D3.4.1

Policy recommendations for EU sustainable mobility concepts based on CIVITAS experience

TRT Trasporti e Territorio
CDV Centrum Dopravniho Vyzkumu

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<tr>
<td>BaP</td>
<td>Benzo(a)pyrene</td>
</tr>
<tr>
<td>CBA</td>
<td>Cost-benefit analysis</td>
</tr>
<tr>
<td>CH₄</td>
<td>Methane</td>
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<tr>
<td>CIVITAS PAC</td>
<td>CIVITAS Political Advisory Committee</td>
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<tr>
<td>CIVINET</td>
<td>CIVITAS National Networks</td>
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<tr>
<td>CIVITAS</td>
<td>City-Vitality-Sustainability</td>
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<tr>
<td>CNG</td>
<td>Compressed natural gas</td>
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<tr>
<td>CO</td>
<td>Carbon oxide</td>
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<tr>
<td>CO₂</td>
<td>Carbon dioxide</td>
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<tr>
<td>CPs</td>
<td>Collaborative Projects</td>
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<tr>
<td>dB</td>
<td>Decibel</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>EEA</td>
<td>European Environment Agency</td>
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<tr>
<td>EEV</td>
<td>Enhanced Environmentally Friendly Vehicles</td>
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<tr>
<td>EU</td>
<td>European Union</td>
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<tr>
<td>EU-12</td>
<td>Member States that joined the EU in 2004 and 2007</td>
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<tr>
<td>EU-15</td>
<td>Member States of the EU prior to EU enlargement in 2004 and 2007</td>
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<tr>
<td>EU-27</td>
<td>European Union of 27 Member States (prior to Croatia’s accession in 2013)</td>
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<tr>
<td>FQP</td>
<td>Freight Quality Partnership</td>
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<tr>
<td>GDP</td>
<td>Gross domestic product</td>
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<tr>
<td>GHG</td>
<td>Greenhouse gas emissions</td>
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<tr>
<td>GPS</td>
<td>Global positioning system</td>
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<tr>
<td>ICTs</td>
<td>Information and communication technologies</td>
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<tr>
<td>ITS</td>
<td>Intelligent transport system</td>
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<tr>
<td>LNG</td>
<td>Liquefied natural gas</td>
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<tr>
<td>Lₙight</td>
<td>Night-time noise indicator</td>
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<tr>
<td>LPG</td>
<td>Liquefied petroleum gas</td>
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<tr>
<td>LTZ</td>
<td>Limited traffic zone</td>
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<tr>
<td>MS</td>
<td>Member State</td>
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<tr>
<td>N₂O</td>
<td>Nitrous oxide</td>
</tr>
<tr>
<td>NH₃</td>
<td>Ammonia</td>
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<tr>
<td>NMS</td>
<td>New Member State</td>
</tr>
<tr>
<td>NMVOCs</td>
<td>Non-methane volatile organic compounds</td>
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<tr>
<td>NO₂</td>
<td>Nitrogen dioxide</td>
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<tr>
<td>NOₓ</td>
<td>Nitrogen oxide</td>
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<tr>
<td>O₃</td>
<td>Ozone</td>
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<tr>
<td>P+R</td>
<td>Park-and-Ride</td>
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<tr>
<td>P2W</td>
<td>Powered two-wheelers</td>
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<tr>
<td>Pkm</td>
<td>Passengers per kilometre</td>
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<tr>
<td>PM</td>
<td>Particulate matter</td>
</tr>
<tr>
<td>PM₁₀</td>
<td>Particulate matter with particles with a diameter of 10 micrometres or less</td>
</tr>
<tr>
<td>PM₂.₅</td>
<td>Particulate matter with particles with a diameter of 2.5 micrometres or less</td>
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<tr>
<td>PT</td>
<td>Public transport</td>
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<tr>
<td>R&amp;D</td>
<td>Research and development</td>
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<tr>
<td>RTPI</td>
<td>Real-Time passenger information</td>
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<tr>
<td>SMS</td>
<td>Short messaging service</td>
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<tr>
<td>SOₓ</td>
<td>Sulphur oxide</td>
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<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>Tkm</td>
<td>Tonnes per kilometre</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<tr>
<td>Wi-Fi</td>
<td>Wireless fidelity</td>
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Executive summary

The purpose of this deliverable is to present the main findings made following the evaluation of the CIVITAS Plus Collaborative Projects (CPs). It seeks to identify factors to which increased attention should be paid in forming effective and consistent future strategies to secure a greater degree of sustainability in urban mobility patterns. To aid policy makers this deliverable provides an up-to-date factual basis for debate and puts forward conclusions and a set of recommendations based on the lessons learnt from the CIVITAS Plus edition.

Mobility patterns in European cities: key aspects and perspectives

This chapter provides a comprehensive overview of the main patterns that characterise urban mobility across Europe today, and, bringing together the most up-to-date evidence on modal split and motorisation rate, it seeks to aid understanding of how the demand for transport has evolved over the last decade across individual EU Member States.

