track PT network (tram, etc.) in Pecs. When the Trendsetter project was designed Hungary was not a member of the EU, even the fix date of the accession was not known. After the accession in 2004, a new financial perspective has opened up for the municipalities in Hungary, to find solutions for those problems, which were already known, but it was never thought, that solutions might be found in the next decades. Pécs – one of the most innovative cities of Hungary – would like to utilize the new financial resources (mainly ERDF and CF grants) for transportation development and innovation incubation.

The measure aims to prepare a local traffic and transportation strategy in order to meet the challenges of the huge increase in traffic (mainly due to the use of private cars) and to provide environment friendly solutions for the transportation needs of the citizens. All objectives face the same mission: Pecs would like to become Europe's Cultural Capital by 2010 and it is inevitable to offer good quality transportation services. The strategy covers alternatives and suggestions for 'inter-urban' transportation, namely the development of the local airport, the highway construction (which fits into the Helsinki Corridors) and the 'intra-city' transportation challenges.

The strategy focuses on two aspects: access limitations in the city centre to offer better living and recreating conditions and the modernisation / 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. Map attachments show the alternative solutions for transportation developments.

The strategy describes the vision of PT in Pecs by 2010, in order to be able to offer efficient public transportation for the visitors coming to Europe's Cultural Capital. Considering the financial resources it focuses mainly on the utilization of the next Community Support Framework (2007-2013) and on the application of the public-private-partnership in providing communal transportation services.

The principles of the strategy will appear in the project proposals to be submitted in the framework of the National Development Plan, which co-ordinates the utilization of the Structural Funds in Hungary. The most important projects are:

1. Re-positioning of the local bus station from the densely populated area to a suburban district,
2. Establishment of a fixed track PT infrastructure,
3. Road infrastructure developments related to the opening of the Expo Centre and the Pecs-Pogány Regional Airport.

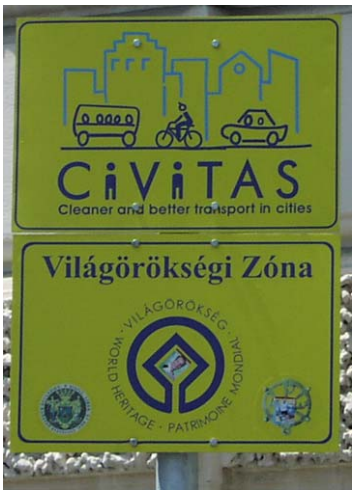
In the framework of measure 6.5 **a zone-modell parking system in the central areas of Pécs has been established**, closely linked to the the car-free zone and the access limited zone. The three parking zones are accompanied by a limited

access area in the buffer-zone of the city-centre and the car-free World Heritage Zone.

As Trendsetter 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 and noise pollution**.**

Pecs has used the easiest technology to achieve traffic reduction in the city, namely the municipality's legal power has been utilized for limiting access, private car usage in the city centre. Based on the principles of democracy all stake-holders and affected citizens have been invited to the planning of the municipal resolution and all political powers supported the actions contributing to the improvement of the environmental and living conditions in the city-centre. No technological innovations have been implemented, but it is not usual in Central- and Eastern Europe to limitate the access of central city areas, which could generate profit if they were used as paying parking places.

Picture No. 3-4.: The entrance of the car-free, so called "CIVITAS World Heritage Zone" in the city centre of Pécs



Elaborating and introducing a completely new integrated traffic strategy in Pecs is innovative, because it builds upon a modal shift from private transportation to public transportation, it investigates and proposes alternative fuel use and it introduces a completely new PT infrastructure (fixed track – rail based).

The actions of the measures result in certain areas 100% decrease in the number of cars accessing the city centre and thus a significant decrease in GHG and noise pollution-emission. The quantifiable outputs are: 95% reduction in the number of

freighters, 20-100% reduction in traffic and 3% reduction in noise pollution is expected in the city centre.

Innovative aspects of the measures implemented in Pecs

- Protection of World Heritage by introducing an access prohibited zone.
- Prohibition of access by cars between Eastern-Western inner city.
- Setting up jet polls to control traffic in the city centre, to limit accessibility.
- Elaboration and introduction of a completely new integrated traffic strategy in Pecs (private and public traffic).
- Introduction of a completely new integrated parking-system in Pecs (limited time, differentiated price)
- Increase free parking space outside the city-centre as well as raised prices and limited parking time in the centre
- Co-ordinated and central management of all parking spaces in Pecs

4.5 Implementation of the measures

The implementation of the Trendsetter project in Pécs has started with the introduction of the zone-modell parking system and the car-free zone. The two actions form one single traffic management system therefore they were implemented parallel. In month 1 the City of Pécs decided on the installation of a zone-model parking system and started the actual implementation immediately (due to political reasons). During months 1-6 the whole city centre was equipped with all necessary traffic infrastructure facilities required for the zone-system. Information boards have been placed out in the city to inform the citizens about the new system. All streets in the city centre have been marked with the necessary information tables in order to launch the model successfully. 120 parking ticket machines have been installed in the first 6 months. In order to ease public acceptance the municipality radio, television and newspaper started a media campaign to persuade the citizens about the positive effects of the system. During the first 12-16 months of the project the City of Pécs has prepared a decision on the introduction of the car-free zone, the location of the car-free-zone has been planned and approved. During the debate of the proposal, all stake-holders and affected citizens/institutions agreed on the necessity of the actions. During month 17 the car-free zone was established in the inner city centre: the municipal resolution on the introduction of the system has been approved.

By the end of the second year (month 24) of the project a speed limit of 30 km/h was introduced and the access of heavy vehicles (over 6 tons) within the World Heritage Zone was prohibited. The extension of the strolling zone was also investigated and the building of new bicycle roads was postponed due to financial reasons. Several streets have been closed and access to others has been limited.

Between months 6 and 24 the implementation of other supplementary measures, as increasing the number of free parking spaces outside the city centre and increasing green areas in the city centre have been started. In month 24 prices and time limits in the system have been changed. After month 24 the establishment of the P+R parking facilities have been the main activities of the measure.

During the implementation the city development department of Pecs started parallel activities:

1. The analysis of the present situation has been prepared based on actual counting / measurement of the traffic (this was performed in 2004);
2. The extension of the access restrictions in the city centre and the location of the parking houses / other parking facilities have been examined and plans have been elaborated to convert existing parking places into green areas;
3. The plan and programme of re-positioning the local bus station has been prepared;
4. The plans to establish a fixed track PT infrastructure have been worked out.

Picture No. 5.: The present car-park in front of the synagogue converted into a leisure park in 2006-2007, based on the new transportation strategy

During 2005, the elaboration of the projects/applications fitting into the respective programmes of the National Development Plan has been started and the lobbying for the integration of the project proposals into the new Community Support Framework has been started.

The evaluation of the results of the actions was started after month 24 and it is still in progress.

Picture No. 6.: Entrance of a park and ride facility, established in the framework of the project

Picture No. 7.: A traffic table showing the entrance of Zone II in the parking-system implemented in Pécs

PART C - Results and Analysis

5 Indicators

5.1 Introduction to the present status of air-quality and the monitoring facilities in the City of Pecs

Since the 1970's environment protection and the monitoring of air-quality has been a central issue in Pecs as the city used to be the largest mining city in Hungary with more than twenty-five thousand coal miners. Pécs used to be among the five most polluted / contaminated cities in Hungary considering the quality of air during the 1970's and 80's, but during the transition period – after 1990 – the situation improved radically, as most of the mines have been closed. The largest air-polluter industry remained the power-plant, which used coal as fuel until 2003. In 2003 a fuel-change shift has been started to natural gas and finally in 2004 Hungary's largest biomass fuelled boiler (50MW) has started its operation in Pecs. However, this improvement has been hindered by an unprecedented growth in the number of cars (about 40% in the last 10 years), which results, that significant actions must be done in traffic management in order to reach the targeted situation.

In order to be able to work out successful programmes to provide healthy environment for the citizens, during the last 20 years the city has been equipped with the following air-quality control facilities:

- 12 units of fixed RIV's (Regional Immission Controllers) to monitor th SO2 és NO2 content of the air 24 hours a day
- 6 units of on-line mobile measuring containers (SO2, NO2, osone, CO, dust {PM10,TSPM}, NOx) to control the quality of air 24 hours a day, providing real time data for the Regional Environment Protection Agency
- 12 measurement containers for particles

Since 2000, the city municipality has started to implement pilot actions to reduce the traffic based air-pollution. In the framework of this programme two main actions has been started:

- the city has joined the Trendsetter Project of the Civitas Initiative in order implement actions of traffic management, access restrictions, etc. based on the experiences of Graz, twin-city of Pécs;
- a bus modernisation programme has been launced aiming the complete change of the fleet by 2010. This programme includes the change of 160 – mainly articulated – buses, most of them older than 20 years into Euro 3 and 4 norm buses. By 2010 the average age of the fleet will drop from 16 years to 6 years,

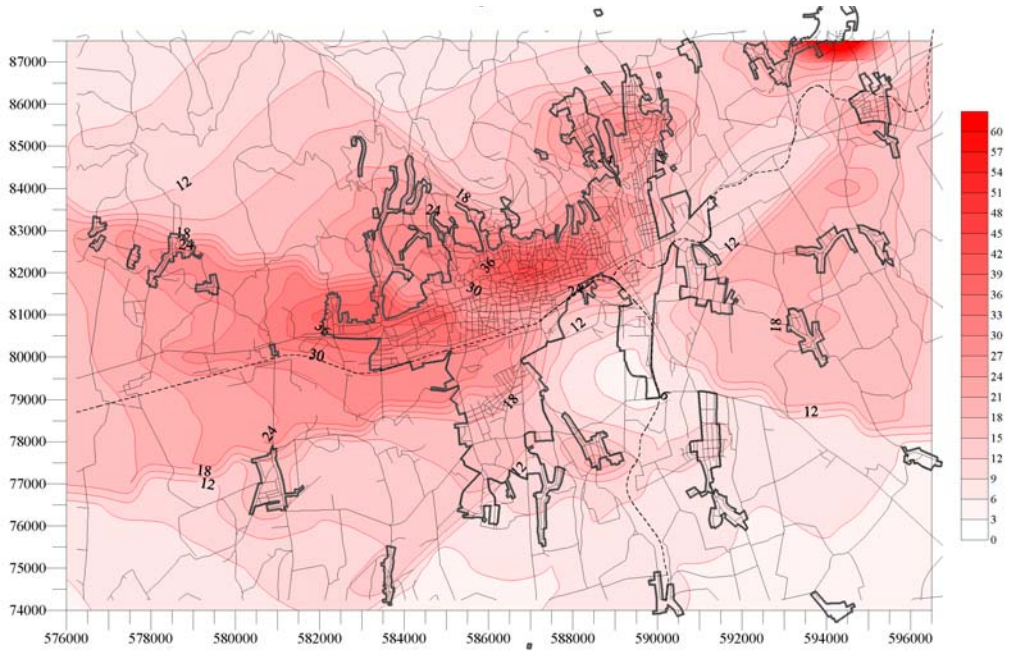
which implies, that Pecs will have the youngest bus fleet among the Hungarian cities.

Table No.2.: Total emissions of traffic origin in the City of Pecs in 2000

Vehicle category	SO2 t/year	NOx t/year	CO t/year	Particles t/year
Passenger car	9,1	487,8	5836	43,2
Trucks/lorries	5,2	95,9	221,8	26,0
Bus	5,5	76,4	177	23,5
Total	19,8	660,1	6234,8	92,7

Source: Tibor Emesz, Regional Environment Protection Agency, 2002

Picture No. 8.: Sulphur-Dioxide air contamination in Pecs in 2002 (µg/m³)

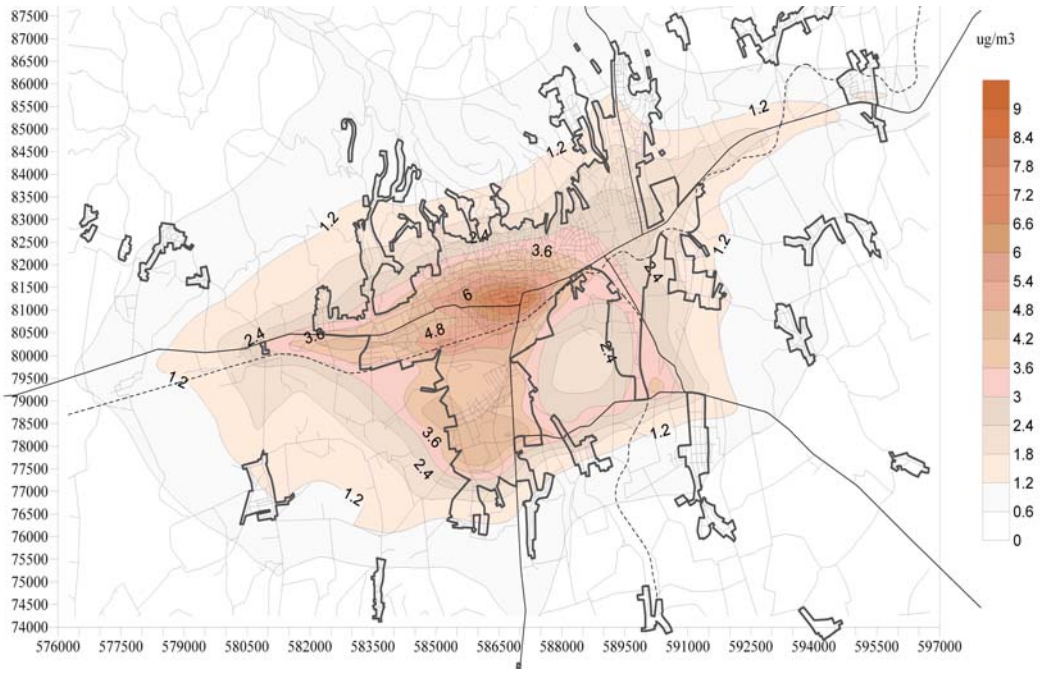


Source: Tibor Emesz, Regional Environment Protection Agency, 2002

From the table and the maps, it can be seen, that passenger cars can be regarded as the main source of air pollution, as they generate more than half of the total emissions in each category. This problem has been realized and in the framework of Trendsetter actions/ measures have been implemented to reduce passenger car

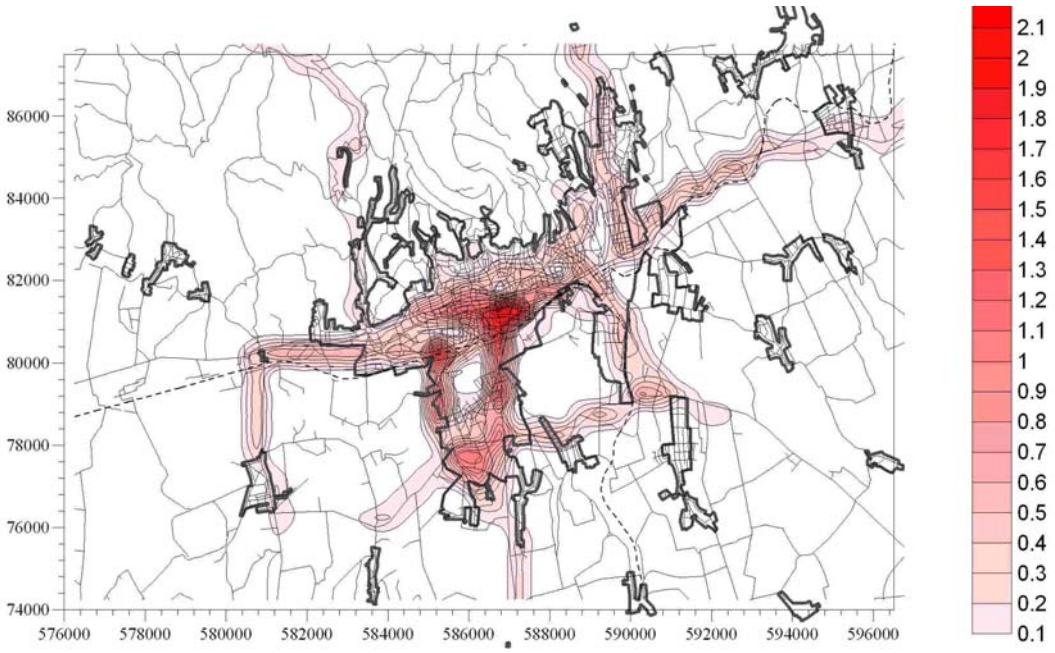
traffic in the inner city, as the central areas are the most contaminated parts of the city.

Picture No. 9.: Total NOx contamination of air in Pecs in 2001 (µg/m³)



Source: Tibor Emesz, Regional Environment Protection Agency, 2002

Picture No. 10.: Total NOx emmissions of traffic origin in 2001 (kg/h)



Source: Tibor Emesz, Regional Environment Protection Agency, 2002

The actions of the measure result in certain areas 100% decrease in the number of cars accessing the city centre and thus a significant decrease in GHG and noise pollution-emission. The quantifiable outputs are: 95% reduction in the number of freighters, 20-100% reduction in traffic and 3% reduction in noise pollution is expected in the city centre.

5.2 Measurement and evaluation

The evaluation of the measures 5.4 and 6.5 is based on the following activities:

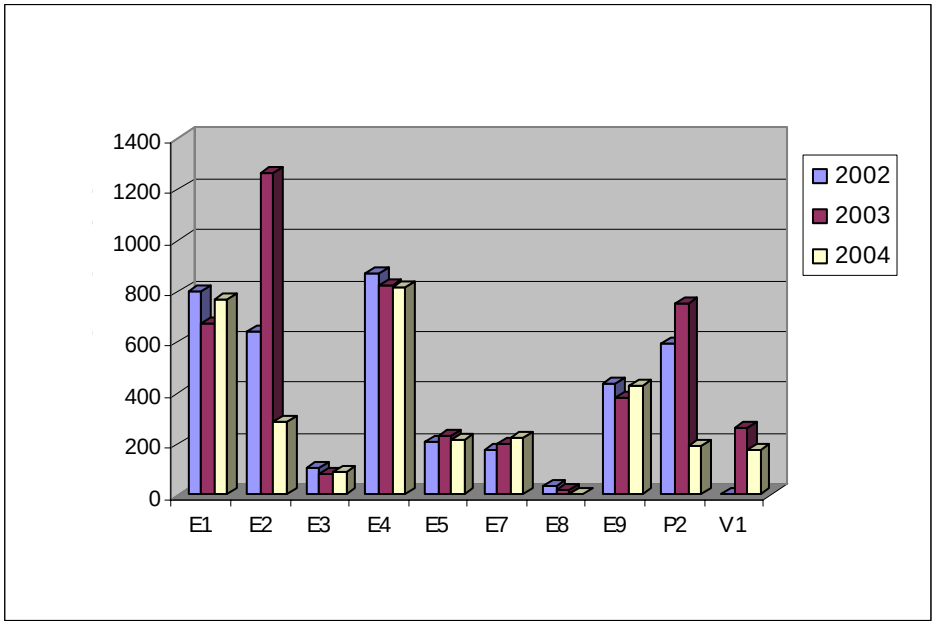
1. The parking company prepares regular reports and analysis on the average car-parking place occupancy and on the revenue balance (informations mainly on average parking time per car, average parking cost per car)
2. The Municipal Operations and Property Management Company prepares annual reports on the parking situation in the city centre, namely demand analysis for further developments (where and what parking infrastructure developments should be implemented annually)
3. The Municiaplity of the City of Pécs prepares annual reports on the number of access permissions accepted and issued.
4. Opinion-polls, interviews with the citizens and remarks from the media and from the official visiting hour of the mayor (residents are entitled to ask the mayor any questions of any topic and parking is the mos favourite issue)

The companies prepare their reports annually about the parking-system and its conditions, the frequency of the measurement usually follows the seasonal changes (we have data for all 3 zones usually for each season of each year, which is normally based on the actual calculation of 1 specific day's occupancy).

Evaluation activities are not applicable for measure 5.5, which aims the preparation of a strategy with 5-7 years of implementation and decade long impacts. The strategy itself does not result any change in the present system, as it only describes the direction of future investments, developments, therefore the before and after scenario are the same. If we investigate the long-term inpact, we may say, that it initiates a complete paradigm change in traffic and transporation in the City of Pécs.