In this chapter, the deliverable also provides a summary of the broad spectrum of impacts that both transport in general and mobility at the urban level have on society as a whole as well as on individual citizens. This chapter briefly but comprehensively analyses the principal social, economic and environmental impacts that are generally associated with transport activities and that negatively affect the overall efficiency of the socio-economic system and citizens’ quality of life.

It concludes by looking at the driving forces that are expected to shape the transport sector in the future. A fresh account is given of demographic aspects and spatial structure before progressing on to values and lifestyles; all of these issues are key drivers that are likely to shape the development of mobility patterns. Trends and factors of change as well as their potential impacts are summarised for each of these drivers.

The CIVITAS Initiative: promoting smart measures for sustainable urban mobility

Mastering the challenges posed by current and prospective future developments of the transport system and of urban mobility in particular, requires the adoption of consistent, effective and integrated policies and strategies capable of balancing the evolution in transport demand with the need to safeguard environmental, social and economic sustainability as effectively as possible.

At urban level, the search for increasingly sustainable mobility has been encouraged and facilitated by the CIVITAS Initiative. Launched in 2002, this Initiative is a prominent example of the efforts undertaken by the European Union to offer local authorities concrete policy and financial support in promoting a new culture of urban mobility, where sustainable and affordable urban transport is seen as a major component for making cities dynamic and vibrant environments.

Against this backdrop, this chapter briefly summarises the programme’s history, tracing back the thematic categories and policy measures that have been implemented during its three editions (CIVITAS I, CIVITAS II and CIVITAS Plus).

Specifically for the third and last edition (CIVITAS Plus), this chapter recaps and describes the eight distinctive thematic categories (clean fuels and clean vehicles, collective passenger
transport, demand management strategies, mobility management, safety and security, car-independent lifestyles, urban freight logistics and transport telematics); in total, these eight categories encompass more than 300 measures across the participating 25 cities during the period 2008-2012.

Evaluating for policy development: the CIVITAS Plus experience

One of the core parts of this deliverable is to pull together the main insights gained from the evaluation of the overall effectiveness of the various policy measures implemented in the demonstration cities.

For each of the eight CIVITAS thematic categories (and related policy measures demonstrated within CIVITAS Plus), the qualitative and quantitative information collated through the consolidated framework approach set up by the CIVITAS POINTER project provides an analytical account of the main findings made in relation to the implemented measures. These have been identified and are presented in line with the following three key aspects:

1. an evaluation of results and success factors;
2. an identification of major drivers and barriers that have occurred in the various phases of a measure’s implementation; and
3. a reflection on further upscaling and transferability potentials.

The outcome of this analysis forms the basis for policy reflections and recommendations.

Recommendations for sustainable urban mobility

Based on findings made and experience gained in the course of the CIVITAS Plus edition, a number of recommendations are made to provide guidance for the future promotion of actions and strategies towards an ever-increasing degree of sustainability of urban mobility across Europe.

The three dimensions (environment, economy and society) under which the concept of sustainability is normally defined are used as a framework on the basis of which the contribution that the CIVITAS Plus has made to the promotion of a higher degree of sustainability in urban mobility is analysed.

A further value of the CIVITAS Plus edition lies in the fact that it aids understanding of the variables (and their interplay) that will frame the future development of the European transport policy and, in particular, of their effects at city level in relation to:

- the timings of policy implementation and expected impacts (short, medium and long term);
- the territorial area (metropolitan, urban or local) that has an interest in the implementation of the policy measures; and
- the main stakeholders that are either positively or negatively affected by the implementation of the policy measures.

As a whole, the CIVITAS Plus edition confirms the effectiveness of many of the policy measures implemented. However, fresh research is needed in the future, for example, regarding those measure that still require further and more in-depth technical and scientific
investigation, and those measures that involve new mobility models and lifestyles and call for a new vision of urban mobility services.

Finally, issues such as the development of strategic planning tools and the attention that needs to be paid to participation, sharing and acceptance of the policies implemented are of key importance given that they are a prerequisite for the successful implementation of the policies in question.

This chapter concludes with the presentation of some general but key suggestions of potential areas of future development towards more effective planning with the aim of achieving a higher level of sustainability in mobility and transport.

**Main conclusions**

The final part of this deliverable addresses the legacy left by the CIVITAS Initiative and outlines the way forward in terms of shaping sustainable urban mobility in European cities. In more concrete terms, this chapter looks back at the experience of the CIVITAS Plus edition and summarises the lessons learnt from the participation in the programme with respect to the framework required for implementing sustainable mobility actions, particularly in terms of: context, teamwork, target groups, tools and methodologies.

As the CIVITAS Plus cities have acknowledged, being involved in large-scale European demonstration projects such as those of the CIVITAS Initiative can be challenging. However, participation has continuously provided a unique opportunity to implement large and innovative solutions in the field of sustainable mobility while gaining and consolidating a background of knowledge and skills that, if used coherently, can be of help for future experiences and have a positive influence on future funding.