As measure 5.4 and 6.6 can be regarded as one traffic management action, their evaluation and justification have been performed jointly. All datas measured and investigated in Pecs are the results of both measures they cannot be separated. Tp summarize, it can be stated, that all objectives envisaged by the partners in Pécs have been met and Trendsetter successfully contributed to the development of inner city transportation conditions.

Picture No. 11.: Number of access permission issued in the central areas of Pécs.



The left axis of the diagram shows the number of permissions issuede in the three consecutive years 2002, 203, 2004; the horizontal axis shows the distribution of the different types of permits, based on the actual location and type (reason for applying and receiving permission). The diagram justifies clearly, that the municipality has been successful in introducing the access restirctions in the city centre as by 2004 the number of cars accessing the city centre has dropped significantly. Considering the numerical analysis the following overall results have been measured:

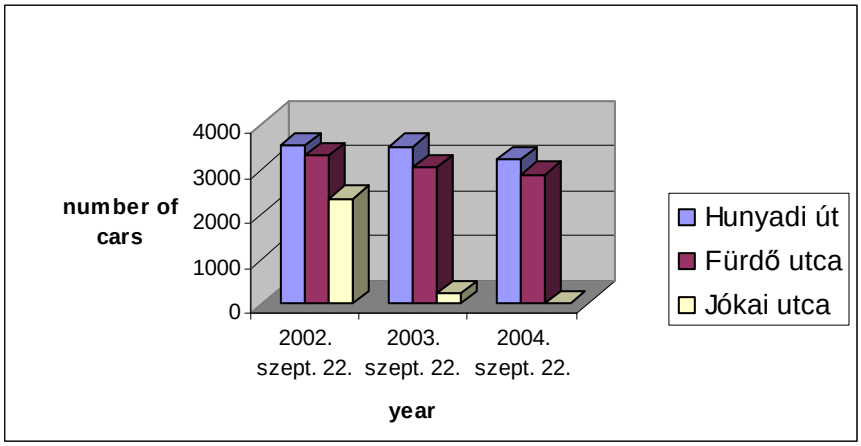
- 3860 access permission has been issued in 2002
- 3195 assecc permission has been issued in 2004.

These data, prove, that the municipality has used its legal power successfully to limit private car access in the city centre. This implies an approximately 20% reduction of private car usage in the whole city centre. The opinion-polls justified, that after two years the limitation was successful even among those, who live in the actual area, and their right for access have been significantly decreased.

It must be noted, that in 2003 the number of permissions has increased to 4836, as new areas have been integrated into the access restriction zones, therefore more citizens became eligible transitionally for applying for the permit. On the other

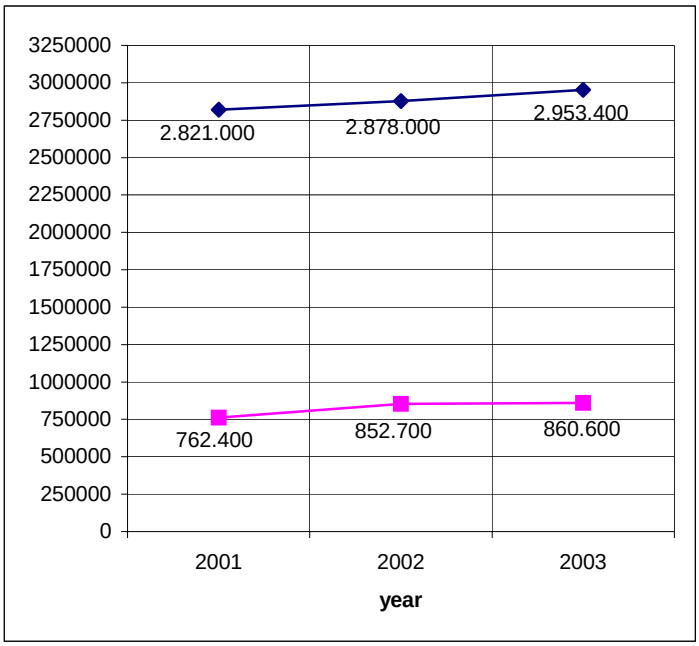
hand it meant, that the size of the access restriction zones was increased by more than 20% from 2002 to 2003.

Picture No. 12.: Total number of cars accessing the central areas on the 22nd of September in 2002, 2003 and 2004



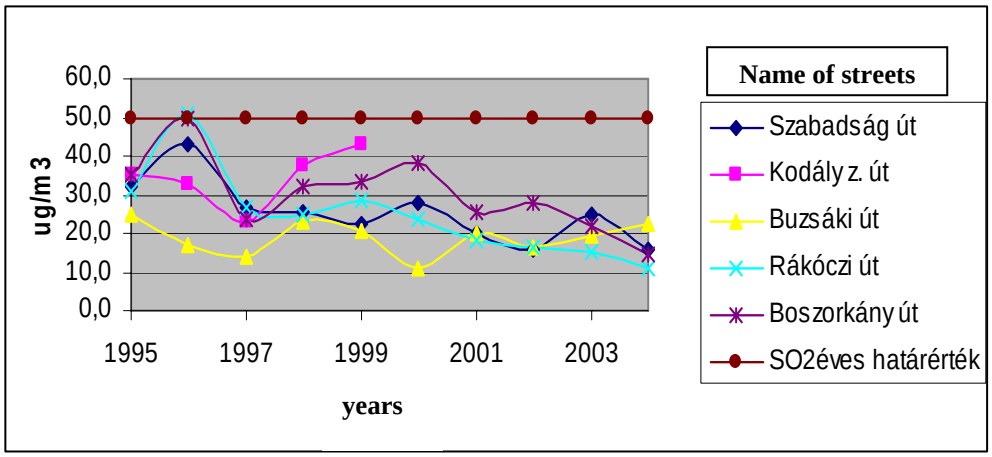
The diagram approves, that Pécs has met all objectives considering the general limitation of car access in the central areas, justified by the counting of the number of cars in the three “entrance roads” to the central areas. The numerical analysis show, that in case of Jókai Street 100% reduction has been achieved (2333 cars passed the street in 2002 and 0 in 2004). In caseof the Hunyadi Street 3514 cars entered the centre in 2002 and 3198 in 2004, which implies 10% reduction. In Fürdő Street 3295 have been measured in 2002 and after a 13% reduction 2879 in 2004.

Picture No. 13.: Number of daily and monthly bus tickets sold in Pécs



From the table above, it can be detected, that the access limitation actions in Pécs have been accompanied by the increase of the number of daily and monthly bus tickets sold. The blue line shows, that a 5% increase has been measured in the daily tickets sold, and the pink line shows that the number of monthly tickets sold, has increased by 13%. This proves, that the measures implemented in Pécs, have inspired the residents of the city to shift from car to public transportation.

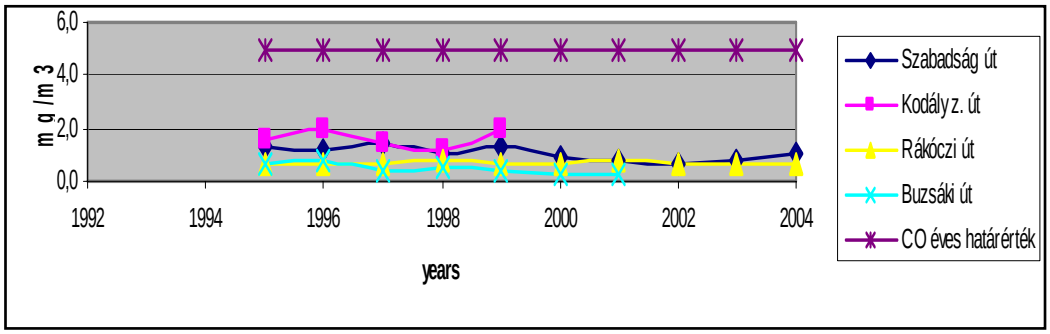
Picture No. 14.: Yearly average SO_2 pollution based on the measurement of the monitoring stations between 1995 and 2004



The diagram shows, that during the lat 10 years, practically in all measured places the SO_2 pollution has been decreasing and a positive trend can be detected in Pécs. It can also be seen, that since 1996 the values have always been under the health limit value (brown line). Since the launch of Trendsetter – 2001 – with the exception of the Buzsáki Street, in all other measuring places the sulphur-dioxide content of the air has been decreasing.

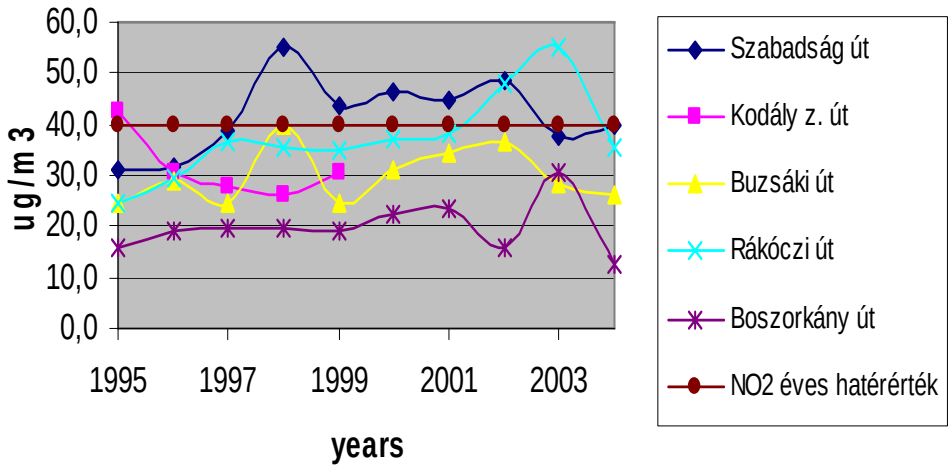
Picture No. 15.: Yearly average CO content of air,

based on the data provided by the monitoring stations (in mg/m^3)



The diagram above shows, that the yearly average CO content of air has been well-under the limit value, but only minor rsults have been achieved duirng the last five years. With the exception of one measuring point (street) the CO content has been decreasing in the city centre, but its rate i not satisfactory, therefore significant and new measures have to be implemented in the future to provide better living circumstances for the residents, tourists, etc.

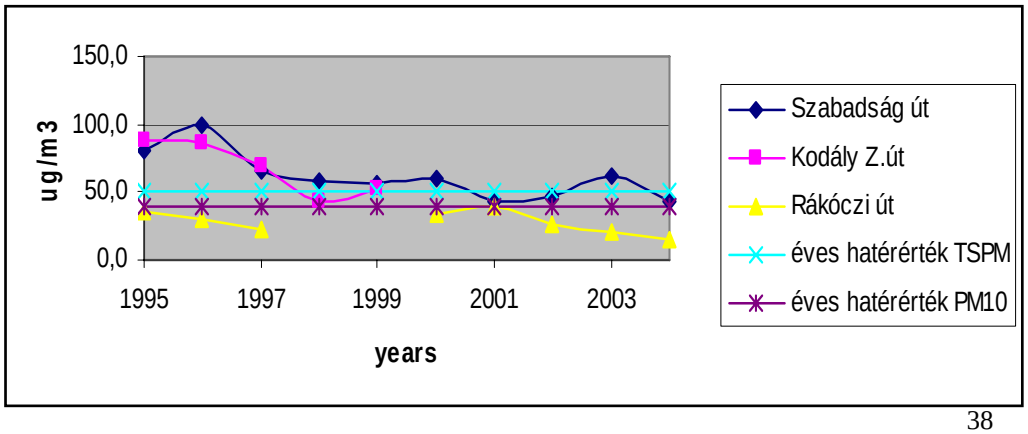
Picture No. 16.: Yearly average NO_2 content of air, based on the data provided by the monitoring stations



The diagram shows, that in two places an increase int he CO content of air has been measured in 2003, while in three other places the reduction has been detectable since the introduction of the Trendsetter measures. This chart proves, that by closing several streets and introducing access limitation zones, the problem of environment protection and air-pollution reduction cannot be solved, as some part of the traffic will be re-postioned to other streets, where it might cause problems. However, by 2004 additional traffic management actions (new traffic order, etc.) have resulted, that even in those cases the emmission rates can be decreased. (The other resaon for the relatively very high datas for the year 2003, is the the climate, the meteorolgical circumstances were not favourable in that year. The summer was much longer, the winter period was milder and the average wind speed was much lower, which have resulted, that the natural air-cleansening processes could not improve the situation effectively.)

Picture No. 17.: Yearly average flue-dust content of air,

based on the data provided by the monitoring stations



If we investigate the yearly values of flue-dust content of the air, similar conclusions can be drawn up. The chart shows, that the situation in Péc has been improving in the last ten years and since 2001 the average flue dust content of the air has been under the healthy limit value and the trend is positive, i.e. the flue dust content is steadily decreasing.

5.3 Fulfilment of objectives

Pécs has fulfilled all objectives, it has envisaged at the beginning of the project, namely the traffic decrease and the deducted decrease in air-pollution and energy-saving has been met.

Table No. 3.: The fulfilled objectives of the measures implemented in Pécs

The quantifiable fullfillef objectives of measure 5.4
• 80% less traffic in certain parts of the inner city
• 95% less traffic of heavy freighters in the city centre
• Around 3% reduction in noise pollution together with WP 6.5
• 100% less traffic in the focal point of the inner city

The quantifiable fulfilled objectives of measure 5.5
• The new strategies will integrate the philosophy of CIVITAS in actual city traffic planning by providing examples for non-CIVITAS candidate country cities (facing similar problems).
• Provide professional background of the future city transportation actions
• Describes the actual places where new parking houses is needed and the re-planning of city transportation is inevitable

The quantifiable fulfilled objectives of measure 6.5
• Indicative analysis on the reduction of pollution from traffic in the inner city (A study on the achieved results in Pecs including the parking concept and the clean-zone.)
• Decrease in number of cars using parking facilities in the inner city (-20%)
• Shorter parking times in inner city (20% reduction in overall parking time is expected)

To summarize, it can be stated, that the measures in Pécs have met the previously identified objectives, thus Trendsetter has positive impacts on the environmental

and traffic situation in the city.

Table No. 4.: The Pécs measures'contribution to the high-level objectives of the project

Measure 5.4
• 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.
• Promote the use of public transport and other alternatives to private cars
• Reduce noise levels in demonstrating cities

Measure 5.5
• 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.
• Increase acceptance of bio-fuels among citizens and encourage operators, politicians and social groups for innovative, low-noise and low emission technology.
• Promote the use of public transport and other alternatives to private cars
• Reduce noise levels in demonstrating cities

Measure 6.5
• Promote the use of public transport and other alternatives to private cars
• Reduce noise levels in demonstrating cities

As the measures in Pécs did not include large-scale investments in fleet modernisation (bio-fuel fleets and fuelling failities) and we mainly limited our activities to actions requiring small-scale infrastruture developments and traffic management actions, we believe, that Trendsetter was extremely successful from the perspective of the cost-benefit analysis. Pecs has used the easiest technology to achieve traffic reduction in the city, namely the municipality's legal power has been utilized for limiting access, private car usage in the city centre. Based on the principles of democracy all stake-holders and affected citizens have been invited to the planning of the municipal resolution and all political powers supported the

actions contributing to the improvement of the environmental and living conditions in the city-centre.

No technological innovations have been implemented, but it is not usual in Central- and Eastern Europe to limitate the access of central city areas, which could generate profit if they were used as paying parking places. Therefore, the Pécs measures have contributed only to the following scientific and technological objectives of the project:

• Evaluation of the effectiveness and political acceptability of environmental zones
• Development of integrated city mobility plans integrating environmental protection, traffic and public health policies
• Evaluation of the effectiveness of web-based information and telematics as means to save energy and emissions in urban transport, and facilitate traffic flows.
• Evaluation of the effectiveness and political acceptability of environmental zones

<u>Results of the measures implemented in Pécs</u>

1. - 80 % less traffic in certain parts of the inner city.
2. - 95 % less traffic of heavy freighters in the city centre.
3. - 100 % less traffic in the focal point of the inner city.
4. - around 3 % reduction of noise together with Trendsetter measure 6.5.

Energy use	- 9 TJ/year (deduction from the reduction in inner city traffic, although the same cars are used, but their parking is outside the centre)
Emissions of fossil CO2	- 120 tonnes (deduction from the decrease in inner city traffic)
Emissions of NOx	- 20 tonnes per year in the inner city (33% reduction in

Please note, that these results reflect the combined values of measure 5.4 and 6.5.

Estimations and deduction, considering the results of the measures implemented in Pécs:

- Based on the 20% average reduction in city centre traffic we estimate, that the number of cars visiting the city centre has reduced approximately by 600-800 pieces daily (this is based on the actual counting of traffic in several points in the city)
- 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
- This amount can be measured in the public transportation occupancy, which has increased by approximately 1-2% in the last years
- Due to the fuel change of the Pecs Power Plant (from coal to biomass) the SOx emission in Pecs has reduced by 50%, but it is not related to the traffic development projects

Considering the measurement of the indicators, wherever it was possible we have used the method of actual counting and measuring, but in case energy savings and emission savings we have tried to unite the values arising from the actual counting of the number of cars and the actual measured results of the air-quality monitoring stations. We assume, that our deductions reflect the real changes and give clear indication on the achievements in Pécs.

The preparation of the strategy (WP 5.5) itself does noz have any measurable results at present, it contributes to the long-term development of the urban environment.

6 Economical aspects, cost-benefit analysis of the measures

The cost of the implementation of the measures in Pécs covers mainly personnel costs required for the planning of the systems 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 Pecs results about 1 million EUR income losses for the municipality budget, but the improvement of the environmental conditions in the long-term has more significant positive impact.

The parking-system practically does not generate revenue for the municipalty as all income is spent by the company of the city (Pecs Property) to improve parking facilities in the city. We estimate, that at least 10 years are needed to reach a level, when the city municipality may take the revenues out from the zone-modell parking-system.

The new traffic and transportation strategy has no financial impect during the termination of Trendsetter, but in the long-term it estimates around 100 million EUR public investment into the built traffic infrastructure and around 50 million EUR investment into the public vehicle fleets. We estimate an annual 2% monetary rate-of-return, which implies, that minimum 50 years will be needed for the investments to become profitable. On the level of environment protection and health improvements, it will have immediate positive results. These results cannot be evaluated on the basis of economical indicators beforehand, it is estimated that public money spent on health preservation and medical treatments, will result that the overally financial rate-of-return will reach 5% annually.

7 Political and administrative aspects

The political and administrative aspect of the Pécs measures is absolutely positive. All political parties support the improvement of the living conditions in the city centre by the limitation of the private cars, in addition to this the occupancy rate of public transportation has expected 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. In the long-term, the environmental impact of the actions justifies the implementation of the actions. These long-term objectives have been accepted by the political level.

The traffic and transportation strategy was initiated by politicians and prepared by mainly the city administration and other experts. As all political parties support environment based modal shift in city traffic, it is expected, that the strategy will be accepted by all political parties.

All political parties have supported the introduction of the zone-model parking-system, still political debates have been going on 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 (Pecs Property) to install and operate the system successfully.

8 Supplementary measures

Measures 5.4 and 6.5 could only be successful in joint implementation as the car-free zone is the central zone of the parking system, 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 PT services in the centre.

The zone-model parking system has been implemented completely and the constant development and extension of the P+R facilities are needed.

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 the complete change of the bus fleet to environment friendly midi buses (at this stage it is most likely, that biogas fuelled) 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).

The financial implementation context of the traffic and transportation strategy is not fully known yet, therefore numerous supplementary measures are needed. Hopefully, the planned actions will be implemented in the framework of the National development Plan 2007-2013, in the next programming period of the European Union. The strategy plans the utilizations of the European Regional Development Fund.

9 Dissemination and publicity measures

Pécs was in a lucky situation considering the promotion of the Trendsetter actions and the dissemination of the results. The city municipality is the owner of the local television channel; one of the local radio stations and it has a weekly newspaper. These facilities have been fully utilized and actually, without these opportunities the implementation the project would have been more problematic and difficult. This derives from the nature of the actions: they build mainly on the legal power of the municipality, to close streets, re-arrange parking, access to certain public areas, etc. Without the support of the media it would have been very difficult to show the residents, that these actions atually serve their interest sin the long term and the environmental aspects are prior to the present discomforts caused by the measures for the residents.