Finally this chapter goes on to discuss those determinants that most likely play a key role in shaping future planning and implementation of urban sustainable mobility. In this respect, the issues of cultural innovation, smart planning activity and the roles of decision-makers at different institutional levels emerge as priority areas of intervention that cities’ decision-makers will necessarily have to consider.
1. Introduction

Transport has become one of the major issues affecting sustainability in European cities. Although cities are the powerhouses for economic growth and development where around 85% of the EU's GDP is generated, transport systems in cities are increasingly regarded as having reached breaking point. This is not least because more than 72% of the European population lives in urban areas, 40% of total CO₂ emissions and 70% of emissions of other pollutants in urban areas are caused by road traffic, traffic congestion costs 1% of EU GDP and, finally, one out of three fatal accidents – mostly affecting vulnerable road users such as pedestrians and cyclists – occur in urban areas.

Enhancing sustainability of transport activities in urban areas while coping with the emergence of new mobility needs and requirements is at the core of the efforts promoted by the CIVITAS Initiative over the last ten years. CIVITAS aims at achieving a breakthrough on the path to helping European cities achieve a more sustainable, clean and energy-efficient urban transport system, while encouraging a change in citizens’ travel behaviour towards more sustainable modal choices. What makes CIVITAS distinctive in comparison to other programmes concerned with the issue of sustainable urban mobility is its capacity to adopt a flexible and cooperative approach to facilitating knowledge acquisition and transferability.

This report is the conclusive deliverable of the CIVITAS Plus edition, whose purpose is to test and further improve cities’ capacity to understand policy and regulatory frameworks, manage processes, and implement packages of measures that can lead to integrated and sustainable urban mobility. It was written by the CIVITAS POINTER project, which acts as a support action to the Collaborative Projects (CPs) implemented within the framework of the CIVITAS Plus edition.

Evaluation and monitoring are the keystones of the CIVITAS POINTER Project and, relying on first-hand, validated statistical evidence gathered from the cities, this deliverable collates, discusses and presents the results of the CIVITAS Plus cross-site evaluation and policy assessment. These findings support the development of clear European-level policy recommendations, whose implementation and results can potentially be embraced by all European cities and not only by those that form part of the CIVITAS community.

1.1 Objectives of the report

Against this backdrop, the purpose of this report is to create a solid conceptual framework that allows a thorough analysis of those elements whose implementation may secure a successful shift towards more sustainable urban mobility.

This conceptual framework is set out in three analytical steps, as follows:

- Investigation of current mobility patterns in European cities and of key drivers for future development of the transport sector;
- Results that have been achieved through the actions undertaken as part of CIVITAS Plus;
- Recommendations that may be implemented in order to encourage an ongoing shift towards more sustainable mobility and promote the best possible policy environment for the implementation of sustainable mobility policies and measures.
These steps can be translated into a number of questions which this report seeks to answer, i.e.:

- “Which are the most promising policy actions to support cleaner and better transport in cities, in particular in view of the expected future growth in urban transport demand?”
- “What can cities do to support a shift towards sustainable mobility?”
- “On which level (locally, nationally or EU-wide) should these measures be planned?”
- “How can the EU contribute to these measures?”

Based on the research undertaken in the compilation of this report and the results arrived at, policy recommendations are made that can be used as a tool by policy makers on which to base independent action. Equally importantly, these recommendations pay specific attention to the need for setting a mix of policies and measures that operate at different levels – city, regional, national, European – and are capable of creating synergies by combining their positive impact while mitigating any negative effects.

1.2 Structure of the report

Following this introduction, the report is divided into five chapters.

Chapter two introduces key aspects and perspectives that characterise current and future mobility patterns in Europe.

Chapter three briefly summarises the keystones of the CIVITAS Initiative since its first edition (CIVITAS I) was launched and, in particular, presents the evolution that has taken place with respect to the thematic categories of measures for sustainable urban mobility implemented within the CIVITAS Initiative.

Chapter four discusses the experience of the CIVITAS Plus edition, which is the most comprehensive and thematically wide among all CIVITAS editions. This chapter illustrates in detail the results of the evaluation process carried out by the evaluation teams of each demonstration city and further supported by the CIVITAS POINTER project.

This extensive analysis of evaluation results supports a number of recommendations, which are set out in chapter five and which are structured in relation to the most relevant aspects of policy action.

Conclusions on the main aspects, including the main lesson learnt in CIVITAS Plus policy making and the roles of policy actors at different levels (city, country, European), are summarised in chapter six.

The last section lists all the references upon which the report has been based. For the sake of brevity, only references different from CIVITAS Plus deliverables (the main sources used for the analysis) are mentioned also in the text.
2. Mobility patterns in European cities: key aspects and perspectives

With approximately 74% of its entire population (350 million people) living and working in cities of more than 50,000 inhabitants, Europe is one of the most densely urbanised areas in the world and, according to the United Nations (UN World Urbanization Prospects, 2011), the share of urban population is expected to increase further up to 82% by 2050.