In the framework of the publicity measures TV, radio reports, newspaper articles, open forums about the parking system in Pecs, have been performed; a free brochure has been prepared by the location of the parking-system and the on the website of Pecs, and the Pecs Property Company information has been provided on the actions.

The preparation of the strategy has been disseminated and officially communicated both to the General Assembly of the Municipality of the City of Péc and to the general public. The residents of Pecs were also invited into some sub-parts (e.g. ideas and design plans were asked publicly for the conversion of a central parking area into a green park) and certain elements have already been shown to the public.

PART D - Conclusions and recommendations

10 Lessons learned and recommendations to other European cities

As Pécs have not implemented technologically and scientifically innovative measures, still it has reached valuable and significant results, the main message of our communication is that not only large and costly measures and actions may lead to results, but actions, which build on the systematic utilization of the existing resources. The city has used its legal power combined with small-scale infrastructure developments (traffic signs, tables, lights, parking facilities, jet-polls, etc.) to issue radical changes in the city centre's traffic.

The basic recommendation from Pécs to all European cities is to be brave and issue radical changes in access restrictions, provided it is accompanied by sufficient communication, promotion activities. In the long-term residents will accept and even support, these actions, which seem to be not in their favour at the beginning.

<u>List of the most important recommendations:</u>

- 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 fits peoples' 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 is somewhat stronger than the global effect, 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.
- 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.
- 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. To create a reference group is 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.
- The city of Pécs suggests to all cities, to take the political responsibility to implement un-popular measures to reduce environmental impact in order to provide better living circumstance in the long run. Getting political support from most parties is necessary for the success of these actions, and only this can guarantee the long-term feasibility of actions like this. The local media is a crucial factor when trying to persuade the citizens about measures which are against their present needs.
- Pécs also 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.
- In addition Pécs strongly advise other cities to have a clear strategy, to consult with opposing actors, work with the legal framework and to use media to communicate your message.
- Cooperate with different types of media to communicate information.
- Involving citizens when planning and implementing measures like this is a positive way to practice democracy.
- Environmental-zones is a type of measure that usually have good acceptance among citizens.
- When planning an environmental zone, communication with road carriers and their organisations has something important to add. A good idea is to form a reference group with participants from organisations 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. It is also necessary to consider what consequences to choose for those breaking the rules.

- It is important to investigate the legal aspect when planning an environmental zone, on both a national level and within the EU. 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 towards bankruptcy.
- Adjust the local infrastructure when implementing restricted zones. Drive-through corridors might be needed in certain cities depending on geography.
    - It is important to involve commerce in the process of transportation and traffic development.
    - 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.
    - 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.
    - Finally, the most important recommendation is to use and involve media as much as possible for the communication – and maybe lobbying – of the traffic and transportation development projects.

To sum it up it is recommended, that each new member state city should modify, update its traffic / transporation strategy based on the results ahievemnets of the cities participating in the Tellus, Vivaldi, Miracles and Trendsetter projects of the Civitas Initiative. The best practices of these cities should appear – mainly in the CEE cities' – medium and long term traffic development programmes. It is easier and more cost-effective to learn from others' experiences and mistakes.

Guide to the reader

Part A - Report summary

Part B - Background Describes the Trendsetter context and gives an overview of the evaluation framework and relevant objectives. It also describes the measures, the problems to be solved and the interaction within WP/Civitas.

Part C - Results and analysis Part C is a comparative analysis between the measures in the WPs. The results are presented and the fulfilments of the objectives are described. The technology used, economic aspects, synergies, political and administrative aspects, up-scaling and transferability is described.

Part D - Conclusions and recommendations Describes the barriers and drivers of the measure implementation, the lessons to consider for replication and utilization by other cities and the recommendation to the EC and other actors

Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

Work Package	Subgroups	No	Measure	City
WP5 Access Restrictions	Environmental Zones	5.1	Widening of the Environmental Zone	Stockholm
		5.2	Widening of Environmental Zone for vehicles > 3.5 tons	Prague
		5.6	Congestion charging	Stockholm
	Strolling zones	5.3	Implementation of strolling zones	Graz
		5.4	Establishment of a car-free zone in the inner city	Pecs
		5.5	Preparation of a new traffic and transport strategy	Pecs
WP6 Integrated Pricing Strategies	Smart Card Systems	6.1	Smart card systems and integrated ticketing	Stockholm
		6.2	Smart card systems and integrated ticketing	Lille
	Parking	6.3	Reduced parking fees to promote clean vehicles	Stockholm
		6.4	Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles	Graz
		6.5	Establishment of a zone-model parking in the central city area	Pecs
WP7 Public Passenger Transport	Information to passengers	7.1	Increasing public transport passengers	Stockholm
		7.5	Customer friendly stops for bus and tram	Graz
	Public transport safety	7.2	Public transport safety	Lille
	PT intermodality	7.3	Intermodal local/regional transport interchanges	Lille
		7.4	Seamless linkage of modes	Graz
		7.6	Park and Ride facilities	Lille
		7.7	Linking different ways of public transport	Prague
WP8 New Forms of Vehicle Use		8.1	New services and services for special customer groups	Graz
	Car pooling/sharing	8.2	Company mobility plan in the administration fleet	Lille
		8.3	Increasing car occupancy	Graz
	Awareness rising	8.4	Site level Mobility Management	Graz
		8.5	Urban Mobility Plan	Lille
WP9 New Concepts for the Distribution of Goods		9.1	Material logistic centre – to optimise freight deliveries at construction site	Stockholm
		9.2	Distribution of goods - Green city logistics	Graz
		9.3	Logistic centre for Old Town of Stockholm	Stockholm

Work Package	Subgroups	No	Measure	City
WP 10 Innovative Soft Measures	Bicycle measures	10.1	Innovations in bicycle transport	Graz
		10.2	Make bicycling attractive (B&R information on the Internet)	Stockholm
	Trip planning	10.3	Creation of a visitor web for optimal trip planning	Stockholm
		10.5	Marketing/information and quality management	Graz
	Awareness of clean transport and safety	10.6	Awareness for speed reduction and less car use	Graz
		10.4	Taxi drivers as information multipliers for clean transport	Graz
WP11 Integration of Transport Management Systems	Traffic information	11.2	Traffic monitoring and supervision	Stockholm
		11.3	Dynamic traffic management system	Graz
		11.4	Accessible road network (street) data	Stockholm
	Improving PT traffic flow	11.5	More adaptive signal control in a bus priority system	Stockholm
		11.6	More adaptive signal control in a bus priority system	Prague
		11.7	High level service bus routes	Lille
		11.1	Technical basis for an efficient customer focussed operation and information	Graz
WP12 Clean Public and Private fleets	Heavy vehicles	12.1	Clean and efficient heavy vehicles	Stockholm
		12.2	Biogas bus fleets	Lille
		12.3	Clean and user friendly bio-diesel bus fleet	Graz
		12.6	Waste collection with biogas-vehicles	Stockholm
	Light vehicles	12.4	Clean municipal fleets	Stockholm
		12.5	Clean municipal fleets	Lille
		12.7	Bio-diesel taxi fleet and bio diesel service station	Graz
		12.11	Making Clean Vehicles less expensive	Stockholm
		12.13	Increasing clean vehicle use in private company fleets	Stockholm
		12.14	Web-portal for drivers of clean vehicles	Stockholm
	Clean fuel distribution	12.8	Optimisation of the bio-diesel collection system	Graz
		12.9	Analysis of the biogas experience	Lille
		12.10	Improved biogas refuelling infrastructure	Stockholm

Appendix 2 – Wordlist

Acronym	Explanation
CCCI	Civitas Common Core indicators
CIVITAS	“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes
CO2	Carbon dioxide
EC	European Commission
GHG	Green House Gas
ICT	Information Communication Technology
IT	Information Technology
METEOR	Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.
MIRACLES	Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS- – A project within the CIVITAS I initiative.
NOx	Nitrogen oxides
P&R	Park and Ride
PM10	Particulate matters, with diameter of less than 10 µm
PT	Public Transport
RKF	Resekortsföreningen I Norden -
SEK	Swedish kronor (1€=9.42 SEK 2005-06-14)
SL	Stockholm Transport
SMIRT	Syndicat Mixte pour I’Integration Reseaux et des Tarifs
SNCF	Société Nationale des Chemins de fer Français
TELLUS	Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.
TJ	TerraJoule
TOE	Tons of oil equivalent
TRENDSETTER	Setting Trends for Sustainable Urban Mobility
Umweltjeton	Special coin for low pollution vehicles in Graz
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIVALDI	Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.
WP	Work Package

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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 – Prague local activities

June 2006, Prague

Trendsetter Report No 2005:13

Trendsetter External Deliverable No 4.4e

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
6. Spedition- und Internationale Transport GmbH
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
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PART A – Report Summary

This report summarises the participation of the City of Prague in the Trendsetter project. Besides Prague, four other cities i.e. Stockholm, Graz, Lille, Pecs, have participated in the project.

City of Prague, participating on Trendsetter project as a following City, is solving three measures in WP 5, WP7 and WP11. Our quota on the total budget of the project is approx. 2%. All three measures agree with Prague's Principles of the Transport Policy, approved by our City Council. Regarding the results and achievements in Prague's part of the project, all three work packages have achieved their objectives.

City of Prague co-operated on the project with three main actors, Public Transport Company (WP 7.7 and WP 11.6), Institute of Transportation Engineering (WP 5.2) and ROPID Prague, organizer of the transport integration.

The measure titles of Trendsetter in Prague are:

- Widening of the environmental zone for vehicles over 6 tons
- Linking different ways of the public transport
- More adaptive signal control in a bus priority system

The activities fulfilled within the Trendsetter project in the City of Prague have contributed to a number of improvements in the city. Good results of the solved measures have led to implementation of the system to many other places, especially the system of the preordination of public transport on signal controlled intersections.

Also the new line of public transport bus operated by small City buses is leading to studies of another lines in other parts of the City of Prague

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.

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:

Effects on Emissions, Energy, and Mobility	Implementation time	Costs for cities
Small	Short	Low
Large	Medium	Medium
	Long	Large

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure
Time –implementation time

Areas	Categories	Emis-sions	Energy	Mobi-lity	Time	Inves-ment cost	Opera-tional cost
Convenient access to public transport	Integrated fares and smart cards	++	+	++	◕	$$$	$
	Increased public transport security	+	+	++	◔	$$$	$$
	Convenient and safe intermodality	+	+	++	◑	$$$	$$$
	Customer-friendly stops	+	+	+	◔	$$	$
	Dedicated bus lanes and priority at junctions	++	+++	++	◑	$$	$
	New services for special needs	–	–	+	◔	$	$
	Quality management	+	+	++	◔	$$	$$
Trip planning for smartest choice	Real-time information helps staff and passengers	+	+	++	◕	$$	$$
	Planning trips on the web	+	+	++	◕	$$	$
	Integrated public transport services	+	+	++	◑	$	$
Traffic management	Traffic management	++	+++	++	◕	$$$	$$
Cycling	Cycling	++	+++	+	◑	$$	$
Access restrictions	Zones favouring pedestrians makes cities attractive*	+	+	–	◑	$$	$
	Selective access restriction for heavy vehicles	++	+++	–	◑	$	$
	Congestion charging	++	+++	++	◕	$$$	$$$
Marketing attractive alternatives	Marketing	++	+	++	◕	$$	$
	Mobility management	+	+	++	◔	$$$	$
Improved goods distribution	Consolidation of goods *	+	+	++	◑	$$$	$$
Clean vehicles and fuels	Biofuelled vehicles	++	+	–	◕	$	–
	Biofuel production	+++	+	–	◑	$$$	$

*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.

Evaluation level	Objectives	Responsibility
Measure Evaluation	Measure objectives	Measure leader
WP Evaluation	WP objectives	WP leaders
City Evaluation	City objectives	City coordination
TRENDSETTER Evaluation	TRENDSETTER objectives	TRENDSETTER Evaluation Manager
European Evaluation	CIVITAS objectives	METEOR, in cooperation with the Evaluation Liaison group

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.

Evaluation area	Indicator	Unit
Energy	*Energy use (total and renewable)*	*Joule/year*
Environment	*Emissions of fossil CO_2*	*Tons/year*
Environment	*Emissions of NOx*	*Tons/year*
Environment	*Emissions of PM*	*Tons/year*
Environment	*Noise levels*	*dB(A)*
Mobility	*No of trips*	*No or Qualitative 5-degree scale*
Mobility	*Travel time*	*Reduction in hours or %*
Mobility	*Quality of service*	*Qualitative 5-degree scale*
Mobility	*Acceptance*	*Qualitative 5-degree scale*

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.

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

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.

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

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

4. Overview of City

4.1 Prague

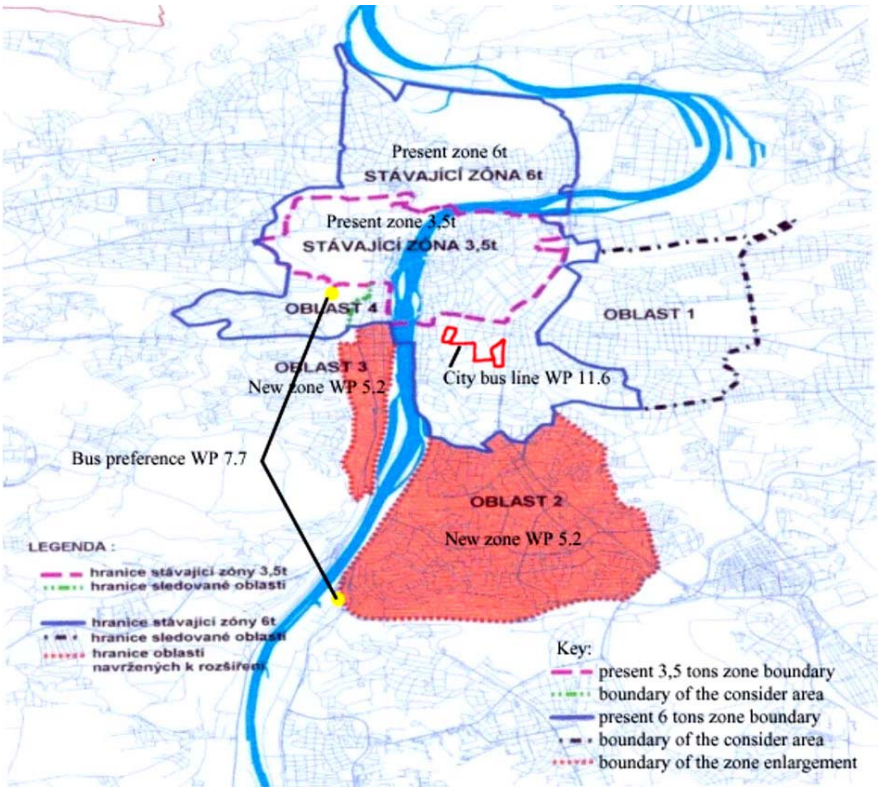
The City of Prague is the capital of the Czech Republic and the country's largest city with 1,300,000 inhabitants. On an average weekday, 44 % of travelers use public transport, 34% go by car and 22% are pedestrians and cyclists. 1 160 million passengers per year uses the public transport system in Prague.

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:

Work Package	Group of Measure	Measure	Measure nr
Access Restrictions (WP5)	Environmental Zones	Widening of Environmental Zone for vehicles > 6 tons	5.2
Public Passenger Transport (WP7)	PT intermodality	Linking different ways of public transport	7.7
Integration of Transport Management Systems (WP11)	Improving PT traffic flow	More adaptive signal control in a bus priority system	11.6

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



4.2 Local context

Prague, a City with population of 1.2 millions inhabitants, has to deal with a recent rise in registered vehicles as well as increased volumes in car traffic. The number of registered vehicles from 1990 to 2003 almost doubled while traffic volumes grew by over two and a half times. Simultaneously, the neighbouring economics of Germany and Austria have adopted fees for haulage, making rise the transit transport density in our country. Intending to curb negative impacts of traffic on the environment, we decided to widen Environmental Zone for Vehicles over 6 tons. It is in the purview of the City Council to do this in order to protect the urban population. Indirectly, the fleets are helped to renew more quickly, which in the end is the best interest of vehicle owners (less energy consumption, improved reliability).

Large locality in the city centre with narrow streets and a great number of medical centres and facilities (hospitals, clinics) with no public transport avaliable leads to the project of a new midibus line, integrated to Prague Integrated Transport. The aim of this measure was to introduce a regular bus line to satisfy basic transpot demands within Karlov area with an emphasis on persons with reduced mobility, sick persons or persons with various handicaps. 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 (between Metro line B, 11 tram lines and 1 bus line)and I P Pavlova(between Metro C and 7 tram lines).

Active detection system facilitates to give the priority to buses passing the crossroads and is based on a radio communication between the vehicle and signal timing controler. Prague started with two independent intersections – on Barrandov Bridge and intersection Holeckova-Zapova streets. The operational succsess leads to implementation of the system to many others intersections at Prague's area.

4.3 Problems to be solved within city

Concerning to measure WP 5.2 the purpose was to limit the heavy haulage vehicles transiting selected densely populated areas of the City centre. The negative impact on the flow of traffic was reduced, including collateral effects (emission, nois).

Measure WP 7.7 – provision of basic transport services within the above mentioned area for specific group of users as well as for other users travelling to this destination.

More adaptive signal control in a bus priority system – WP 11.6 – solves the problem of the priority of public transport to individual one. This priority is one of the greatest priorities of the Transport Policy in Prague.

4.4 Local policies and actions on sustainable mobility

In January, 1996 the City Council of Prague has approved the **Principes of the Transport Policy in the Capital of Prague**. These Principes lay down the general concept for the transport system in Prague which, in spite of the tight budget, gets gradually implemented by the Authorities responsible for the City administration.

The mayor long-term aim of the Transport Policy in Prague is to acquire the quality of the transport system throughout the City and its surroundings in accordance with transport demands, with the requirements for environmental production and protection as well as the expected future development of the City.

Those Principles contains nine based items with specific expression on Publi transport priority.

•

4.5 City objectives

- Shift in modal split from private car transport towards public means of transport with emphasis on improving public bus service transport (using new and alternative approaches) to the same high level service as other means of transport (underground, tramways) in the City
- Reduction of heavy transport (over 6 tonnes) in certain areas of the City and therefore reduction of traffic strain in these areas regarding some of the final stages of the City ring road construction

	5.2	**7.7**	**11.6**
Modal split		X	X
Reduction of heavy transport	X		X

4.6 Description of local consortium

The leading member of Prague's consortium is City of Prague. Its Vice-mayor Mr. Martin Hejl has signed the project contract on February, 2002.

General managing activities has been handed over to the Department of Transport Development of the City of Prague by City Council agreement.

Two of three Prague's measures are working out by Public Transport Company, which is owned by City of Prague and the third one by Institute of Transportation Engineering, also owned by the City of Prague and ROPID, our organizer of the Transport Integration.

PART C – Results and Analysis

5. Indicators

5.1 Indicators and results

Below is a table containing the measures and used Trendsetter Common Indicators and other city-relevant indicators.

Trendestter Common Indicators	**5.2**	**7.7**	**11.6**
Energy use (total and renewable)	12,2 TJ/y		-3 358GJ/year
Emissions of fossil CO2	-1650 T/y	- 4.7 T/y	-0.029 T/y
Emissions of NOx	-43,5 T/y	-0.005 T/y	-0.066 T/y
Emissions of PM	-3 T7y	0	-0.001 T/y
Noise levels			
No of trips		1.1 bn	70/h
Travel time			-00:16
Quality of service		98%	++
Acceptance			
Other city relevant indicators			
Number of customers		2 400 daily	
Reliability of the bus service			100%

5.2 Analysis of results on indicator level

The most interesting result can be seen in measure 11.6 – more adaptive signal control in a bus priority system – which leaded to massive enlargement of this system.

6. Fulfilment of Objectives

6.1 Achievement of city objectives

WP 5.2

Reduction of CO 2, Nox PM emission, decrease of energyconsumption and noise level, favourable change of the traffic flow composition

WP 7.7

Before starting the actual operation there had been certain concerns about poor acceptance of this new transport connection by the public transport 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 new 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.

WP 11.6

The first stage included verification of the functionality of the system. After its validation measurements were carried out to identify time savings of buses passing through the crossroads. In connection with linking the system to timetables there was a certain drop of time savings resulting from the fact that priority is allocated only on selected vehicles.