Generating about 85% of the EU’s GDP, cities undoubtedly play a crucial role as powerhouses for economic growth and development. In addition, they are places of connectivity, creativity and innovation as well as centres for services, business and culture (EC, 2011c). However, cities' development poses a large number of territorial challenges on different geographic levels, notably the relationship between cities and their peripheral areas or the relationship between cities and the territorial development of the EU as a whole (EC, 2011c).

Transport mobility reflects this duality of advantages and disadvantages of urban areas. While population growth increases the pressure on the supply of transport services, such transport services tend to be particularly well-developed and widespread where population density is high.

Against this backdrop, the analysis in chapter two starts with an overview of the current state of transport and mobility in Europe, and particularly in European (CIVITAS Plus) cities, illustrating the main trends in the modal split and the motorisation rate and providing an understanding of the major impacts produced by transport activities. Also, chapter two is a contribution to recent debates about the future development of mobility, and it provides insights on those factors and drivers that are likely to shape mobility patterns in the future.

2.1 Characteristics of transport demand

Transport is a core component of the European economy. Since 1995 this sector has been experiencing continuous growth (measured in tonnes and passenger kilometres) in line with the development of the GDP (EU, 2013a). Freight transport reached its peak (a 40% increase in comparison with 1995) in the two-year period of 2007-2008, before falling again as a consequence of the economic downturn. As for passenger transport, this has been rising continuously since 1995 with only a small slowdown after 2007.

Passenger cars remain by far the predominant mode of transport globally, as is confirmed by the evidence gathered and presented below in terms of modal split and motorisation rate. Public transport still accounts for rather a small proportion of the overall modal split, even though the general trend seems to confirm that its share remains higher in post-communist countries than in the western EU Member States.

Modal split

Passenger cars dominate the modal split of all inland transport modes, accounting for approximately 84% (measured in passenger kilometres (pkm) for 2011). Powered two-
Cleaner and better transport in cities

wheelers, buses and coaches follow with a total share of 9%, while the percentage for rail transport is reported at only 7% (EU, 2013a).

It is worth underlining that, on average, the share of passenger cars in the modal split has never fallen below 60% in any EU-27 country\(^1\) during the period 2000-2010. This percentage holds true for both the EU-15 and EU-12 Member States, although it should be noted that, in 2000, the EU-15 countries (with the exception of Austria, Denmark and Greece) accounted for a proportion of passenger cars higher than 80%, which was not the case for the EU-12 Member States. Ten years later, in 2010, this scenario has changed considerably as the EU-12 Member States are represented at both ends of the spectrum. Lithuania, Poland and Slovenia rank highest, whereas, conversely, the proportion of pkm for passenger cars is the lowest in Hungary and the Czech Republic (EU, 2013a).

The same domination of cars is also seen at city level (see figure 1). When focusing on CIVITAS Plus cities, the share of cars varies between 76% in Monza and 13% in Iasi, while car dominance (more than 40% of the modal split) is recorded in 14 out of 25 cities.

A share of public transport in the modal split of higher than 40% is reported in Brno, Gdansk, Tallinn, Zagreb, and Ústí nad Labem; all of these cities are located in transition countries. This finding corresponds to the general trend that the share of public transport is higher in post-communist countries than in western EU Member States.

The highest share of cycling in the modal split was measured in Utrecht (21%), Gent (20%), Szczecinek (19%), Iasi (19%) and Aalborg (15%). The highest share of walking in the modal split was reported in Gorna Oryahovitsa (60%), Vitoria-Gasteiz (54%), Iasi (49%), Donostia-San Sebastián (43%), Skopje (33%) and Zagreb (30%).

\(^1\) Data for Cyprus, Malta, Estonia, Latvia and Lithuania are not available for 2000.
Figure 1 Share of passenger transport in CIVITAS Plus cities

Motorisation rate

A high level of ownership of passenger cars, calculated in terms of rate of motorisation (i.e. the number of passenger cars per thousand inhabitants), is indicative of the wide use of individual motor transport. Among the EU-27 Member States\(^2\), the highest motorisation rates were observed in Luxembourg (658 passenger cars/1,000 inhabitants in 2011) and Italy (610 in 2011). Seven more EU Member States (Cyprus, Malta, Finland, Austria, Slovenia, Germany and Lithuania) had rates over 500 – at least one car per two inhabitants – in 2011. The lowest rate was observed in Romania (203 in 2011), which translates to about one car per five inhabitants. The motorisation rate has been increasing since 1990, especially in the EU-12. The highest increase was observed in Poland, where the number of passenger cars per 1,000 inhabitants grew from 261 in 2000 to 470 in 2011, i.e., an 80% increase. Romania followed with a 64% increase (from 124 in 2000 to 203 in 2011). In spite of these increases, the motorisation rate still remains significantly lower in the EU-12 compared to the EU-15.

\(^2\) EUROSTAT 2012a
However, the rate of motorisation in urban areas is usually higher than the national average because of the high concentration of people and cars. Among the CIVITAS Plus cities, the cities with car ownership rates above the EU-15 average are Perugia, Brescia, Monza, Bologna and Ljubljana. Higher values than the EU-27 average were also recorded in Funchal, Gorna Oryahovitsa and Donostia-San Sebastián. Most of the cities reported motorisation rates higher than the EU-12 average, with the exception of Porto, Craiova, Skopje and Iasi.

Figure 2 Car ownership rate in CIVITAS Plus cities

Note: Data for Brighton & Hove, Coimbra, Donostia-San Sebastián and Iasi are available only at the national level (UK, Portugal, Spain and Romania)
Source: Urban Audit / POINTER Interviews with cities; valid for years between 2007 and 2011

2.2 Impacts of the transport sector

The transport sector has a clear and direct impact on sustainability since:

- transport (excluding maritime transport and pipelines) absorbs approximately one-third of the total energy consumption in the EU, and transport energy consumption has shown a continuous growth between 1990 and 2007;
- transport modes are still heavily dependent (97%) on fossil fuels such as gasoline and diesel for their energy needs, while they only rely on a minor proportion of biofuels and electrical energy (1% and 2% respectively); 84% of fossil fuels are imported, and the energy bill for fossil fuels amounted to one billion euros a day in 2011 (EC, 2013a);
- passenger and freight transport accounts for about 70% of the final demand for oil and oil-derived products in the EU;
- a significant proportion of total greenhouse gas emissions (GHG) in the EU-27 originates from the transport sector. In particular, transport is responsible for up to 24% of total GHG emissions (CO₂, CH₄, NO₂) (including international aviation and
maritime transport and excluding land-use change and forestry activities which can eliminate or reduce GHG emissions); and

- the road transport sector represents the largest energy consumer, accounting for 82% of the total energy consumed by transport in 2009. Energy used for air, rail and inland navigation accounts for 18%.

It therefore comes as no surprise that the decarbonisation of transport activities and the subsequent reduction in their adverse environmental impacts has attracted increasing awareness and has become a top-ranking political priority. Policy goals are the achievement of more sustainable mobility capable of mitigating the negative impacts of motorised transport, while not hampering increasing mobility needs.

The 2011 White Paper also stressed that addressing oil dependence is crucial in order to meet rising mobility needs, while securing competitiveness of the EU economy. Although transport has become cleaner over the last few years, greater transport volumes are still responsible for increased oil consumption.

Based on the above, section 2.2.1 covers the main impacts associated with road transport activities on the environment, individuals and society as a whole. Bringing together a broad spectrum of research findings and using the most up-to-date statistical evidence, the first part of this section concentrates on the contribution made by the road segment to climate change, air pollution and noise, and its adverse effects on the environment and human health in general.

Section 2.2.2 analyses social and economic impacts generated by road transport and in particular measured in term of the costs of road fatalities, congestion and oil dependence.

### 2.2.1 Environmental and health impacts

Regarding the environment, climate change, GHG emissions, air pollution, noise, energy supply security and oil dependence are regarded as the most crucial areas of intervention. Climate change and GHG emissions together with increasing oil dependence and energy consumption threaten the world’s natural environment on different levels and on a large scale and consequently affect the world population’s health. At the local level, rising levels of pollutants result in ever-decreasing air quality and growing health concerns in urban areas.

#### Climate change

In compliance with the Kyoto Protocol on climate change, the EU has agreed to reduce its GHG emissions by 8% by 2012 compared to the levels in 1990. Comparing the base year set by the Kyoto Protocol and the year 2010, it can be seen that GHG emissions in the EU-15 have fallen by approximately 15% in all sectors except transport over these 10 years; transport, however, increased by 20% and accounted for over 20% of all GHG emissions. This means that transport is the second biggest greenhouse gas emitting sector after energy and the only major sector where greenhouse gas emissions are still rising.

Urban transport is responsible for a quarter of all GHG emissions from transport. Only in the last few years has the amount of transport GHGs stagnated (see figure 3).
Air pollution

Motorised traffic is responsible for emitting various harmful substances such as particulate matter (PM$_{10}$, PM$_{2.5}$), acidifying substances (NO$_x$ and NMVOCs) and ozone precursors (NO$_2$, SO$_x$, and NH$_3$). In Europe, particulate matter (PM), ground-level ozone (O$_3$), benzo(a)pyrene (BaP) and nitrogen dioxide (NO$_2$) are of particular concern. Transport is a dominant source of emissions in cities, which contributes to negative health impacts.

These are summarised in the figure below.

Figure 3 CO$_2$ emissions from the transport sector in the EU Member States

Note: Excluding indirect emissions from electricity consumption
Source: (EC, 2011)
Alongside the negative effects on human health, air pollution also damages ecosystems; it is estimated that two-thirds of the protected sites in the EU Natura 2000 network are currently under severe threat from air pollution (EEA, 2013).