The achievement of the city objectives is presented and commented.

6.2 Contribution to Trendsetter objectives

The contribution from the city to the Trendsetter objectives (High level, Demonstration and Scientific/Technical) is shown. The Trendsetter objectives are shown in earlier chapter.

Implemented measures support trends contributing to improved environment on the field of the City transport.

- provide input to European policy making and promote a sustainable transport future in Europe
- demonstrate new ways to improve urban goods logistics and efficiency
- promote the use of public transport and other alternatives to private cars
- reduce emissions of CO2, Nox, particulate matters and noise

7. Results on City Level

7.1 Common Core Indicators on City Level

Common core indicarors are energy use, emissions of CO2, Nox, PM, level of satisfaction on PT services and quality of PT

7.2 Potential up-scaling the measures

WP 5.2

Concerning quality: Up-scaling the measure is not necessary

Concerning quantity: In keeping with traffic development and as population and local governments demand, the current heavy haulage restricted-access zone can be further extended

WP 7.7

There is the 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.

WP 11.6

Based on good results on first 7 intersections (2 within project Trendsetter and 5 more in 2004), gradual up-scaling of this priority measure to additional intersections is planned and that within integral segments and compact areas with busy bus traffic.

7.3 Conclusions

Up scaling of projects is a perfect way of continuing with projects after a pilot scheme. This is especially the measure 11.6. – preference of public transport buses – which seems to be very successful in Prague and it is possible to recommend it for implementation in other bigger cities. In City of Prague is and will be implemented using a step-by-step method.

Also implementation of City buses (new type of public buses transport in Prague) is the first step leading to projecting another places for using it.

8. Economical Aspects, Cost Benefit

8.1 Per measure

Measure 11.6. – more adaptive signal control in a bus priority system – was a pilot project on only two intersections. Very good results lead to continuing the system in another bus lines (out of Trendsetter project) and till today more five intersections are in operation and we are continuing with projecting other possible lines. The economic benefits should be seen after the implementation in large scale.

9. Synergies between Measures

9.1 Overview of synergies within the city

WP 5.2

The most demanding was to negotiate and get approved the proposed heavy haulage Environment Zone extension with the urban authorities. They were afraid of a potential increase in permit applications to enter the restricted-access zone.

The growth in rightfully awarded entry permits for necessary traffic service that rises along with the extension of the restricted-access zone is indeed a drawback somewhat limiting the measure. The vehicles that obtained the permit for servicing the needs in the newly extended area can then access the original zone as well. Another limiting factor is the lack of available ring road which could take on the goods vehicle traffic from a transit zone.

What was helpful, on the other hand, was the co-operative attitude of heavy haulage operators inside the delimited zone in respecting the regulation and trying to find solution also in shifting towards smaller lorries. The carriers found also helpful the option to get a permit in necessary cases.

WP 7.7

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.

WP 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. An objective barrier could be e.g. the lack of financial funds. 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.

9.2 Conclusions

One of the highest priorities in Prague’s transport policy is the public transport. That’s why two from three Prague’s measures implemented changes in public transport and are parts of our plans of public transport development.

The third measure – enlarging of the Environmental zone – also follows Prague’s Principles of the Transport Policy approved by City Council.

10. Dissemination Activities

10.1 Overview of dissemination activities

WP 5.2

In order to disseminate information on the adopted measure, special leaflets were printed, articles in newspaper issued as well as information spread on web pages.

WP 7.7

An extensive information campaign was launched in the press in connection with introduction of the new bus line. At the same time we prepared also a leaflet campaign – informative leaflets were distributed in vehicles, at stops and at the travel information centres.

WP 11.6

Time savings relating to implemented autonomous intersections are not visible from the perspective of an ordinary users. It is therefore not a topic suitable for dissemination in media. Accordingly, information about this new system was published mainly in corporate press.

11. Assessment of All Measures

Below is a table of the measures, with comments of their implementation and fulfilment of measure level objectives as well as contribution to City level objectives.

	Implementation (as planned/partly /not implemented)	**Fulfilment of measure objectives** (yes/partly/no)	**Contribution to City level objectives** (yes/no)
5.2 Widening of the Environmental Zone for vehicles over 3.5 tons	As planned	Yes	Yes
7.7 Linking different ways of public transport	As planned	Yes	Yes
11.6 More adaptive signal control in a bus priority system	As planned	yes	Yes

PART D – Conclusions and Recommendations

12. Lessons to Consider for Replication and Take-up by Other Cities

In general, it has been shown that many people initially oppose changes but since the measures have been implemented, the opinion changes and after that, the most of them is positive. This statement is valid for all three Prague's measures:

- Environmental zones
- Preference of public transport buses
- New public transport lines.

12.1 Technical issues

All implemented measures can be used also in other cities.

12.2 Synergies

See chapter 8.1

12.3 Political and administrative issues

In Prague, environmental zones were implemented in the very centre of the City. Its spreading to the other central parts of Prague needed the approvement by local municipalities, by police and also long discussions with local firms.

13. Recommendations to Decision Makers

Important issue is the ability of daring to take difficult decisions and stand for them

- Long-term strategies
- Public transport priority
- Good traffic control management
- Enlarging the good results

Appendix 1 – Description of the measures

WP 5.2

Measures to regulate traffic in the city centre and improve the environment started to be taken as early as in early 1960s. Initially, an Access Restriction Zone for vehicles over 3.5 t was set up in the inner city centre (approximately 5 sq. km); later, a zone in a larger centre was implemented restricting vehicles over 5.5 t of total weight. It was to become later, due to changes in fleet, an Environmental Zone for vehicles over 6 tons. It covered a central city area of approximately 6 sq. km. The zone was widened in steps to finally cover the area of roughly 17 sq. km in late 1990s. After these measures have been implemented, the heavy haulage decreased on some roads by as much as 85 per cent. The traffic moved over mainly to the available sections of the Inner Ring in the south of the city, which are equipped for alleviating the negative impacts of traffic.

An ongoing increase in urban traffic called for regulatory measures to curb heavy haulage in other densely populated neighbourhoods where the heavy vehicles were deteriorating the environment substantially with emissions and noise as well as adversely affecting the other traffic. They were primarily the neighbourhoods with close and dense housing inside the Inner Ring adjacent to the current Environmental Zone for vehicles over 6 tons. In line with the criteria, 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. Analyzing them made possible to set apart the number of heavy goods vehicles that pass only through without having their origin and/or destination inside the area considered. To implement the measures, two areas were finally selected where the limit on heavy haulage could be expected to have satisfactory effect while the local road network arrangement and condition make the measure feasible.

Subsequently, projects were prepared to introduce changes in traffic signs marking the new extensions of the Environmental Zone, then local governments and general public were engaged and after the administrative decisions were issued, the widening was launched.

WP 7.7

The aim of this measure was to introduce a regular bus line to satisfy basic transport demands within Karlov area with en 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 unaccessible 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.

WP 11.6

Active detection system facilitates to give priority to buses when passing through the crossroads and is based on a radio communication between the vehicle and signal timing controller; it consists of a stationary part and a mobile part. An infra-red beacon located in front of the crossroads is used to localize vehicles.

Priority system is linked to timetables of particular lines thus facilitating to assess real time location of the bus against the timetable and based on the time difference identified to allocate an appropriate level of priority on a case-by-case basis. Based on such pre-defined conditions, priority is thus provided only to vehicles, which need it.

Appendix 2 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

Work Package	Subgroups	No	Measure	City
WP5 Access Restrictions	Environmental Zones	5.1	Widening of the Environmental Zone	Stockholm
		5.2	Widening of Environmental Zone for vehicles > 3.5 tons	Prague
		5.6	Congestion charging	Stockholm
	Strolling zones	5.3	Implementation of strolling zones	Graz
		5.4	Establishment of a car-free zone in the inner city	Pecs
		5.5	Preparation of a new traffic and transport strategy	Pecs
WP6 Integrated Pricing Strategies	Smart Card Systems	6.1	Smart card systems and integrated ticketing	Stockholm
		6.2	Smart card systems and integrated ticketing	Lille
	Parking	6.3	Reduced parking fees to promote clean vehicles	Stockholm
		6.4	Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles	Graz
		6.5	Establishment of a zone-model parking in the central city area	Pecs
WP7 Public Passenger Transport	Information to passengers	7.1	Increasing public transport passengers	Stockholm
		7.5	Customer friendly stops for bus and tram	Graz
	Public transport safety	7.2	Public transport safety	Lille
	PT intermodality	7.3	Intermodal local/regional transport interchanges	Lille
		7.4	Seamless linkage of modes	Graz
		7.6	Park and Ride facilities	Lille
		7.7	Linking different ways of public transport	Prague
WP8 New Forms of Vehicle Use		8.1	New services and services for special customer groups	Graz
	Car pooling/sharing	8.2	Company mobility plan in the administration fleet	Lille
		8.3	Increasing car occupancy	Graz
	Awareness rising	8.4	Site level Mobility Management	Graz
		8.5	Urban Mobility Plan	Lille
WP9 New Concepts for the Distribution of Goods		9.1	Material logistic centre – to optimise freight deliveries at construction site	Stockholm
		9.2	Distribution of goods - Green city logistics	Graz
		9.3	Logistic centre for Old Town of Stockholm	Stockholm

Work Package	Subgroups	No	Measure	City
WP 10 Innovative Soft Measures	Bicycle measures	10.1	Innovations in bicycle transport	Graz
		10.2	Make bicycling attractive (B&R information on the Internet)	Stockholm
	Trip planning	10.3	Creation of a visitor web for optimal trip planning	Stockholm
		10.5	Marketing/information and quality management	Graz
	Awareness of clean transport and safety	10.6	Awareness for speed reduction and less car use	Graz
		10.4	Taxi drivers as information multipliers for clean transport	Graz
WP11 Integration of Transport Management Systems	Traffic information	11.2	Traffic monitoring and supervision	Stockholm
		11.3	Dynamic traffic management system	Graz
		11.4	Accessible road network (street) data	Stockholm
	Improving PT traffic flow	11.5	More adaptive signal control in a bus priority system	Stockholm
		11.6	More adaptive signal control in a bus priority system	Prague
		11.7	High level service bus routes	Lille
		11.1	Technical basis for an efficient customer focussed operation and information	Graz
WP12 Clean Public and Private fleets	Heavy vehicles	12.1	Clean and efficient heavy vehicles	Stockholm
		12.2	Biogas bus fleets	Lille
		12.3	Clean and user friendly bio-diesel bus fleet	Graz
		12.6	Waste collection with biogas-vehicles	Stockholm
	Light vehicles	12.4	Clean municipal fleets	Stockholm
		12.5	Clean municipal fleets	Lille
		12.7	Bio-diesel taxi fleet and bio diesel service station	Graz
		12.11	Making Clean Vehicles less expensive	Stockholm
		12.13	Increasing clean vehicle use in private company fleets	Stockholm
		12.14	Web-portal for drivers of clean vehicles	Stockholm
	Clean fuel distribution	12.8	Optimisation of the bio-diesel collection system	Graz
		12.9	Analysis of the biogas experience	Lille
		12.10	Improved biogas refuelling infrastructure	Stockholm

Appendix 3 – Wordlist

Acronym	Explanation
CCCI	Civitas Common Core indicators
CIVITAS	“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes
CO2	Carbon dioxide
EC	European Commission
GHG	Green House Gas
ICT	Information Communication Technology
IT	Information Technology
METEOR	Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.
MIRACLES	Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS- – A project within the CIVITAS I initiative.
NOx	Nitrogen oxides
P&R	Park and Ride
PM10	Particulate matters, with diameter of less than 10 µm
PT	Public Transport
RKF	Resekortsföreningen I Norden -
SEK	Swedish kronor (1€=9.42 SEK 2005-06-14)
SL	Stockholm Transport
SMIRT	Syndicat Mixte pour I’Integration Reseaux et des Tarifs
SNCF	Société Nationale des Chemins de fer Français
TELLUS	Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.
TJ	TerraJoule
TOE	Tons of oil equivalent
TRENDSETTER	Setting Trends for Sustainable Urban Mobility
Umweltjeton	Special coin for low pollution vehicles in Graz
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIVALDI	Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.
WP	Work Package

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 – Stockholm local activities

June 2006, Stockholm

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2. City of Graz
3. Lille Metropole
4. City of Prague
5. Stockholm Transport
6. Spedition- und Internationale Transport GmbH
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
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Guide to the reader

Part A – Report summary

Part B – Background Describes the Trendsetter context and gives an overview of the evaluation framework and relevant objectives. It also describes the measures, the problems to be solved and the interaction within WP/Civitas.

Part C – Results and analysis Part C is a comparative analysis between the measures in the WPs. The results are presented and the fulfilments of the objectives are described. The technology used, economic aspects, synergies, political and administrative aspects, up-scaling and transferability is described.

Part D - Conclusions and recommendations Describes the barriers and drivers of the measure implementation, the lessons to consider for replication and utilization by other cities and the recommendation to the EC and other actors.

PART A – Report Summary

This report summarises the participation of the city of Stockholm in the Trendsetter project. Besides Stockholm, four other cities, i.e. Graz, Lille, Prague, Pécs, have participated in the project. In Stockholm, 19 different activities have been part of the project. Regarding the results and achievements in Stockholm most of the measures have achieved their objectives. Parts of the project and some measures have been delayed. The measures have been evaluated regarding emissions, energy consumption and mobility to fulfilments, economical aspects, synergies, dissemination activities, up-scaling possibilities, different kind of barriers and drivers. At the end of the report, recommendations to decision makers are listed.

The explicit measure titles of Trendsetter in Stockholm are:

- Widening of the environmental zone
- Congestion charging
- Smart card systems and integrated ticketing
- Reduced parking fees to promote clean vehicles
- Increased public transport passenger
- Material logistic centre – to optimise freight deliveries at construction site
- Logistic centre for Old Town of Stockholm
- Make bicycling attractive (B&R information on the internet)
- Creation of a visitor web for optimal trip planning
- Traffic monitoring and supervision
- Accessible road network (street data)
- More adaptive signal control in a bus priority system
- Clean and efficient heavy-duty vehicles
- Waste collection with biogas-fuelled vehicles
- Clean municipal fleets
- Making clean vehicles less expensive
- Increasing clean vehicle use in private company fleets
- Web-portal for drivers of clean vehicles
- Improved biogas refuelling infrastructure

The activities fulfilled within the Trendsetter project in the city of Stockholm have contributed to a high number of improvements in the city. In spite of that some of these activities have been delayed, the most important targets have been met. One important target not fully met has been the increase in public transportation passengers. The target was an increase of 100 000 passengers per day. The result was 72 000. The discrepancy can be explained by that the growth in population was not as great as anticipated and that the implementation of congestion charging was delayed. The target for an increase of clean vehicles was 300 and a number of about 3 000 was achieved, far greater than the target. Recently, the interest for and sales of clean vehicles have increased considerably. Among other things, the Swedish car manufacturers Volvo and SAAB have started to market and sell new clean vehicles. The contribution from Trendsetter in this respect is clear. The targets to reduce CO_2, NO_X and noise have, in spite of the delays mentioned above, has already been fulfilled. Regarding the target for particulate emissions, the target was set to high when the project application was compiled. Besides that, the decrease in particulate emissions achieved by the Trendsetter project is still remarkable. In general, the drivers have been satisfied with the biogas-fuelled vehicles. They are quieter when used in confined spaces and in addition, the drivers no not have the nuisance of diesel exhaust fumes as before. The total energy use has increased but the use of fossil resources has decreased. Finally, the co-operation between the stakeholders in the Stockholm part of the Trendsetter projects has increased. Likewise, the co-operation between the other cities in the Trendsetter project, as well as also other cities outside the project has increased

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.

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 used scales are shown after the table.

Areas	Categories	Emis-sions	Energy	Mobi-lity	Time	Inves-ment cost	Opera-tional cost
Convenient access to public transport	Integrated fares and smart cards	++	+	++	◕	$$$	$
	Increased public transport security	+	+	++	◔	$$$	$$
	Convenient and safe intermodality	+	+	++	◑	$$$	$$$
	Customer-friendly stops	+	+	+	◔	$$$	$
	Dedicated bus lanes and priority at junctions	++	+++	++	◑	$$$	$
	New services for special needs	–	–	+	◔	$	$
	Quality management	+	+	++	◔	$$$	$$
Trip planning for smartest choice	Real-time information helps staff and passengers	+	+	++	◕	$$$	$$
	Planning trips on the web	+	+	++	◕	$$$	$
	Integrated public transport services	+	+	++	◑	$	$
Traffic management	Traffic management	++	+++	++	◕	$$$	$$
Cycling	Cycling	++	+++	+	◑	$$$	$
Access restrictions	Zones favouring pedestrians makes cities attractive*	+	+	–	◑	$$$	$
	Selective access restriction for heavy vehicles	++	+++	–	◑	$	$
	Congestion charging	++	+++	++	◕	$$$	$$$
Marketing attractive alternatives	Marketing	++	+	++	◕	$$$	$
	Mobility management	+	+	++	◔	$$$	$
Improved goods distribution	Consolidation of goods *	+	+	++	◑	$$$	$
Clean vehicles and fuels	Biofuelled vehicles	++	+	–	◕	$	–
	Biofuel production	+++	+	–	◑	$$$	$

*Measures that mainly have local effect

Effects on Emissions, Energy, and Mobility	Implementation time	Costs for cities
Small	Short	Low
Large	Medium	Medium
	Long	Large

Costs are divided into Investment costs and Operational costs. Costs here refer to costs for the city to implement the measure
Time –implementation time

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.

Evaluation level	Objectives	Responsibility
Measure Evaluation	Measure objectives	Measure leader
WP Evaluation	WP objectives	WP leaders
City Evaluation	City objectives	City coordination
TRENDSETTER Evaluation	TRENDSETTER objectives	TRENDSETTER Evaluation Manager
European Evaluation	CIVITAS objectives	METEOR, in cooperation with the Evaluation Liaison group

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.

Evaluation area	Indicator	Unit
Energy	*Energy use (total and renewable)*	*Joule/year*
Environment	*Emissions of fossil CO_2*	*Tons/year*
Environment	*Emissions of NOx*	*Tons/year*
Environment	*Emissions of PM*	*Tons/year*
Environment	*Noise levels*	*dB(A)*
Mobility	*No of trips*	*No or Qualitative 5-degree scale*
Mobility	*Travel time*	*Reduction in hours or %*
Mobility	*Quality of service*	*Qualitative 5-degree scale*
Mobility	*Acceptance*	*Qualitative 5-degree scale*

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.

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

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.

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

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

3.1 Objectives - Stockholm

The city of Stockholm has a number of overall objectives regarding, e.g. improving air quality and reducing the use of fossil energy and noise. The city-based objectives for Stockholm are listed below. The Trendsetter project should contribute to achieving these goals. The objectives of Stockholm are:

- Reduce the emissions of fossil CO_2 by 20 % from 1990 to 2005
- Reduce the emissions of NO_X reaching a daily average not exceeding 60 µg/m^3 by 2006
- Reduce the emissions of particulates, reaching a daily average not exceeding 100 µg/m^3 by 2006
- Reduce the share of residents that are exposed to noise maximums higher than recommended level to 10 %, i.e. 50 % reduction
- Increase the number of public transport passengers by 100 000 by 2005, an increase by of 15 %. i.e. a shift from private transport by car towards public transport
- Increase the number of clean vehicles to 5,000 by 2005, thereby contributing to the long-term objective that clean vehicles shall reach a market share where the further increase is self-sustaining, i.e. 5 % of the City's public and private fleet
- The city shall keep its leading position in the field of clean vehicles and gain a leading position in the field of sustainable transport management

3.2 TRENDSETTER contribution from Stockholm

The targets for Trendsetter measures in Stockholm were:

- Reducing annual fossil CO_2 emissions by 9 300 tonnes by 2005
- Reducing annual NO_X emissions by 70 tonnes by 2006
- Reducing annual particulate emissions by 1 850 tonnes by 2005
- Reducing the share of residents exposed to noise maximums higher than recommended level to 10 % within the environmental zones
- Increasing the number of public transport passengers by 100 000 by 2005
- Increasing the number of clean vehicles to 300 by 2005
- Increasing cooperation with other European Cities

4. Overview of the city of Stockholm

In this chapter, an overview of the city of Stockholm and the particular issues to be solved by this project is discussed.

4.1 Local context (Description of city)

Stockholm is the capital of Sweden. It is mainly located on a number of small islands, which makes the transportation difficult both regarding transit traffic and traffic inside the city. Stockholm has about one million inhabitants and about 1.5 million on reasonable commuting distance in the area of Greater Stockholm. Stockholm has political support for making its transport system even more environmentally compatible by substituting conventional vehicles with clean vehicles and making logistic services more effective. More effective and attractive public transport means combined with intelligent traffic information technologies are other important fields. An overview of Stockholm and the Trendsetter measures is shown on the city map of Stockholm in Figure 2 below.

Figure 1. Trendsetter activities on the map of Stockholm

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.

4.2 Problems to be solved within city

The biggest problems today in Stockholm include an increasing number of vehicles, congestion on many principal roads, heavy-duty traffic and limited capacity of the rail network. Bicycling has a relatively low share of the transportation in Stockholm. Moreover, there are problems with the air quality in the inner city areas, especially regarding a high concentration of NO_2[1] and particulate matter. Furthermore, the noise levels are high. Nineteen measures have been implemented in Stockholm within the Trendsetter project.

4.3 Trendsetter – Stockholm – and description of local consortium

There are seven partners within Trendsetter Stockholm. These are (with abbreviations in parenthesis):

- City of Stockholm, Environment and Health Administration (MF)
- Stockholm Transport (SL)
- Swedish Road Administration, Stockholm Region (SRA)
- Stockholm Real Estate and Traffic Administration (GFK[2]).
- Statoil Detaljhandel AB (Statoil)
- AGA Gas AB (AGA)
- Home 2 You AB (H2U)

The partners in Stockholm intended to implement 19 different measures within the Trendsetter project. In Table 1, and overview of the various measures in the city of Stockholm are shown.

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[1] NO_2 is part of NO_X, comprising both NO and NO_2. NO_2 is the more harmful of the two compounds. Usually, NO dominates in vehicle exhaust but eventually, all NO will be oxidised to NO_2 in the urban air. Depending on the atmospheric conditions, the rate of oxidation varies. NO and NO_2 also play a part in the formation of ozone and secondary particle emissions.

[2] At the end of the project, GFK was divided into two administrations, i.e. the Stockholm City Traffic Administration (TK) and Stockholm City Development (MK).

Table 1. Trendsetter measures in Stockholm

Work package	Group of measure	#	Measure	Proj. Owner
WP5 Access restrictions	Environmental zones	5.1	Widening of the environmental zone	TK
		5.6	Congestion charging	MF
WP6 Integrated pricing strategies	Smart card system	6.1	Smart card systems and integrated ticketing	SL
	Parking	6.3	Reduced parking fees to promote clean vehicles	MF
WP7 Public passenger	Information to passengers	7.1	Increasing public transport passengers	SL
WP9 New Concepts for the distribution of goods		9.1	Material logistic centre – to optimise freight deliveries at construction site	GFK (MK)
		9.3	Logistics centre for Old Town of Stockholm	H2U
WP10 Innovative soft measures	Bicycle measures	10.2	Make bicycling attractive (B&R information on the internet)	SRA
	Trip planning	10.3	Creation of a visitor web for optimal trip planning	SRA
WP11 Integration of transport management systems	Traffic information	11.2	Traffic monitoring and supervision	SRA
		11.4	Accessible road network (street) data	GFK (TK)
	Improving PT traffic flow	11.5	More adaptive signal control in a bus priority system	GFK (TK)
WP12 Clean public and private fleets	Heavy-duty vehicles	12.1	Clean and efficient heavy-duty vehicles	MF
		12.6	Waste collection with biogas-fuelled vehicles	MF
	Light-duty vehicles	12.4	Clean municipal fleets	MF
		12.11	Making clean vehicles less expensive	MF
		12.12	Measure merged with WP 12.11	MF
		12.13	Increasing clean vehicle use in private company fleets	MF
		12.14	Web-portal for drivers of clean vehicles	MF
	Clean fuel distribution	12.10	Improved biogas refuelling infrastructure	MF

Figure below illustrates the organisation for the Trendsetter project in the city of Stockholm.

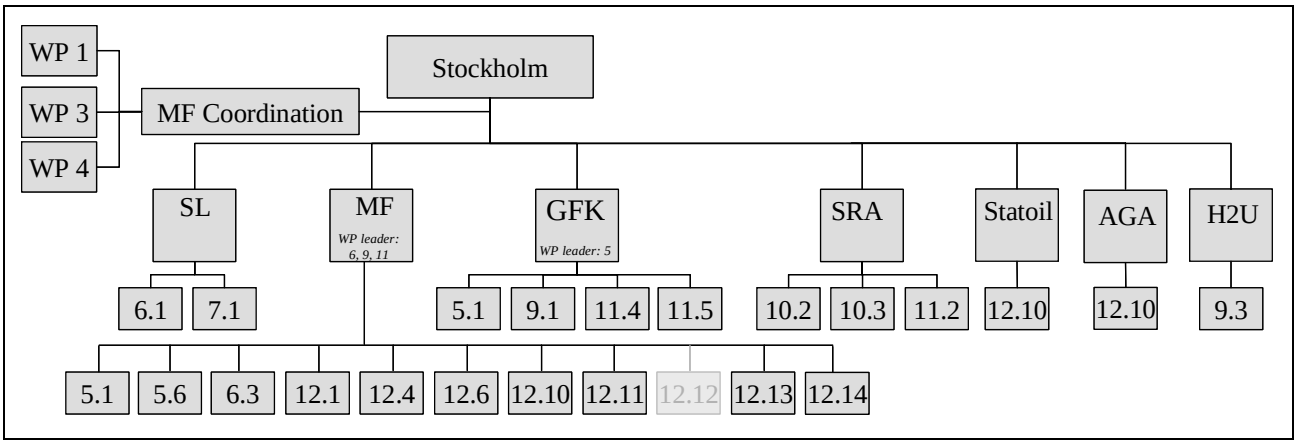

Figure 2. Organisation in City of Stockholm. Measure 12.12 has been merged with 12.11

At the end of the project, GFK was divided into two administrations, i.e. the Stockholm City Traffic Administration (TK) and Stockholm City Development (MK). TK was responsible for measure 5.1, 11.4 and 11.5 and MK was responsible for 9.1. Figure above shows GFK as responsible for all these measures, as was the case when the Trendsetter project started.

PART C – Results and Analysis

The target for an increase of clean vehicles was 300 and a number of about 3 000 was achieved (this despite the delayed implementation of the congestion charging and free parking). When these measures will be fully implemented, the number of clean vehicles will be far greater. Recently, the interest for and sales of clean vehicles have increased considerably. For example, the Swedish car manufacturers Volvo and SAAB have started to market and sell new clean vehicles. The contribution from Trendsetter in this respect is clear.

The activities fulfilled within the Trendsetter project in the city of Stockholm have contributed to a number of improvements in the city. In spite of that some of these activities have been delayed, the most important targets have been met.

One important target not fully met has been the increase in number of passengers in public transportation. The target was an increase of 100 000 passengers per day. The result was 72 000. The discrepancy can be explained by that the growth in population was not as great as anticipated and that the implementation of congestion charging was delayed.

The targets to reduce CO_2, NO_X and noise have, in spite of the delays mentioned above, has already been fulfilled.

Regarding the target for particulate emissions, an error in setting the target was made when the project application was formed. Therefore, the numbers shown for this target are unrealistic. Besides that, the decrease in particulate emissions achieved by the Trendsetter project is still remarkable.

In general, the drivers have been satisfied with the biogas-fuelled vehicles. They are quieter when used in confined spaces and in addition, the drivers no not have the nuisance of diesel exhaust fumes as before. The total energy use has increased but the use of fossil resources has decreased.

Finally, the co-operation between the stakeholders in the Stockholm part of the Trendsetter projects has increased. Likewise, the co-operation between the other cities in the Trendsetter project, as well as also other cities outside the project has increased.

5. Indicators

5.1 Indicators and results

Energy

The impact of the measures on annual energy use by traffic – in many of the measures divided into vehicle categories or modes of transport – has been assessed. The energy use should also be divided into total energy use and use of renewable sources. All measures have evaluated the annual energy use.

Environment

This evaluation category Environment consists of four indicators; Emissions of fossil CO_2, Emissions of NO_X, Emissions of PM and noise levels. Below, a short description of each indicator is given.

- *Emissions of fossil CO_2*
  Annual emissions of CO_2 (Carbon dioxide) from traffic, in many measures divided on vehicle categories or modes of transport. All measures evaluate the emissions of fossil CO_2
- *Emissions of NO_X*
  Annual emission on NO_X (oxides of nitrogen) from traffic, in many measures divided on vehicles categories or modes of transport. All measures evaluate the emissions of NO_X.
- *Emissions of PM*
  Annual emissions on PM_{10} (particulate matter) from traffic, in many measures divided on vehicles categories or modes of transport. PM_{10} are particles with a diameter less than 10 µm. All combustion particles are generally smaller than 1 µm. All Trendsetter measures evaluate the emissions of PM. The Trendsetter project limits itself to targets for combustion particles, i.e. particles from the engine tailpipe[3].
- *Noise levels Noise levels in dB(A).*
  Unwanted or harmful outdoor sound, including noise emitted from traffic.

Mobility

The evaluation category Mobility consists of four indicators; Number of trips, Travel time, Quality of service and Acceptance.

[3] It should be noted that there are many other particles from vehicles that do not originate from the tailpipe. Some examples of such particles are clutch and break wear as well as particles originating from the tire and road contact. As many of these particles are larger than combustion particles, they dominate the particle mass emissions.

5.2 Analysis of results on indicator level

Widening of the environmental zone

One of the objectives of this measure was to widen the environmental zone that restricts the access of heavy-duty (< 3.5 tons) vehicles into the inner city. Another objective was to improve the obedience of the environmental zone decree.

The objective of this measure was that it should be widened to include Hammarby Sjöstad. Since the construction of, e.g. about 8 000 new apartments was delayed, the widening of the environmental zone has been postponed into the future.

Eventually, this measure has yielded positive environmental impacts anyway, since the understanding and obedience of the environmental zones already in force, has increased. Also, the acceptance of clean vehicles has increased as a result of this measure. Other cities have gained information from this activity both within and outside of the Trendsetter project.

Congestion charging in Stockholm

The Stockholm trial with congestion charging started in August 2005 by increasing the public transport services. In January 2006, the congestion charging trial enters the next phase (delayed due to legal issues) with actual congestion charging of the traffic to the city centre. Because of the late start, no before/after studies could be conducted within the Trendsetter project. The main impact of the measure has thus been estimated to be:

- Reduced traffic: major reduction (about 30 per cent) in car traffic within the zone in the inner city in the morning and afternoon rush hour.
- Reduced congestion: improvements accessibility within the zone and on major traffic routes. Queues will still occur, but not be as severe as before.
- Reduced emissions: -110 tons of NO_X, -37 tons of PM10 and positive impact (+ in the five-degree scale used in Trendsetter) on emissions of CO_2 in the inner city.
- A transition to more sustainable transportation modes: reduced share of private cars, increased PT, cycling and walking.

The measure has also increased the interest of clean vehicles, though they are excluded from the congestion charges.

Smart card system and integrated ticketing in Stockholm

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.

Since the implementation of the smart card system is delayed, it has not been possible to carry out an indicator-based evaluation of this measure. When the system will be implemented, the energy use and emissions 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 level of acceptance for 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 passenger satisfaction by 15 %. The goal was not reached. SL has achieved 72 000 new passengers and the satisfaction increased by 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 of the passenger's opinion of the public transport system.
- The smart card system was delayed due to miscalculations in the 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.

Reduced parking fees to promote clean vehicles

Measure "Reduced parking fees" is an incentive measure to promote the use of clean vehicle in Stockholm, will lead to more clean vehicles within the inner city. The free parking for clean vehicles is a supportive measure to the measure - Increasing clean vehicle use in private company fleets. Evaluation of the information campaign has not been possible to accomplish, as there has been no campaign due to delayed political decisions. If the project had been implemented, the issue about a definition of clean vehicles in Stockholm would most likely not have been put on the city agenda. The issue has contributed to an increase in knowledge and 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. Recently, the media coverage has increased as well as the awareness among journalists. If this would not have happened, the public perception would have been considerably lower. Today, many believe that they will buy a clean vehicle in 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.

Increasing public transport passengers

The aim of this measure was to increase the number or passengers in public transportation. Quality and quantity surveys, marketing campaigns, travel guarantee and disruption information was some of the tasks implemented to achieve this target.

To reach the Trendsetter goals of reducing the emissions and improving air quality, SL decided that it could be possible to increase the number of passengers by encouraging a shift from cars to public transportation. The reasons for not reaching the goals are several, such as e.g.:

- The population in the County has not increased as much as predicted
- The contractor responsible for the commuter trains did not prepare themselves properly when they assumed the operation in year 2000 from the previous contractor
- The level of satisfaction in information about new PT. The Smart Card System was delayed due to a miscalculated time schedule for preparations before and carrying out the procurement itself. It was also delayed due to internal problems at the Suppliers side, not being able to set up a proper project organisation. Therefore, no survey can be carried out until the year of 2007 when the new system will be in operation.
- The number of satisfied citizens in the County of Stockholm should increase by 4 % from 1998 to 2004. Instead, a decrease of 5 % has been experienced, mainly due to the problems with the contractor operating the commuter trains but also to a raise of the fare in the beginning of year 2004.
- The number of trips per year is measured once a year and the figures are showing that there was a decrease by approximately 0.8 % in the year 2004 compared to 2003.

At the end of 2004, SL could see a clear trend. The number of passengers was increasing and so was 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 had to face even more dismal figures SL will make every effort to keep on the work of 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! Calculating that the average use of a car is about 1.3 persons[4] per car during rush hours and that SL has increased the number of passengers by 72 000 could mean that there are as much as 46 000 cars less in the city of Stockholm as it would have been if all travellers had used a private car instead.

"Construction materials", Hammarby Sjöstad

A new housing area called Hammarby Sjöstad with 8 000 new apartments and thousands of new office spaces is under construction in a former harbour area in Stockholm. The aim of the Logistic Centre (LC) in this area has been to reduce number of transports and thus also the congestion in the area to improve the quality of life for the inhabitants in the area.

Since there is no actual situation "before" Trendsetter, only calculations with estimations and assumptions have been made for that scenario (without a Logical Centre). For the "After" situation, the LC has a computer system that stores data of: number of goods, the receiver and the sender of the goods. Calculations have been made in order to get an

[4] The number of occupants is higher during off-peak hours, i.e. about 1.8 persons.

overview of the total number of arriving transports to the area. Interviews have been made with contractors, drivers and suppliers. In a Master Thesis report[5], the most important results and findings from those studies were presented.

Through this project there has been an reduction in the number of trips within the area by 12 500 during peak periods (2,5 years = 700 days). This implies an average level of a reduction by 20 trips per day during this period. During the 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 between 1 and 5. The working and living environment are valued as noise hours. More accurate would be to look at the reduction of exceeded maximum noise levels as number of times per day. During the highest peak, the LC helped to reduce the number of times exceeding the maximum noise levels (55 dB(A) as a standard limit according to the Swedish Road Administration[6]) were exceeded by 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. 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 by 38 kilometres per day with the LC compared to a situation without the LC. Of the total number of vehicles in the area during the project period, almost half was private cars (= 111). The total number of delivery vehicles are therefore 169 per day, see Figure 3. 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 by almost 1.5 TJ.

"Restaurant supplies", Stockholm

The need of an efficient delivery system within the medieval part of Stockholm was the main driving force behind this measure. The main objective was to decrease the number of small direct deliveries to restaurants and shops in the Old Town through co-transportation with clean vehicles. This would result in an improved environment for inhabitants, visitors and people working in the area.

The expected outcome from the Logical Centre was to increase the number of customers from 14 to 25. By introducing the LC for food deliveries, the transport mileage to the restaurants was expected to decrease by 65 %. The calculations for the LC were based on invoice data from the "O-centralen". The number of stops and cages were calculated for the period from December 2004 until February 2005. The numbers were then multiplied with 4 to get the yearly result. This is because of the short period of time the LC has been

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[5] Ekerlund, S., Stuhrmann, E. (2003) *Hammarby Sjöstad Logistik Center – Samordnad distribution på en byggarbetsplats* Trendsetter Report No 2003:1, Trendsetter internal deliverable No D 9.1.1

[6] More information is available at the Internet site of SRA: www.vv.se.

in operation. The assumptions and emission factors used are the same as in a report from February 2004[7] and are used throughout the whole project.

The results show that the outcome of a LC for Old Town in Stockholm is very good. There is a huge potential in reducing 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. With the LC, the total number of trips is reduced with 9 trips per day and the number of vehicle kilometres is reduced with 6 km per day.´

Make bicycling attractive (B&R information on the Internet)

The objective of this activity was to make the use of bicycles as a transport means more attractive and to make the bicyclists more satisfied with the traffic situation

A digital map with regional cycleways has been made (for the whole county). An improved utilisation of the information available on the Internet has been of great importance. Bicyclist's organisations have been informed about the work on this measure. During the period of 2003 to 2004, adjustments were being made in language and usability of the information on the Internet.

Creation of a visitor web for optimal trip planning

In this measure, a visitor web has been created to enable commuters to plan their trips in an optimal way. The focus in this measure has been on functionality, co-operation, quality assurance and evaluation of the measure.

User statistics was utilised to follow up the strategic goals on a yearly basis and the collected customer knowledge was used to follow up the tactical goals on a yearly basis. Regarding user friendliness it could be mentioned that all results were utilised to improve the website regarding content, design, structure and usability. All results collected were used to improve the user friendliness of the website concerning content, design, structure and usability. By the year 2003, the design was improved considerably. A common logotype (this was to strengthen the trademark) was implemented for the website www.trafiken.nu in the regions/counties of Stockholm, Skåne and Gothenburg.

Inception studies have been carried out to prepare for an optimal trip planning. Numerous complex issues have been identified on the technical level, regarding usability as well as co-operation issues in the integration of several organizations 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. By achieving higher quality of the actual level of service, a more fair comparison between transport types can be made. This has increased the confidence in a dynamic route planner.

Traffic monitoring and supervision

The traffic monitoring and supervision system, MatriX, does not lead to any environmental effects itself, but the access to information provided by this system is a solid ground for effective management of the road transport system, which leads to

[7] Rapport till Miljöförvaltningen, Trendsetter-projektet – 9.3 Logistics Centre of Old Town of Stockholm, Home2You.

positive environmental impact. Indicators within the areas such as energy, environment, mobility and transport have showed positive results. Traffic management is an important measure for increased traffic flow and more efficient use of the space. A better traffic flow leads to positive effects on the environmental. Likewise, the mobility is expected to increase. MatriX has a potential to be an important building block in the whole chain of efficient traffic management. The long-term effects are estimated to be larger than the effects on short-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".

Accessible road network (street) data

The overall objective of this measure was to make it possible to reduce congestion and improve mobility, by providing easy access as well as high quality network data and to compile information about the road situation within the Municipality of Stockholm.

Evaluation of the environmental impacts was carried out through literature surveys and workshops. Implementation of a digital road network doesn't give any environmental positive effects in itself. But when data are linked together, the access to the information will increase and data needed for basic analysis can easily be extracted. The data can be used in a more convenient way for purposes such as better traffic planning, improved information to the public about alternative routes or travelling schemes. The more efficient use of the traffic network, more adequate public information and better planning tools are considered to result in improvements of the total environment.

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 on the systems and use data derived from the system. This does not count those persons using data exported to the Swedish Road Administration. In the context of the project regarding producing public services and integration of additional systems, it is likely that there will be thousands of persons taking part of and benefiting directly form the data that has been collected in the system.

More adaptive signal control in a bus priority system

The objective of this measure was to install a dynamic IT-based bus priority system, with SPOT/UTOPIA-signal installations at eleven intersections. Improved safety and higher level of service were two of the main objectives.

The results from this measure 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 CO_2 and NO_X are based on only the traffic flow. Looking closer into the results from the simulation studies, these show that the number of stops was reduced and the speed was increased by approximately 15 to 20 %, i.e. a completely new traffic flow. This indicates that the potential for control of local emission by using this method is great.

Clean and efficient heavy vehicles

The objective of this measure was to procure 26 clean heavy vehicles. The method used to collect relevant data has been through 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 data or life cycle data.