The impacts of air pollution on the environment depend not only on air pollutant emission rates but also on the location and conditions of such emissions.
THE AIR QUALITY DIRECTIVES

The Air Quality Directives 2008/50/EC and 2004/107/EC set legally binding limits for ground-level concentrations of outdoor air pollutants. Key elements of the EU air quality legislation are:

- **EU limit values**: are legally binding concentration thresholds that must not be exceeded. Limit values are set for individual pollutants and are made up of a concentration limit, an averaging time over which a pollutant is to be measured or estimated, the number of exceedances allowed per year (if any), and a date by which the limit value must be achieved. Some pollutants have more than one limit value covering different endpoints or averaging times. Limit values are legally binding on the EU Member States.

- **Target values**: are to be attained where possible by taking all necessary measures not entailing disproportionate costs. Target values are not legally binding.

- **Exposure reduction obligation**: concentrations are to be reduced by a given percentage depending on the mean triennial PM$_{2.5}$ urban background concentrations from 2008–2010 to 2018–2020.

Observing the trend in air pollutant emissions in Europe, PM$_{10}$ and PM$_{2.5}$ have dropped by 14% and 16% respectively between 2002 and 2011. The following figure shows the most polluted European cities. These are located in Bulgaria, Poland, Romania and Italy.

Figure 5 PM$_{10}$ Annual average, 2010

Analogously, a downward trend is visible over the same period for emissions of SO\textsubscript{X} and NO\textsubscript{X}, which have declined by 50% and 27%, respectively. Emissions of NH\textsubscript{3} have fallen at a slower pace, decreasing by only 7%. Technological advancement, innovation in exhaust gas treatment in road vehicles (brought about by the introduction of EU standards) and improved fuel quality (especially reduced sulphur concentration) are the major reasons for this substantial reduction in air pollutants.

Regarding emissions of ozone (O\textsubscript{3}), most of the cities where ozone limits are exceeded are located in Italy. The highest annual mean concentrations of NO\textsubscript{2} were observed in Italy, Romania and Greece. Among the CIVITAS Plus cities, Porto, Coimbra and Brescia are the most polluted in terms of PM\textsubscript{10}, while Monza, Brno and Ljubljana have the highest values of ozone emissions.

**Figure 6 Number of days PM\textsubscript{10} when concentrations exceed 50 μg/m\textsuperscript{3} in CIVITAS Plus cities (available data)**

![Figure 6](source.png)

Source: Urban Audit

**Figure 7 Number of days ozone (O\textsubscript{3}) exceeds 120μg/m\textsuperscript{3} in CIVITAS Plus cities (available data)**

![Figure 7](source.png)

Source: Urban Audit
Among CIVITAS Plus cities, the annual average concentrations of NO₂ are the highest in the Italian cities (Brescia, Bologna and Monza).

**Figure 8 Annual average concentrations on NO₂ in CIVITAS Plus cities (available data)**

![Bar chart showing annual average concentrations of NO₂ in CIVITAS Plus cities. Brescia has the highest concentration, followed by Bologna and Monza.]

Source: Urban Audit

**Noise**

Motorised traffic (together with airports) is the most significant source of noise that affects people living in urban and metropolitan areas. Almost 70 million people living in agglomerations with more than 250,000 inhabitants are exposed to road traffic noise levels in excess of 55 dB during the daytime, while at night-time the number of people exposed to road traffic noise above 50 dB L_{night} amounts to approximately 50 million.

The WHO Night Noise Guidelines for Europe (WHO, 2009) describe levels above 55 dB at night as “increasingly dangerous for public health. Adverse health effects occur frequently”. More precisely, higher levels of noise can disturb sleep, cause cardiovascular and psycho-physiological effects, reduce performance, and provoke annoyance responses and changes in social behaviour.
2.2.2 Social and economic impacts

Road safety

In 2012, 27,700 people died and nearly 313,000 were seriously injured in the EU-27 Member States as a consequence of road accidents. Statistical evidence collected by the Commission and released in March this year, however, indicates a positive trend as, in 2012, the percentage of road deaths dropped by 9% (equivalent to 2,661 deaths) in comparison to 2011 when the reduction was only 2% down from the number of road fatalities reported in 2010.

At an aggregated level, the largest reduction in the number of road deaths was achieved by the EU-12 Member States after 2004 (-11%), while the EU-15 Member States collectively achieved a 9% reduction in the number of road fatalities (ETSC, 2013).

Looking more closely at urban areas, road safety is influenced by a combination of factors including increasing transport demand, integration of transport into residential areas and increasing shortage of space in city centres (TRIP, 2013a). Almost 50% of all fatalities involve pedestrians and cyclists.

The number of fatalities due to road accidents per million of inhabitants differs substantially from city to city. Six CIVITAS Plus cities have numbers of fatalities per million inhabitants that are higher than the EU-27 average. These are Craiova, Bath, Brescia, Coimbra, Ústí nad
Labem and Skopje. In contrast, the lowest numbers of fatalities per million inhabitants are reported by Porto, Tallinn, Brighton and Hove, Utrecht and Aalborg.

Figure 10 Road safety - fatalities

Note: Data for Donostia-San Sebastián, Szczecinek, Iasi, Zagreb and Gorna Oryahovitsa are not available.
Source: POINTER elaboration - valid for the period 2008-2010

To improve the safety of pedestrians and cyclists, the EU is taking the following three-fold action: first, promoting regulative measures aimed at defining compulsory safety standards for vehicles; second, supporting research projects testing innovative road designs to improve safety; and third, increasing awareness through information campaigns.

Congestion costs

From an economic perspective, the main negative impact of transport lies in the costs caused by congestion. Congestion is the principal transport concern in urban areas since it:
- contributes to GHG emissions, local air pollution, noise, traffic accidents,
- hampers accessibility and, finally,
- adversely affects economic competitiveness, social cohesion and sustainable growth.

While urban congestion mainly depends on car ownership levels – urban sprawl, the availability of PT alternatives and congestion on the interurban network are the result of growing freight demand across specific corridors at their points of intersection with links serving local traffic.

Congestion is now responsible for a loss of 1% of European GDP. Congestion costs are projected to increase by about 50% by 2050 to nearly 200 billion euros annually in the absence of effective countervailing measures such as road pricing.
Energy supply security, oil dependence

Motorised transport has negative impacts not only on climate, public health and the environment but also on the economy. This is because EU transport depends on oil for 94% of its energy needs. According to COM(2013)17 final ‘Clean Power for Transport: A European alternative fuels strategy’, in 2011 84% of oil was imported, with a bill of up to 1 billion euros a day, resulting in a significant deficit in the EU trade balance of around 2.5% of GDP.

As is stated in the White Paper ‘Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system’, if this oil dependence is not addressed, people’s ability to travel could be severely impacted with dire consequences on inflation, trade balance and the overall competitiveness of the EU economy. It is of concern that, although transport has become cleaner, increasing transport volumes (i.e. increased car ownership and vehicle-km) contribute to increasing oil consumption despite technical progress (EC, 2011c).

2.3 Perspectives for future development

Transport behaviour and choice of transport modes are influenced by different factors. These factors evolve over time and involve a number of key developments and trends that are an expression of new and increasingly differentiated lifestyles and working patterns, or seek to respond to the profound changes that are occurring in population structure and the subsequent modification in mobility behaviours. This change in mobility behaviour will determine the emergence of new mobility needs and requirements, while generating the need for adequate and accessible policies that offer equal mobility opportunities to all citizens.

There is a substantial body of academic literature on these issues; in this section we present an overview of the most important points, i.e. demographic changes, spatial structure and behavioural developments.

2.3.1 Demographic aspects

Future projections of demographic trends are the basis of any realistic forecasts of future transport demand, in particular those with a focus on ageing population, migration flows, gender, household composition and labour market trends.

The ageing of the European population is the result of different demographic factors: a decrease in birth rates, increased life expectancy due to medical progress as well as migration dynamics and policies. The overall size of the population is projected to be only slightly larger in 50 years’ time but much older than it is now: by 2060, the median age of Europeans is projected to be more than 7 years higher than it is today, and the number of people aged 65 or more is expected to comprise 30% of the population as opposed to 17% today3.

As far as mobility is concerned, transport supply will need to adapt to elderly people, especially in terms of accessibility, availability of public transport, user-friendliness of payment systems, safety and security.

3(EC, 2008).
The other relevant component of the population structure which has a predominant role in shaping mobility needs over the coming decades is the role of **gender and household composition**. According to available statistics, women adopt more sustainable mobility patterns (such as short journeys, frequent use of public transport, cycling and walking) than men. This does not, however, imply that women prefer to travel in a more sustainable way. In fact, differences in mobility choices could be the consequences of gender differences in the labour market and the division of household tasks: women are still over-represented in lower paid sectors and under-represented in decision-making positions. Parenthood keeps female employment rates down, and women continue to work more unpaid hours than men at home.

According to a study conducted on data from Edinburgh (Ryley, 2005), households with children exhibit distinct travel behaviours: they are highly dependent on cars as the primary means of travel, they own but do not often use bicycles and they favour bicycle trips predominantly for leisure rather than work journeys. Households consisting of students, unemployed people and part-timers without children are most likely to use non-motorised forms of transport. Conversely, families consisting of retirees and high earners are least likely to use non-motorised forms of transport.

The evolution of household and parental models, new developments on the labour market with the spread of new forms of work, increased labour market participation on the part of women, as well as population ageing and new technologies are likely to **increase the variety of mobility patterns** and call for **appropriate transport policies** able to combine attention to sustainability with the consideration of gender- and age-specific mobility needs.