The consumption of fossil energy was reduced by almost 21 TJ per year. The emissions of fossil CO_2 were reduced by 8 %, i.e. equivalent to 1 329 tons per year. Emissions of NO_X, particle matter and CO were reduced by 50 %. However, the emissions of HC increased by a factor of 20. The main reasons for this increase are the type of engine used and the impact of the catalytic aftertreatment. First, diesel engines are converted to otto engines and the latter category generally has higher emissions of unburned fuel (HC) than the former. Second, the oxidation of methane (CH_4), the main composition of HC from gaseous engines, in a catalyst is more difficult to oxidise than HC emissions from diesel engines. On the positive side it can be noted that the health impact of methane is very low compared to HC from other fuels. However, methane is a more potent greenhouse gas than CO_2, so these emissions must be considered in an evaluation of the impact on global warming.

The cost of maintenance has increased from 0,033 € per km to 0,045 € per km. The increase in cost can be derived from the fact that the biogas engine is an otto engine which needs more maintenance and change of spare parts than a diesel engine. The fuel consumption has increased by 60 % in comparison with the consumption of the corresponding diesel vehicles. This is due to the fact that a diesel engine is more energy-efficient than an otto engine, in particular when the engines are operating at low load. The consumption of engine lube oil has been twice as high in the biogas vehicles compared to the 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 biogas vehicles and a majority of the drivers said that they would recommend other drivers to drive heavy-duty vehicles fuelled by biogas.

Clean municipal fleets

The objective of this measure was to increase the number of clean vehicles in the municipal fleet of Stockholm. Actions have been taken to remove barriers and create incentives to promote clean vehicles. Common procurement of clean vehicles has cut prices for clean vehicles. Information campaigns and seminars have been launched.

The same methodology as for the clean and efficient heavy-duty vehicles was used also in the evaluation and assessment of the clean municipal fleets. The principal evaluation method was questionnaires also in this case.

The total energy consumption was reduced by 20 %. The emissions of fossil CO_2 decreased from 700 ton per year to 561 tons per year. The emissions of NO_X, HC and CO were reduced as well. The average maintenance cost has been 5 % higher for the clean vehicles compared to cars running on petrol mainly because the biogas vehicles needed more maintenance and repair. The fuel cost was 15 % lower for the biogas vehicles compared to petrol vehicles. The cost of ethanol (E85) was equivalent to petrol. The fuelling cost for the electric hybrid vehicles was 30 % less than for the corresponding petrol cars. The clean vehicles have not consumed more lube oil than the 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 % said that they would recommend others to drive clean cars.

Waste collection with biogas-fuelled vehicles

The objective in this measure was to increase the experience and knowledge in the municipality regarding clean waste collection vehicles in Stockholm city centre operated by private entrepreneurs of the waste collection sector.

A questionnaire has been sent out to drivers of the vehicles. Their experiences of the vehicles have then been supplemented with technical data on the vehicles. The period was the years 2002 to 2004.

In general, the drivers have been satisfied with the biogas vehicles. They are quieter when used in confined spaces and in addition, the drivers no not have the nuisance of diesel exhaust fumes as before. The total energy use has increased but the use of fossil resources has decreased.

Improved biogas refuelling infrastructure

The lack of refuelling infrastructure for biogas-fuelled vehicles has been a great barrier. Improving the access to refuelling stations has been the main objective of this measure.

Three refuelling stations have been built in the course of this project. Initially, it was intended that that fourth station would be erected but the fourth station could not be built due to a debate about its location (i.e. near the city centre). The activities carried out within the project have led to an increase in biogas both in Stockholm and in other cities.

Making clean vehicles less expensive

One of the main objectives of this measure was to encourage vehicle manufacturers to produce clean vehicles and to make them available on the Swedish market. 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 addition were two of the backbone tasks of this measure.

The tasks in this measure are interlinked for the city of Stockholm. 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 is rising and it has also been measured through interviews and questionnaires.

- The share of energy from alternative fuels has increased

- Fossil carbon dioxide emission has been reduced
- The number of clean vehicles has increased in private companies and within the public. This project has had an impact of increasing the number of clean vehicles by 206 vehicles. The total increase is a result of the combination of reduced prices and subsidies
- Emissions of particles and nitrogen oxides are approximately the same as those calculated from certification data.

A clean vehicle's mobility is on the same order of magnitude as for a conventional petrol-fuelled vehicle operated in Sweden. Mobility, infrastructure, vehicle range, operational cost, operational safety and comfort are parameters included in the evaluation. Operational costs also include fuel and parking.

Increasing clean vehicle use in private company fleets

The objective of this project was to increase the market penetration of clean vehicles in private company fleets.

The evaluation has taken the "before" and "after" scenarios into account. Evaluations of the indicators have been made annually. The basis for the evaluation was the sales statistics for clean vehicles in the Stockholm County. If the project would not have been carried out, the conclusions are that without active and intense work to increase the awareness of clean vehicles and fuel, the knowledge about these would still have been quite low. As early as in 1994, the clean vehicle project started in Stockholm and many activities were already started at this time. The media and public would still be unaware of clean vehicles, in contrast; today many believe that they will buy clean vehicles in the 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 compared to the previous situation, several models of vehicles are available on the market and additional vehicles will be commercialized. Some of the vehicle manufacturers will commercialise vehicles fuelled by all currently available alternative fuels in near future. In addition, the production of the clean vehicles already in production has increased and prises have started to decrease.

This project has reached good results. The direct achievements are:

- The number of clean vehicles has increased in private companies and within the public. This project has resulted in an increase of clean vehicles by 2.440 vehicles representing different models.
- The mobility is similar for a clean vehicle compared to a conventional vehicle. In that calculation, operational cost, operational safety, comfort, safety and the range of the refuelling has been taken into account.
- The total energy consumption has decreased from 128 to 116 TJ/year. This has been accomplished by using clean vehicles instead of conventional vehicles without negative influence on the mobility. The share of renewable energy consumption has increased steadily during the project years 2002, 2003 and 2004.
- The emissions of fossil carbon dioxide on the vehicle basis have decreased from 186 g/vkm to 87 g/vkm. In this calculation, it has been taken into account that

68 % of the fuel for the vehicle is the alternative fuel and rest of the fuel 32 % is petrol. On the other hand, if 100 % petrol would have been substituted, the fossil carbon dioxide would have been reduced to 53 g/vkm.

- The reduction of CO_2 emissions implies that the total amount of fossil carbon dioxide has decreased by about 5 400 tonnes/year during the project time compared to the use of petrol vehicles only. In this calculation, the emissions during the full life cycle have been taken into account. Calculations of the difference in the end use only (car emissions) indicated that the decrease would amount to 7 800 tonnes/year. The difference is due to that the alternative fuel has a relatively larger impact on the environment in the stages of production and distribution of the fuel compared to fossil fuels.
- The project has resulted in an increased attention in the media compared to the situation a few years ago.
- The primary reason why companies purchase clean vehicles are that they want to test them because they are working actively with environmental issues, are curios or because they want to use them for marketing purposes.
- To convince the companies to choose clean vehicles there has to be additional and stable economical incentives.
- 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 policy. There is lack of policies and guidelines within the company, which leads to a high degree of freedom in the choice of a car. Because of that it is difficult to process common rules within the organisation.

Web-portal for drivers of clean vehicles

The objective of the measure was to promote and make information available and easy accessible on a public web site on the Internet.

After running the web-portal www.miljofordon.se for 18 months, it was evaluated through a questionnaire, distributed via e-mail and network e-mail lists to 500 visitors/users. This was the only way to get a fair assessment of the qualitative measures of interest. To complement the qualitative results, the number 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 these sites was not transparent. 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 everyone interested in clean vehicles (drivers, buyers, vehicle manufacturers, fuel suppliers) would be necessary to support the ongoing development in this area. Regarding this measure, it is not possible to apply a before-and-after perspective.

The aim of the project was to collect, refine and complement the information earlier spread on other web sites and to disseminate comprehensive information on clean

vehicles and related issues, meeting a rising demand in this field. The evaluation carried out in December 2004 showed that the web site had 12 000 visitors per month by the end of 2004 and the number is continually increasing. The visitor's assessments are largely positive and the users are mainly (69 %) buyers or potential buyers of a clean vehicle. The contents corresponds to a very high degree to the visitors expectations and concerning content, it gives them all the answers they need (40 % gave the website the highest possible marks). Another 69 % 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 clean vehicle-projects of the cities. The cities – Stockholm, Gothenburg and Malmoe – sees the project as very successful and they 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

The overall objectives for the city of Stockholm have been fulfilled although several of the measures have been delayed or all tasks within measures could not be implemented. The current assessment is that the targets for these activities will be reached after the implementation and therefore, contributes in a positive way to the objectives of Trendsetter. Some activities are difficult to evaluate in a quantitative way so for this reason only qualitative assessments can be made for several activities. This is also the reason why some activities are described in more detail in this chapter.

A few successful measures and some that has not yet been successful could be mentioned. During the period of the Trendsetter project, the interest in clean vehicles has increased considerably. So far, the number of vehicles is too small to have any substantial impact on air quality or use of fossil energy but nevertheless; the development initiated could have a much greater impact in the future. The year of 2005 could be considered the year of breakthrough for clean vehicles. A number of measures, most of them part of Trendsetter, contribute to this positive trend. Congestion charging, one of the measures that, potentially, could have the greatest impact on congestion, mobility and use of public transportation in the future has been delayed due to legal issues.

In spite of the delay in the introduction of smart cards, this measure has a great potential. The smart cards will lead to significantly improved services for the passengers and a more fair way of paying for the trip.

6.1 Achievement of city objectives

Widening of the Environmental Zone

The objectives of the measure 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 has been postponed.

Congestion charging

The main objective for the congestion charging measure was to prepare the scheme in the City of Stockholm and also to show the potential for it to: reduce traffic intensity on the most crowded 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 CO_2, NO_X and particulate matter; save energy and make the central city more attractive.

Design studies, adaptation of evaluation schemes and several inception studies have been carried out. The congestion charges will be fully implemented in January 2006 and the objectives regarding congestion and environmental issues are then expected to be met.

Smart card systems and integrated ticketing

The main objective for introducing a smart card system in Stockholm was to increase 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 objectives are not met. As earlier described, the number of passengers and the satisfaction has increased, but not as much as expected. Although delayed, the smart card system is considered to have a great potential for the future.

Reduced parking fees to promote clean vehicles

The parking measures all reduce emissions, noise levels and energy consumption within the city centres. Reduced parking fees, as an incentive to promote the use of clean vehicle in Stockholm, will lead to more clean vehicles within the inner city. Due to late decisions by the politicians in Stockholm, the parking measure was delayed. The reduced parking fee is available since May 2005.

Increasing public transport passengers

The survey of the number of passengers, as described in the previous chapter showed that SL did not reach the goal to increase the number of passengers in public transport in Stockholm by 15 % (+100 000), i.e. from 640 000 per day from the baseline year of 1998 to 740 000 per day by the end of year 2004. The reason for not reaching the goal was due to a number of issues. Population growth was less than expected in the County and together with a high unemployment and a raise of the fare are likely to be some of the reasons for not reaching the goal. A number of inhabitants have also discovered the benefits of using the bicycle, which of course affects SL's figures in negative way but is otherwise a positive trend. If the increase of 72 000 passengers is calculated as if all those passengers instead of using the public transport should have travelled by car, there is a decrease of 55 000 cars per year. The average number of passengers per car is 1.3 persons during rush hours, which implies 72 000 / 1.3.

Based on the data above, SL believes that they have contributed to the reduction of both energy use and emissions without having any exact figures to present.

"Construction materials", Hammarby Sjöstad

The Logistics centre in Hammarby Sjöstad was successfully implemented. Measure objectives have been mostly fulfilled. 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 has been considerable savings of energy and emissions during peak conditions. The users are very satisfied. There has also been considerable reduction in thefts, losses and damaged materials.

Both living and working environment has been estimated to having improved considerably with the LC compared to the situation without it. (This is only a calculation, since there is no comparison with a situation without the LC.) The LC helped to reduce

the number of vehicles and to decrease the traffic jam. That is the main reason for the good results achieved.

“Restaurant supplies”, Old Town

The project was delayed and it was hit by several setbacks. The original plan was to use an electrical truck for the delivery of goods. 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 electrical. The delivery time was long and an ordinary diesel truck had to be used in the meantime. After some time of using the logistic centre it became obvious that the ordinary delivery timeframe in the area (i.e. 6 am to 11 am) was not long enough. Therefore, an application for exemption from this rule was made. Waiting for the outcome of this application put the LC in an uncertain and problematic situation. The project could not take on any more customers because the capacity for delivering the goods was not sufficient. This makes the marketing campaign hard. Having just a few customers, it was difficult to achieve the objectives for impact on environment and efficiency. 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. Those deliveries were not consolidated with other customers but the vehicle was fully loaded in spite of that.

In January 2005, the LC did get permission for exemption of the delivery timeframe. The number of restaurants has increased steadily and it is now (spring 2005) in the order of 30 to 35, which provides a good potential for the future.

Make bicycling attractive (B&R information on the Internet)

The objective of this activity was to make the use of bicycles as a transport means more attractive and to make the bicyclists more satisfied with the traffic situation. By encouraging more and more commuters to change from other transport modes to bicycling, improvements of the environment such as reduced energy consumption and less noise and exhaust emissions. The project has been successful and all targets have been reached.

Creation of a visitor web for optimal trip planning

All the targets have been achieved. However, it is difficult to make a qualitative estimation of how great the environmental gains have been. The activity has led to that commuters can plan their trip more effectively. The information provided at www.trafiken.nu has also become more reliable and the accessibility has increased. Support for planning of the route and estimating travelling time is available already today.

Traffic monitoring and supervision

The objective of the measure about traffic monitoring and supervision 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 possibilities to optimise and balance traffic flows on various main roads, reduce the 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 objective to implement a real-time multi-modal transport model that is intended to serve as a platform for a traffic management system is still valid and it is in progress in other projects outside of Trendsetter. The objectives were partly fulfilled. The measure was delayed due to financial cutback and opening of a large tunnel system in southern Stockholm that affects the traffic flow.

Due to the construction work on the Southern Link, additional work has been necessary to carry out, since the model had to be adapted. It will take some time for the travellers to find new routes but after a while, a new equilibrium will be established.

Accessible road network (street) data

The overall objective was to make it possible to reduce congestion and improve mobility, by providing easy access as well as high quality network data, as to compile information about the road situation within the Municipality of Stockholm. This would be carried out 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 fulfilled. 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. Thus, there has not been enough time within Trendsetter to develop an external interface, but work on this is to be initiated soon. It is already possible to export data to external users and tests of this possibility have already been carried out, for example exporting data to the Swedish National Digital Database and to projects using digital speed limit (Intelligent Speed Adaptation). Everyone who has asked for data has received it from the database developed within the Trendsetter project.

More adaptive signal control in a bus priority system (SPOT-project)

The objective was to install a dynamic IT-based bus priority system, with SPOT/UTOPIA-signal installations at eleven intersections. This aims was to increase the reliability and attractiveness of the bus services and to reduce queuing, which also would reduce pollution. The objectives have been fulfilled.

Clean and efficient heavy vehicles

The objective to procure 26 clean heavy vehicles has not been fulfilled within the project time. Two vehicles are missing compared to the plan. However, in the near future, more than 200 new heavy-duty clean vehicles will be put in operation. The clean vehicles have contributed to a reduction of noise and exhaust emissions such as NO_X, PM, CO as well as use of fossil energy and emissions of CO_2.

Clean municipal fleets

More than 200 clean vehicles have been purchased and some 50 % of these vehicles are comprehensively monitored by the use of questionnaires one to two times per year (manually recorded data: distance travelled, fuel consumption petrol/alternative fuel, service/maintenance events). Performance reports are written about the vehicles (the

drivers' experience, fuel consumption, driving distances and service/maintenance events as well as costs). A survey of the market for used clean cars has been carried out. 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 after 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.

Waste collection with biogas-fuelled vehicles

The objective in this measure was to increase the experience and knowledge of the municipality regarding clean waste collection vehicles in Stockholm city centre operated by private entrepreneurs of the waste collection sector. The objective of the measure has been fulfilled with high satisfaction from the stakeholders involved in the measure. An evaluation of operational use of garbage trucks has been carried out.

Improved biogas refuelling infrastructure

Three new refuelling stations for biogas have been built. The construction of the fourth station was stopped for political reasons. It has been ordered and is under construction but might have to be moved to another location. Because of the delay in building the stations, assessment of the volume biogas sold and experiences of biogas delivery to fuel stations has not been completed. Assessment of increased use of biogas vehicles and increased use in dual-fuelled vehicles has not yet been completed yet. This measure was delayed due to problems of finding an operator for the refuelling stations.

Making clean vehicles less expensive

A common procurement of clean vehicles has been facilitated within the Trendsetter project. Efforts have been made to encourage vehicle manufacturers to produce clean vehicles and to make them available on the Swedish market. The objective to establish a network of clean vehicles by providing subsidies to 100 vehicles was reached and even doubled. Moreover, valuable experiences from the use of the vehicles has been collected, analyzed and disseminated through press releases, newsletter and by publishing this information on a web site. A total of 206 clean vehicles were purchased within the Network of clean drivers. The first 40 clean vehicles were procured by private companies

Increasing the use of clean vehicle in private company fleets

The objective of this project was to increase the market penetration of clean vehicles in private company fleets. It has been shown that the project goals were fulfilled. Today, a large number of the private companies in Stockholm have included clean vehicles in their fleets. Using interviews and questionnaires from the evaluations and research carried out in the project, it has been estimated that approximately 50 % of all major companies have at least one clean vehicle in their fleet.

The awareness of clean vehicles has also been an important issue when the project started and today it is estimated that every private company having an environmental manager have gained considerable knowledge about clean vehicles. This estimate is based on information from large companies in the Stockholm region having 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 regarding clean vehicles in the project show the fulfilment of the goals. Approximately 35 000 m^3 renewable fuel is sold in the region. The volume share of renewable fuel is 2.73 % and calculated on an energy basis that is equivalent to 1.73 %. The reduction of greenhouse gases such as carbon dioxide is estimated to 100 g per vehicle km. It is more difficult to estimate the impact on harmful emissions depending on which fuel the comparison is made with. Generally, NO_X and particulates emissions are decreasing.

Web-portal for drivers of clean vehicles

The web site (www.miljofordon.se) has clearly contributed to the reinforcement of the efforts of Stockholm, and the co-operating cities Gothenburg and Malmoe in the promotion of clean vehicles as a solution for improving environmental impact and reducing energy use.

7. Results on city level

7.1 Common Core Indicators on City Level

In Table 2, a summary of the results achieved has been made.

Table 2. Summary of results in the measures of Stockholm in the Trendsetter project

					Widening of environmental zone	Congestion charging	Smart card system	Reduced parking fees for clean vehicles	Increased public transport passengers	Material logistics centre	Logistics centre for Old Town	Make bicycling more attractive	Visitor web for trip planning	Traffic monitoring and supervision	Accessible road network data	Adaptive signal control, bus priority	Clean heavy-duty vehicles	Clean municipal fleets	Waste collection with biogas vehicles	Biogas refuelling infrastructure	Less expensive clean vehicles	Clean vehicle use in private company fleets	Web-portal for clean vehicles
	Parameter	**Unit**	**Target**	**Reachc**	**5.1**	**5.6**	**6.1**	**6.3**	**7.1**	**9.1**	**9.3**	**10.2**	**10.3**	**11.2**	**11.4**	**11.5**	**12.1**	**12.4**	**12.6**	**12.10**	**12.11**	**12.13**	**12.14**
Reduce	CO_2	ton /year	9 300	10 766	300	↓	(↓)	↓	↓	110	1	↓	↓	↓	2 000	400	1 551	409	165	↓	430	5 400	↓
	Energy	TJ / year		65	2	↓	(↓)	↓	↓	1,5	0	↓	↓	↓	21	5	21	0	2	↓	1	12	↓
	NO_X	ton/year	70	162	30	110	(↓)	↓	↓	0,7	0	↓	↓	↓	9	1	10	0	0	↓	0	1	↓
	PM	ton/year	1 850	41	0.40	37	(↓)	↓	↓	0,0	0,2	↓	↓	↓	0,2	1	0	2.5	0	↓	↓	±0	↓
	Noise		-10	↓	↓	↓	(↓)	↓	0	↓	↓	↓	0	↓	↓	X	↓	↓	↓	↓	↓	↓	X
Increase	PT	#	100 000	72 000	0	12 000	(↑)	X	60 000	0	0	↓	↑	X	X	0	0	X	X	X	X	0	X
	Clean vehicles	#	300	3 000	↑	↑	X	1800	X	0	3	X	X	X	X	X	24	200	8	↑	0	2 438	↑
	Co-operation		↑	↑	↑	↑	(↑)	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑	↑
	Mobility		↑	↑	↑	↑	(↑)	X	↑	↑	↑	↑	↑	↑	↑	↑	X	X	X	X	X	X	X

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.

In the trial with congestion charging, and increase of 100 000 seats in public transportation has been achieved. (SL has estimated that the increase in demand for public transportation due to the congestion charging fees will be 7 %.)

7.2 Potential up-scaling of the measures

Many of the measures implemented could be up-scaled on a local level, implemented in other cities and extended in various ways. For example, environmental zones and congestion charging could be extended both geographically and include other categories of vehicles. Smart cards could be adapted for larger areas and include more services. Free parking for clean vehicles could be extended and the fee for non-clean vehicles could be increased. Internet sites of various kinds that provide more services for cyclists and makes the purchase of clean vehicles easier could be scaled up. The increase in the number of environmentally-adapted heavy-duty vehicles, such as city buses and garbage trucks are examples of measures that could be scaled up if there is a political commitment. Likewise, the number of refuelling stations for alternative fuels could be increased. By using various campaigns, it is probably possible to encourage more private companies to choose clean vehicles as company cats.

There are also examples where measures could be scaled down. One such example is the logistics centre at the construction site at Hammarby Sjöstad. It is not often that such large construction sites are planned but in many cases, similar advantages might be found also on a smaller scale.

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 of experience from working with environmental zones. Stockholm has considered introducing parking ban for vehicles that do not fulfil the environmental zone rules, but a change in legislation is a prerequisite for such a ban. If this can be accomplished, the idea is to let the traffic warden do some of the surveillance work. If the traffic warden can supervise the environmental zone there would 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 fuelled by other fuels than diesel fuel. The environmental zone cities are investigating this but also in this case there is a need to change the law and no decisions have been made yet.

Congestion charging

If the full-scale congestion charging trial gives the forecasted effects, it could be made permanent in Stockholm. A continuation depends, however, on the results from the referendum in September 2006. Due to results from evaluations and the referendum, a renewed scheme might be introduced.

In that case, it is possible that the scheme might be somewhat expanded. It could for example apply to foreign vehicles and include a wider choice of payment methods for the user. The trial will and has already provided valuable information about how to implement congestion charging in a city. Therefore, this measure has good transferability also to other cities that wants to implement this kind of measure.

Smart card

An up-scaling of the smart card system in Stockholm could involve other services, such as 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 has 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.

Reduced parking fees

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 carried out in other Swedish cities for example Malmoe and Gothenburg. The geographical area could of course also be expanded and include the nearby municipalities as well.

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 disturbances, the passengers shall be aware of that within a few minutes. The personnel working at the different depots are introduced to new technologies as well as they are 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.

Reaching out to habitants who recently moved within or moved into 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 the organization. All people being contacted have also been 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 persons 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.

“Construction materials”, Hammarby Sjöstad

To be able to scale up the project it is essential to visualise hidden costs for example transports, theft and damaged goods. Those are the biggest benefits for the contractors and they need to be aware of those to be willing to pay for the service involved in the LC. Since the LC have been dismantled there have been several comments about contractors now understanding that their schedule could not have held the schedule without the

logistics centre and they are now asking for the services again. Those examples need to be showed when starting similar projects somewhere else for marketing purpose.

The project in Hammarby Sjöstad serves as a good example of projects regarding logistics in the construction sector. 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, partly as state-of-the-art in construction business. Construction sites works for a finite period of time and therefore, it is important to solve logistics problems in a way that it is easy to move or dismantle the centre during/after the project. The value-added services regarding storage of materials to reduce theft and damage of goods is very much appreciated at a construction site. Hopefully this project can be copied to numerous other construction sites, but it is important to mention the need involve the entrepreneurs in the project!

"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.

Make bicycle attractive

Many of the activities in this measure are well suitable for transfer to other cities. Bike policy audits, which give guidance to the criteria to be assessed but leaves room to integrate the local circumstances and to develop own actions, is one such example. Bike training in real traffic, speed limit to 30 km/h (might require legal check), displays with feedback on speed, information systems for bike/PT, innovative marketing (with locally adapted attractions) and QM for PT (it might require different criteria) are other activities that could be scaled up. This measure is relatively easy to up scale and it is possible to do it small steps.

Traffic monitoring and supervision

In Stockholm, a number of activities are identified as potential up-scaling factors of the MatriX-system:

- 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 purpose
- Implementation of the control functions in MatriX to be able to manage and balance the traffic flow.
- 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

Accessible road network (street) data

Regarding the accessible road network (street) data, there is no need for up-scaling. The project in not a pilot or test phase, 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.

More adaptive signal control in a bus priority system

Regarding the measures for more adaptive signal control in a bus priority system, the measure in Stockholm is possible to up-scale about ten times during the next years, as the City of Stockholm consist of a number of similar areas near the city centre.

Clean and efficient heavy-duty vehicles

The local public transport company, SL, has decided to procure 100 biogas 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 company's ultimate goal is that all buses should be clean. A common co-ordinated procurement of ethanol-fuelled buses is planned in order to reduce the prices. Several stakeholders around the world are likely to take part in this procurement process.

According to the latest (summer 2005) available information from the participants in this measure, other European cities are interested in participating in the co-ordinated common procurement of ethanol-fuelled buses.

Waste collection with biogas-vehicles

In the Trendsetter project, 11 biogas-fuelled vehicles have been operated. It is possible that all 85 waste collecting vehicles in the city would be biogas-fuelled in the future. This would lead to further reductions in emissions of CO_2, NO_X and PM.

Improved biogas refuelling infrastructure

AGA Gas has plans for building another 15-20 fuelling stations for biogas in central 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 biogas at the moment but there are plans for building stations even there.

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.

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.

Web-portal for drivers of clean vehicles

A lot of information on clean vehicles, facts about fuels etc is common for all European member countries, but national web sites are necessary. A valuable up scaling 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

7.3 Conclusions – Up scaling

Environmental zones are well established measures that can be recommended to other cities who want to reduce traffic with heavy-duty vehicles, emissions of particulates, NO_X and noise in city centre. Environmental zones can be implemented successfully using a step-by-step method and they can be 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. Information and awareness campaigns are tools to use to get larger impact of already existing measures or to use for up-scaling of the measures. The measures can also be transferred to other cities after analyzing the differences and similarities between the cities. 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.

A possibility for up-scaling of projects is value added services in relation to the consolidation centre. The 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 on their material or theft on the site. In the evaluation of the project, many customers highlighted this opportunity and they valued it very high. This is also a great opportunity for retailers in cities. They have often a very limited storage possibility (due to high rental cost 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.

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 project in the

Old Town in Stockholm has worked with food deliveries but is trying to up-scale the project and to include other types of restaurant supplies.

8. Economical aspects, cost benefit

In summary, a number of economic aspects are of most importance to comment. The initial cost for a smart card system is great but should be covered by an increase in the number of passengers. As anticipated, reduced parking fees result in a reduced income for the city. The cost for a travel guarantee could probably be covered by the increase in goodwill and associated incLarge initial investments have to be made during a start-up phase for logistics centres. Clean vehicles are so far plagued with high investment costs and even the maintenance cost seems to be higher in some cases. Also the incremental cost for fuel infrastructure is an economic barrier for biogas. Establishment of common procurement consortia has a potential to reduce the cost for clean vehicles and create a strong buyer's group.

The cost for a congestion charging system will be high but, albeit that drawback, it is considered to be a very efficient measure for reducing the traffic.

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.

Reduced parking fees to promote clean vehicles

The reduced parking fees for clean vehicles in Stockholm will be a positive incentive to purchase a clean car. Free parking for clean vehicles has not yet been implemented. Implementation will result reduced parking income for the city. 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 € 600 000.

Increasing public transport passengers

The Travel Guarantee initially seems as a cost but the goodwill it creates 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. It is very likely 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.

“Construction materials”, Hammarby Sjöstad

In the beginning the system was sponsored by The City of Stockholm. Initially, 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 LC’s different services it was possible to increase the prices and in the end of the project it was almost break even for the cost/income. The contribution from the city was then about 40 % of the budget. In a continuation of the project, the city contribution is estimated to be nil.

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 service (delivery in time, part deliveries, goods delivered by crane into the building). To get good turnover in the LC the charge for the temporary material storage started after day 4. LC charged the contractor for all this service. Their benefits of the LC were money saved thanks to less traffic jams, less damaged goods etc. Unfortunately those benefits are not always clear to the construction companies.

The delivery companies were one of the big winners of this solution, because the contractor didn’t charge them. A contact between the LC and the contractors was entered and each user was receiving a monthly invoice according to the service used. The practical operation of the LC was performed by a subcontractor hired and funded 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. In the beginning the subcontractor got a large part of the income until break even when the city received a larger part of the profit.

“Restaurant supplies”, Stockholm

The state of uncertainty and the complications in the project caused a troublesome economic situation and it is difficult to draw any final conclusions about the project and its economy. On a long-term horizon, the expectations are that the incomes will correspond to the costs and that the project will be self funded. For the project to reach break even and enable it to use the LC as it was meant to be, it is necessary to have all those three suppliers as customers (There is a total of ten suppliers in the area and there is a possibility that more will join the project later). Then it will be economically possible to staff the LC at daytime and the real co-ordination would start from that point. The investment costs have been very high. This project has provided H2U with some positive economical contribution margin; 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 the preparation of reports.

Make bicycling attractive and Creation of a visitor web for optimal trip planning

No particular cost-effectiveness analysis for these measures has been carried out. However, since the cost of these measures is moderate, it is likely that the cost-effectiveness is high.

Traffic monitoring and supervision (11.4) AND Accessible road network (street) data (11.5)

The timing of “More adaptive signal control in a bus priority system” was not within the optimum normal investment cycle of traffic control equipment 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. Considerable new equipment in this area, mostly traffic controllers, has been exchanged over the last years in order to renew the stock of equipment and to replace obsolete technology. Both these circumstances lead to hesitation, as these investments needs to pay off before planning for their replacement.

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 a government that have been able to understand all positive effects that might, and hopefully will, come from this project.

Clean and efficient heavy vehicles

The incremental cost for investing in a biogas bus or heavy vehicle like a lorry is SEK 300 000 to 500 000 (€ 33 000 to 55 000) compared to a conventional diesel-fuelled vehicle. Also the biogas fuel is more expensive than diesel fuel. Even the cost for maintenance seems to be somewhat higher.

From a strict commercial point of view, the biogas-fuelled heavy-duty vehicles are more expensive to operate the conventional diesel-fuelled buses. If “Polluter Pays Principle” would be used concerning the societal of pollution, noise etc would be added, it would be the other way around. It is necessary to reduce the biogas cost and/or to have a higher price on diesel fuel. This might very well be the case in the near future since the price of crude oil most probably will rise. To make biogas-fuelled heavy-duty vehicles more competitive, it is also necessary to reduce the incremental vehicle cost.

Clean municipal fleets

Investing in clean vehicles is more costly than buying conventional cars. The incremental cost varies from model to model but it seems that electric and electric-hybrid models has the highest incremental costs and that ethanol vehicles have only minor incremental costs. Also the maintenance costs seem somewhat higher for clean vehicles. This concerns electric and biogas cars in particular. As far as fuel cost is concerned, electric and electric hybrids have a lower cost than petrol while biogas and ethanol has roughly similar cost compared to petrol. All together it is obvious that most clean vehicles are more expensive to own and operate compared to conventional cars, at least from a strict commercial point of view. If the fuel would be priced according to the principle “Polluter Pays Principle”, it might be vice versa. A real breakthrough on the market for clean vehicles is likely to occur within a few years when the price of fossil fuel increases and the incremental investment cost will be reduced.

Waste collection with biogas-fuelled vehicles

It is more expensive to operate the biogas vehicles. The cost of the biogas vehicle (~ SEK 1.3 million, i.e. € 140 000) is approximately 30 % higher compared to a conventional garbage truck (~ SEK 1 million, i.e. € 110 000). The cost of using diesel fuel is about half of that of biogas. The oil consumption was initially very high, up to 14 liter/1000 km. This was due to a defect in the positive crankcase ventilation system of the engine. After modifications of this system, the oil consumption was similar to the diesel vehicles. The total energy consumption has increased by 40 % due to that the biogas engine, which is an otto engine, has significantly lower efficiency at low engine loads. The long periods of idling and having short distances in between the stops implies a very low load on the engines. The maintenance cost has increased from 0,033 Euros/km to 0,045 Euros /km. The increase is a result of the change from a diesel engine to an otto engine. Otto engines need more service and change of spare parts.

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 biogas vehicles has developed further, which might take some 5 years or more, it is necessary to support the market regarding its infrastructure. The market for biogas production and distribution, as well as for biogas vehicles, would probably increase considerably if the fossil fuels were priced after the principle “Polluter Pays Principle”.

Making clean vehicles less expensive

Due to the common procurement the buyer consortium was offered higher discounts than before. The cost reduction was 2 to 3 %. Companies owning large vehicle fleets have chosen clean vehicles instead of conventional vehicles. Using 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 subsidies of part of the incremental cost, there are still problems with high purchase cost for biogas and electric hybrid cars in combination with a week second hand market.

Increasing clean vehicle use in private company fleets

As in the case above, there are economic incentives for choosing clean vehicles also for the vehicle fleets of private companies. Reduced taxation, good-will and improved environmental profile are driving forces in this case too. However, there are still problems with high purchase price for biogas and electric hybrid cars in combination with a week market for used cars.

Web-portal for drivers of clean vehicles

The web site has contributed to the decision making 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.

8.1 Conclusions – Economical aspects

The investments in infrastructure and technology can be large, especially for a measure such as congestion charging. Congestions charges are formulated differently in different cities and countries, some-times they are defined as a tax and in other cases as a charge. In the first case, the income belongs to the state and in the latter case it belongs to the municipality/region. Implementing smart card systems necessitates considerable initial investments. The maintenance cost might increase, 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 is reduced due to fewer mechanical parts. Since smart card systems hopefully increases the number of passengers, the revenues increases. Personnel cost 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 provide positive economical incentives for car owners. The city revenues will be lower due to the reduction. The costs for the systems are reasonable.

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 economic support and that the project has not been able to be self-funded and create a critical mass during the project period.

A conclusion that can be drawn from these two projects and the Trendsetter projects is that initiatives made by private companies are more valuable than public initiatives. Both are needed, but the greatest part of the interest must be from the private company.

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.

There are also other factors of importance, such as less congestion and thus, time savings or a reduced need to repair roads that leads to economic gains. However, these gains are very difficult to quantify.

9. Synergies between measures

9.1 Overview of synergies within the city

In Table 3 an overview of synergies between the measurements within Stockholm part of Trendsetter are shown. The matrix shows the “Effects” in a qualitative marking on the strength of the synergy, where 1 is the highest marking.

Table 3. Overview of synergies

	5.1	5.6	6.1	6.3	7.1	9.1	9.3	10.2	10.3	11.2	11.4	11.5	12.1	12.4	12.6	12.1	12.1	12.1	12.1
5.1 Environmental zone (TK)													2		2				
5.6 Congestion charging (MAK)				1	1		2	2	1	2				1				1	
6.1 Smart cards (SL)					1							1	2						
6.3 Free parking (MF)									2					1		2	2	1	2
7.1 100 000 new customers (SL)									1			1							
9.1 LC Hammarby Sjöstad (TK)							1												
9.3 LC Old Town (H2U)													2		2	2			
10.2 Bicycle web (VV)									1		1	2							
10.3 www.trafiken.nu (VV)										2	2	2							2
11.2 MatriX (VV)											1	1							
11.4 Road network (TK)												1							
11.5 Bus priority (TK)																			
12.1 Heavy-duty vehicles (MF)														2	1	1	2	2	1
12.4 Municipal vehicles (MF)															2	1	1	2	1
12.6 Garbage vehicles (MF)																1	2		2
12.10 Biogas refuelling (MF)																	2	1	1
12.11 Affordable vehicles (MF)																		1	2
12.13 Company fleets (MF)																			1
12.14 Web-portal (MF)																			

Same as on upper side of the diagonal

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

- Improved public transport. 200 new buses have been purchased for meeting the increased demand from former private car commuters. These buses will be part of 12 new bus routes. 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. Since Stockholm choose to have a trial and a referendum before making the congestion

charges permanent, the costs will be higher compared to a scenario without the trial period.

The smart card system is one component in achieving an attractive and competitive public transport alternative. The attractiveness increases when using a standard on the smart card that is common in the surroundings of the County/Country to achieve a seamless travelling without boundaries for the passengers. The reduced parking fees for clean vehicles in Stockholm was a supportive measures to other Trendsetter measures, Clean Public and Private fleets, Increasing clean vehicle use in private company fleets, Web portal for clean vehicles, Improved biogas refuelling structure, Making clean vehicles less expensive. A political long-term strategy for clean vehicles would help to make the measure more successful. There are often opportunities for synergies when starting real life practical projects, especially if there are many projects of the same type and projects with the same kind of objectives within the same area or region. The projects themselves create possibilities for other actors. As in the case with making clean vehicles less expensive the same conclusions are valid also to increase the use of clean vehicles in private company vehicle fleets. Development of the refuelling infrastructure in combination with more vehicle models at lower prices will be necessary to create a market breakthrough.

9.2 Conclusions – Synergies

Different kind of measures often requires complementary measures. Therefore a comprehensive view is necessary when a sustainable urban transport system is the target. 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 charges for road use outside of the cities both affect heavy traffic and interact with each other.

Congestion charging should always be part of a package including also improved public transport, park & ride facilities and other measures.

The smart card systems and their related services aim at making using public transportation more attractive. The parking measures in Stockholm are more supportive measures compared to measures aiming at increasing the use of cleaner vehicles.

All measures are part of a broader environment and cannot be implemented completely alone, although the current demonstrations can be rather conclusive. It is particularly important that cars, when promoting public passenger transport, are pushed away from the city in a way that 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.

One of the main synergy effects of this project and other similar project is that the media coverage of the projects helps the citizens etc. to get a better awareness of logistic 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 those questions become more important and up-to-date in those organizations and will be put on the agenda for other measures.

For The Old Town there are also effects like a more pleasant urban environment, a more attractive tourist area and an enhanced access to the area. When it is possible to show good results from one project, it is easier to implement a similar project with similar prerequisites somewhere else.

The Hammarby Sjöstad project serves as a good example of construction logistic projects. The construction business has a history of difficulties in logistics due to 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 partly as state of the art in construction business. Construction sites works for a finite 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 material in order to reduce theft damage and stolen is much appreciated in a construction site. Hopefully other construction sites can copy this project. However, it is important to get the entrepreneurs engaged in the project.

10 Dissemination activities

10.1 Overview and assessment of dissemination activities

In the different projects the results have been spread through seminars, conferences web pages and meetings. In the project “Logistics centre for Old Town of Stockholm” different cases studies have been performed and spread through seminars. A web site has also been an important link to share information in- and outside the project.

European trips have also been made to London and La Rochelle. Stockholm delivered experiences to London and La Rochelle. In Sweden, the project has been presented at a more than 50 different seminars. There is a large interest for this type of activities.

The development of the municipality fleet is monitored twice a year. The results regarding clean vehicles bought fuelling statistics are disseminated throughout the City. The development is also disseminated in the newsletter and on the web site.

The entrepreneurs have been reporting problems, fuel consumption, oil consumption, etc. once every six months. A part of the bus fleet was equipped with advertising for Trendsetter. The measure “Web portal for drivers of clean vehicles” is a pure dissemination project. The dissemination activities undertaken have been the spreading of the web address, and arguments for the advantages a visit would bring.

In the measure “Congestion Charging”, information about the Stockholm trial have been spread through information campaigns, websites (set up for the trial), newsletters, brochures, advertising campaigns, press conferences and in daily newspapers.

10.2 Workshops and meetings

A quantity of meetings has been performed with the police authorities, haulers and others within the frame of the measure “Widening of the environmental Zone”. The measurements “Smart card and integrated ticketing” and “Increased public transport passengers” have participated in two working meetings in Graz, and several internal and external meetings with SL. There have been several meetings with potential buyers of clean heavy vehicles including SL. There also have been several articles in the papers and press releases. The results have been disseminated in a newsletter reaching more than 4.000 stakeholders.

10.3 Conferences, seminars

Measurement “Smart card and integrated ticketing” and “Increased public transport passengers” have participated in the UITP conference in Linköping. Measurement “Logistic centre for Old Town of Stockholm” have taking part in conferences for spreading information about the projects in Gothenburg, CVF hopefully, Amsterdam. Within the measure “Traffic monitoring and supervision” workshops have been performed at both EU- and city-level. Further there were presentations at the Swedish Transport Research Institutes yearly about research within the transportation area, “Transportforum”. The measure has presented articles in newspaper published within the Trendsetter. Presentations were held for environmental politicians in the city of Stockholm and there was a great interest.

10.4 Media activities

In the measure “Logistic centre for Old Town of Stockholm” press releases, inauguration, radio shows etc have been taking place. Both national and local newspapers have been publishing articles about the new filling stations within the measurement “Improved biogas refuelling infrastructure”. Maps showing the locations are being produced and distributed both locally and nation wide showing also the other fuelling stations for biogas in Sweden. Work has recently started in Stockholm to put up signs along the roads and streets showing where to find the stations. In the measure “Congestion Charging”, information campaigns have been carried out with advertisements in local daily newspapers, in the subway and on busses.

10.5 Government local authorities and other cities

The system in measurement “More adaptive signal control in a bus priority system” has been demonstrated for several road authorities from Scandinavia as well as from other parts of Europe.

10.6 Other dissemination activities

A doctor’s degree on the theme of travel guarantee (Sara Björlin, Karlstad University, 2004) has been completed and presented. Before the common procurement in the measure “Making clean vehicles less expensive” was started the procurement manager performed a nation wide information and PR campaign. Leaflets and brochures have been produced and distributed to more than 10.000 companies and organizations. Several meetings have been held to disseminate facts about the procurement. Several dissemination actions to spread the knowledge about the network of clean drivers and subsidies i.e. press release, newsletter to 1300 companies, a national web portal on clean vehicles, as well as direct contacts with potential target purchasers. As a part of the measure “Congestion Charging”, a handbook has been written that will serve as guidance for other cities that are considering using congestion charging. In the handbook valuable experiences and recommendations will be communicated.

11. Assessment of all measures

Measure	**Implementation** (as planned/partly /not implemented)	**Fulfilment of measure objectives** (yes/partly/no)	**Contribution to WP objectives** (yes/no)
5.1	Partly	Partly	Yes
5.6	As Planned	Yes/Partly	Yes
6.1	Not Implemented	No, Due To Delayed Implementation. Fulfilment Expected In 2007 When Implemented In Full-Scale.	No, due to delayed implementation. Contribution in 2007 when implemented in full-scale.
6.3	As Planned	Yes	Yes
7.1	As Planned	Partly	Yes
9.1	As Planned	Yes	Yes
9.3	As Planned	Yes	Yes
10.2	As Planned	Yes	Yes
10.3	As Planned	Yes	Yes
11.2	Partly	Partly	Yes
11.4	As Planned	Partly	Yes
11.5	As Planned	Yes	Yes
12.1	Partly	Partly	Yes
12.4	As Planned	Yes	Yes
12.6	As Planned	Yes	Yes
12.10	Partly	Partly	Yes
12.11	As Planned	Yes	Yes
12.13	As Planned	Yes	Yes
12.14	As Planned	Yes	Yes

PART D - Conclusions and Recommendations

12. Lessons to consider for replication and take-up by other cities

In general, it has been shown that many people initially oppose changes but since the measures have been implemented, the opinion changes and after that, most of them are positive. This statement is valid for, among others:

- Environmental zones
- Logistics centres
- Biogas-fuelled garbage trucks

Another general experience is that it often takes much longer than initially anticipated to implement new measures and that brave politicians that dare to make controversial and unpopular decisions are of great importance.

12.1 Technical issues

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

No major technical barriers have been identified for implementation of smart cards and reduced parking fees, since no totally new technology was used in these measures. Implementing a new technical system, as a smart card system, takes long time. Lack of information - for example when introducing technical systems as a smart card system, Stockholm Transport have been aware of the importance of information to the Public Transport users and have planned for the information in due time.

A driver to implement the Travel Guarantee was the collected experiences from another country similar to Sweden, i.e. Norway. In Norway, the Guarantee was implemented before Stockholm and the public transport users in Norway received it positively. The surveys conducted in Stockholm showed that the two factors of most importance 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 desire the most. No major technical barriers were identified.

The project "construction materials" would never have been initialised without the efforts of city of Stockholm. A major economical risk was taken by the city. To succeed in a project like this, a strong co-ordinator is needed to gather the different contractors and propose targets together. One of the reasons why this kind of solution is not more common is that the (construction) industry is conservative. There is no legal barrier in this project since there are no hampering regulations. But, one huge barrier for understanding of the problem of increasing number of heavy-duty vehicles in the distribution of goods is the transport cost. The actual cost for transportation is rarely mentioned in invoices, but

instead included in the price of the merchandise or product. This can lead to the discontented situation that the customer thinks that the transport is for free. There is a need to put more focus on hidden costs. A better knowledge of logistics and environmental issues would be a good step towards decreasing the barriers for LC projects. The concept of the LC provided 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 financial support is mainly to overcome the conservative attitude and culture within the construction business and to get the project started. One driver in motivating this kind of project and get funding for it is to highlight the possibility of ending the construction project at the planned time and according to the right budget.

The biggest barriers of the project "logic centre in Old Town" have been lack of customer demand and involvement and 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 drivers of the project have been the interest of other groups in the project. Local stakeholders, 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 (Home 2 You), have a genuine interest of consolidation of goods and environmental issues. This is the reason that the project will continue after the Trendsetter project ending. A strong and convinced leading spokesman is needed in a project of this nature. The number of private cars in traffic has grown by about 20 % during the last 12 years. The number of heavy-duty vehicles in the same period of time has increased by 50 %, i.e. a significant difference! This is a driver and an argument for increasing the consolidation of goods and in that way it reduces the number of heavy-duty vehicles in traffic on the roads and in the cities. Food handling creates barriers in consolidation projects. If there is a wish to consolidate food with other types of goods, a lot of special permits, regulations and restrictions need to be considered. The vehicles have 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. IT-connections to customers with the same interface are needed to get a good overview of the flow of goods, deliveries etc. vehicle used in Old Town, Stockholm, is very well suited for transports at narrow streets. This vehicle could be used in many similar areas in Europe.

Developed 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 will decrease. This has led to stress in the organisations of today. A paradigm shift/mind shift is needed in many organizations, to be able too see and work with the possibilities of the new systems. 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 new systems used, i.e. MatriX, have been a barrier. The use of only one supplier for building the main system has been a problem for "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. Working with real time information is a complex task. It is dependent in delivery of data from other systems (sensors e.g.). It is difficult to find errors in the description of road network systems. It is also a problem to control changes

made in other systems that affects the MatriX system (chain reaction that may affect MatriX output badly).

Road operators want to get an overview over the current traffic situation and manage it. Now there are systems available that can provide help concerning this task.

There are no heavy-duty vehicles or trucks fuelled by ethanol available on the Swedish or European market but transit (city) buses. There is only one producer of ethanol buses on the Swedish and the European market at the present time. The incremental investment cost for clean heavy-duty vehicles and the higher costs associated with 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 biogas for vehicles is too limited to allow a large-scale introduction of clean heavy-duty biogas-fuelled vehicles at the moment. Production, distribution and refuelling costs are too high. The insufficient infrastructure of refuelling stations is evident.

12.2 Barriers and drivers for clean vehicle fleets

A barrier for a clean municipal fleet might be the lack of suitable vehicle models (e.g. van or large family car) and/or transmission option (i.e. automatic transmission). The refuelling infrastructure is still insufficient and the insecurity of biogas supply is important for this fuel option. Occasionally the drivers have to drive to several different fuelling stations in order to fill up the tank. Public awareness of clean vehicles is still low and the interest from car dealers and car manufacturers to launch and promote clean vehicles is also low. In addition, the incremental cost is high for clean vehicles. A number of drivers for clean vehicles could be mentioned. A tax reduction for private use of company cars is important. No or reduced parking fee for clean vehicles and/or congestion tax are two other drivers. An increased awareness of the global warming effects and the problems associated with the dependence of crude oil as an energy resource are drivers that have gained more focus today. Finally, environmental requirements in procurement of transportation services set limits that are easier to fulfil with clean vehicles.

12.3 Barriers and drivers for improved biogas refuelling infrastructure may bee:

Probably the most important barrier for an improved refuelling infrastructure is the high investment cost for the erection of a biogas refuelling station. Most operators loose money in the short time perspective. The political decision in Stockholm not to build new filling stations within the environmental zone (in city core) is a barrier. The biogas production cost is still high, which makes the competition with conventional fossil fuels difficult. Drivers for the project are the benefits for using biogas vehicles, e.g. favourable parking conditions and the relief of congestion charging. Additionally, people who drives biogas vehicles and pay taxes for benefit recieve a tax relief. A final driver is lower price of biogas compared to petrol.

12.4 Barriers and drivers for making clean vehicles less expensive and increasing clean vehicle use in private company fleets may bee

Some of the most important barriers are delivery problems due to technical problems of new technology, such as bi-fuel systems and electric hybrid systems, and a weak market for used vehicles creating an uncertainty regarding the depreciation of the vehicles. Additionally, there is a lack of suitable clean vehicles models e.g. vans and large family vehicles, as well as vehicles equipped with automatic transmission and the infrastructure of re-fuelling stations is insufficient. Finally it takes time to reach out to potential buyers and influence the awareness and perceptions. However, the drivers are new attractive high-tech clean vehicle models are available at the market, reduced tax on private use of company cars and possible local incentives as free parking. Other drivers are the increased awareness of greenhouse effect and dependency on fossil crude oil and environmental requirements in public procurements of transport services Also the prejudice against alternative fuels among sales people and the public together with the lack of real long-term political commitments on tax reduction and infrastructure investments are barriers

12.5 Synergies

Se table 4 in chapter 9.1

12.6 Political and Administrative issues

In Sweden, environmental zones were implemented in Stockholm, Gothenburg and Malmoe in 1996 and these cities have been great driving forces. Environmental issues spread the thought and there was a need to get rid of the problem with too old heavy-duty 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 necessity to change the national laws.

Other barriers in Stockholm have been the procurement laws imposed by EU directives and the case law, which has slowed down the implementation process considerably. Also, the uncertainties in Swedish legislation, concerning the formal status of congestion charges have been a problem. When the government found that the charges were to be considered as a state tax, this implied that several national governmental bodies had to be engaged in tax collecting, procurement etc.

A very limited time span, which has been severely strained, has been a problematic aspect of the process. Drivers in the congestion-charging measure have mainly been that a majority in the parliament and in the local assembly have had political concordance regarding the trial. Another positive aspect is that there have been sufficient resources for working with this project.

Lack of acceptance by citizens can make that a measure fail. Lack of political support can be devastating for a measure. 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.

The need for political decisions to implement a measure can be an insurmountable barrier. In other cases, such as the parking measure in Stockholm, it takes much longer time than expected to get the final decision. Stockholm has had great difficulties to estimate the number of clean vehicles that will 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 in political decision making.

The lack of information about fuelling possibilities, Euro standards and other information in the Swedish register of all vehicles will cause problems when special parking permissions for clean vehicles will be issued. 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 several years ago. They apply a system where all clean cars, regardless 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. The lack of national definition of clean cars / non-

polluting cars can be a barrier[8]. To get acceptance of a definition within a city might also be time consuming. Buying a new ticket and payment system is legally very complex and has substantial economical consequences. Lack of European or national standards can be a barrier and delay the implementation of a smart card system

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 Logistic centre in Old Town, Stockholm, has emerged in the discussion among local NGOs, politicians, officials and a small/medium sized company. Among them there is a high acceptance of the project, but it has not emerged from the demand of the actual customers. These are the restaurants and their suppliers who have not been part of the discussion. 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 receive a change in structure.

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 could be considered. An arrangement could also be that the town has a communication partner for discussions and decisions. A lot of time is often spent by searching for the right partner to communicate with.

A strong, devoted and committed leader for the projects is needed to gain success. It could also help that a company with a known name and logotype are driving the marketing campaign. Customers tend to trust established companies with a trustworthy competence more than newly formed organisation in new types of services.

12.7 Economical issues

A barrier for environmental zones is that road carriers often only see the increased cost and therefore argues against implementing the measure.

There is a risk for increased costs when implementing smart card systems. The initial investments are large. Implementing the smart card system might also increase the total maintenance cost even though the cost per unit decreases but the number of units increase substantially. It depends on the current situation and what system will be implemented.

[8] Note that, as previously mentioned, the Swedish Road Administration is preparing a national definition for clean vehicles to be used in vehicle purchasing.

Smart card system and integrated ticketing can increase the number of passengers and thereby increase the revenues from tickets. Some investments are significant, even if depreciated over a long period of time. Decisions may require progressive implementations and must often be validated by pilots to demonstrate economic feasibility and viability.

Value-added services are a good extra profit for consolidation and logistic centres. The material logistic centre at Hammarby Sjöstad offered their customers a storage function that was highly appreciated. This helps avoiding thefts, destruction of material by weather or other issues, e.g. loss of materials etc. A considerable amount of money was saved by the contractors by using this facility.

For a small/medium-sized company such as H2U (Home 2 You) it is difficult to take a lot of economical risks and big investments. It is also difficult for a small company to co-operate with big political bodies as the city or its departments and staff. It is difficult for the parties respectively to understand each other's problems. It becomes easier if the city takes the responsibility for the project, calls it theirs and 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 incremental costs related to environmental or other expenses it becomes easier for the small company to continue.

13. Recommendations to decision makers

Based on the results of the measures implemented in this project and additional outcome and experiences, the following recommendations to decision makers can be made:

- One important issue is the ability of daring to take difficult decisions and stand by them.
- Long-term strategies. Work for common definitions both for clean vehicles and smart cards, which are valid for varied purposes and broad geographical areas.
- Environmental zones, incentives, congestion fees (charges) and free parking places are important tools for the introduction of clean vehicles.
- A good traffic control management and different types of information channels are important in order to both increase the accessibility and the number of passengers choosing PT and bicycle over private cars.
- A better infrastructure of refuelling stations with alternative fuels increases the use of clean vehicles (both light vehicles, buses and heavy duty vehicles)
- The citizens are often opponents in the beginning but are changing opinions when the measure in question has been implemented.

Appendix 1 – List of Trendsetter measures

The implemented measures in Trendsetter are listed below.

Work Package	Subgroups	No	Measure	City
WP5 Access Restrictions	Environmental Zones	5.1	Widening of the Environmental Zone	Stockholm
		5.2	Widening of Environmental Zone for vehicles > 3.5 tons	Prague
		5.6	Congestion charging	Stockholm
	Strolling zones	5.3	Implementation of strolling zones	Graz
		5.4	Establishment of a car-free zone in the inner city	Pecs
		5.5	Preparation of a new traffic and transport strategy	Pecs
WP6 Integrated Pricing Strategies	Smart Card Systems	6.1	Smart card systems and integrated ticketing	Stockholm
		6.2	Smart card systems and integrated ticketing	Lille
	Parking	6.3	Reduced parking fees to promote clean vehicles	Stockholm
		6.4	Integrated pricing strategy for parking zones – differentiation between polluting and non-polluting vehicles	Graz
		6.5	Establishment of a zone-model parking in the central city area	Pecs
WP7 Public Passenger Transport	Information to passengers	7.1	Increasing public transport passengers	Stockholm
		7.5	Customer friendly stops for bus and tram	Graz
	Public transport safety	7.2	Public transport safety	Lille
	PT intermodality	7.3	Intermodal local/regional transport interchanges	Lille
		7.4	Seamless linkage of modes	Graz
		7.6	Park and Ride facilities	Lille
		7.7	Linking different ways of public transport	Prague
WP8 New Forms of Vehicle Use		8.1	New services and services for special customer groups	Graz
	Car pooling/sharing	8.2	Company mobility plan in the administration fleet	Lille
		8.3	Increasing car occupancy	Graz
	Awareness rising	8.4	Site level Mobility Management	Graz
		8.5	Urban Mobility Plan	Lille
WP9 New Concepts for the Distribution of Goods		9.1	Material logistic centre – to optimise freight deliveries at construction site	Stockholm
		9.2	Distribution of goods - Green city logistics	Graz
		9.3	Logistic centre for Old Town of Stockholm	Stockholm

Work Package	Subgroups	No	Measure	City
WP 10 Innovative Soft Measures	Bicycle measures	10.1	Innovations in bicycle transport	Graz
		10.2	Make bicycling attractive (B&R information on the Internet)	Stockholm
	Trip planning	10.3	Creation of a visitor web for optimal trip planning	Stockholm
		10.5	Marketing/information and quality management	Graz
	Awareness of clean transport and safety	10.6	Awareness for speed reduction and less car use	Graz
		10.4	Taxi drivers as information multipliers for clean transport	Graz
WP11 Integration of Transport Management Systems	Traffic information	11.2	Traffic monitoring and supervision	Stockholm
		11.3	Dynamic traffic management system	Graz
		11.4	Accessible road network (street) data	Stockholm
	Improving PT traffic flow	11.5	More adaptive signal control in a bus priority system	Stockholm
		11.6	More adaptive signal control in a bus priority system	Prague
		11.7	High level service bus routes	Lille
		11.1	Technical basis for an efficient customer focussed operation and information	Graz
WP12 Clean Public and Private fleets	Heavy vehicles	12.1	Clean and efficient heavy vehicles	Stockholm
		12.2	Biogas bus fleets	Lille
		12.3	Clean and user friendly bio-diesel bus fleet	Graz
		12.6	Waste collection with biogas-vehicles	Stockholm
	Light vehicles	12.4	Clean municipal fleets	Stockholm
		12.5	Clean municipal fleets	Lille
		12.7	Bio-diesel taxi fleet and bio diesel service station	Graz
		12.11	Making Clean Vehicles less expensive	Stockholm
		12.13	Increasing clean vehicle use in private company fleets	Stockholm
		12.14	Web-portal for drivers of clean vehicles	Stockholm
	Clean fuel distribution	12.8	Optimisation of the bio-diesel collection system	Graz
		12.9	Analysis of the biogas experience	Lille
		12.10	Improved biogas refuelling infrastructure	Stockholm

Appendix 2 – Wordlist

Acronym	Explanation
CCCI	Civitas Common Core indicators
CIVITAS	“Cleaner and better transports in cities” – An initiative to achieve a significant change in the modal split towards sustainable transport modes
CO2	Carbon dioxide
EC	European Commission
GHG	Green House Gas
ICT	Information Communication Technology
IT	Information Technology
METEOR	Independent EU project that will compare and assess the results from the CIVITAS I projects in a harmonised way.
MIRACLES	Multi Initiatives for Rationalised Accessibility and Clean Liveable EnvironmentS- – A project within the CIVITAS I initiative.
NOx	Nitrogen oxides
P&R	Park and Ride
PM10	Particulate matters, with diameter of less than 10 µm
PT	Public Transport
RKF	Resekortsföreningen I Norden -
SEK	Swedish kronor (1€=9.42 SEK 2005-06-14)
SL	Stockholm Transport
SMIRT	Syndicat Mixte pour I’Integration Reseaux et des Tarifs
SNCF	Société Nationale des Chemins de fer Français
TELLUS	Transport and Environment aLLiance for Urban Sustainability – A project within the CIVITAS I initiative.
TJ	TerraJoule
TOE	Tons of oil equivalent
TRENDSETTER	Setting Trends for Sustainable Urban Mobility
Umweltjeton	Special coin for low pollution vehicles in Graz
UNESCO	United Nations Educational, Scientific and Cultural Organization
VIVALDI	Visionary and Vibrant Actions through Local transport Demonstration Initiatives - – A project within the CIVITAS I initiative.
WP	Work Package

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