### 2.3.2 Spatial structure

Among the main reasons behind current mobility trends, **spatial distribution** of housing and activities plays a key role. **Urban sprawl** is the main challenge for urban transport as it entails a greater need for individual transport modes and thereby generates congestion, environmental problems and land take for roads and parking areas (EEA, 2010).

In the past, the growth of cities in Europe was driven especially by an increasing urban population. Nowadays, even where there is little or no population pressure in European Member States, a variety of other factors are still driving the development of the modern city: these include individual housing preferences, increased mobility, commercial investment decisions, and the coherence and effectiveness of land use policies at all levels (EEA, 2006).

Notably, recent studies show that urban sprawl, as a dominant trend in the post-war era, is not expected to disappear in the coming years. However, for reasons linked to land scarcity and costs as well as to an increased appreciation of city life, the speed of increase in urban sprawl may decrease. There is some evidence that urban sprawl has already reached its peak in many cities and, in parallel with a reduction in urban sprawl, a certain trend towards re-urbanisation is being observed with inner city areas becoming more attractive to new target groups (e.g., high-income households, small families, older people, etc.).

Inhabitants of urban areas, which are generally congested and have well-developed PT services, are able to re-think their mobility behaviour and abandon car use. Thus, it is to be expected that **urbanisation might be a driver for a reduction in car ownership levels**.
2.3.3 Values and lifestyles

Mobility patterns are also heavily affected by changes in values and lifestyle. However, it is difficult to make future predictions about the intensity and timing with which these will impact on levels and distribution of demand.

Everyday mobility might be reduced given the home-working and home-entertainment options provided by new technologies. In general terms, technological development in general and the diffusion of innovation are affecting almost every aspect of our life (labour, travel, leisure, health, etc.) and have started to change our daily habits significantly. The most pre-eminent role is played by information and communication technologies (ICTs). ICTs, in fact, have a great potential to lessen (and sometimes even eliminate) the conventional constraints of time and space, which are the two physical dimensions that give rise to the need for travel.

Today, many different kinds of activities can be undertaken via the Web (e.g., e-shopping, e-banking, e-booking of different services, etc.). These options are likely to become more and more common in the future and attract an ever-increasing number of users due to the natural decline of digital illiteracy in the population. The diffusion of immersive networking technology, especially among young people, may lead to the development of different sets of mobility preferences of future generations, who are likely to spend more time in virtual spaces. That said, the potential impacts of ICTs on lifestyles and travel demands tend to be educated guesses at this stage.

There is also a silent, though significant, cultural change in habits and lifestyles among the younger generation. A major shift is taking place from the time when the car stood at the centre of youth culture and was viewed as the ultimate gateway to freedom and independence. Today, young people are in fact increasingly viewing cars more as appliances rather than aspirations. Certainly, cars are still essential to drivers of all ages, including the younger ones, but automobiles have gone down in the estimation of younger people.

Factors like the high cost of fuel and insurance premiums, youth unemployment and increasing job insecurity certainly play a role in making cars less attractive to young people, or forcing young people to postpone the use or purchase of cars. Nevertheless, the change is more profound and is ignited by the use of social media that give young people access to new lifestyles and identities that would once have been associated with cars.

There is a good argument that there is a clear interplay between technological development and the emergence of new (leisure and working) lifestyles and values that the increasing and wider use of new ICTs is likely to initiate, accompany and reframe.

To sum up, this chapter has explored a number of variables that might influence the future development of urban mobility towards new travel patterns. These contribute to a complex transport environment where more demanding and differentiated mobility needs will have to be balanced with the increased importance of sustainability.

The analysis of these variables has revealed that all of them could play an important role in reframing future mobility: every domain has relevant driving forces that, either on their own or in combination with others, could substantially impact on transport demand. Predicting the intensity of such impacts as well as their timing is challenging, mainly because the speed in
which such changes might take place is hard to predict and this, in turn, renders the planning and development of future transport systems difficult.

Managing these paradigm changes will require a more holistic approach than the one traditionally used, which should be widened to properly consider the complexity of the system and its interactions with all the domains of human activities.
3. The CIVITAS Initiative: promoting smart measures for sustainable urban mobility

Transport emerges as one of the major issues affecting sustainability in European cities. It has been acknowledged that transport activities produce a range of environmental, social, economic and health impacts that adversely affect society as a whole but also each single individual. The intensity of these impacts is of particular concern at urban level – not least because of high urbanisation that characterises European cities.

Improving urban sustainability has therefore become a primary objective, and action has been increasingly taken at different governance levels (European, national and local) to respond to the need for implementing measures that facilitate a change in travel behaviour and awareness.

At EU level, policy efforts and financial support have culminated in the implementation of the CIVITAS Initiative that, since 2002, helps participating European cities to design, establish and manage innovative and smart measures aimed at greater sustainability of the urban mobility environment.

The purpose of chapter three is to trace the CIVITAS Initiative’s history and to outline how measures progressively evolved across the different editions of the Initiative down to the last CIVITAS Plus edition, which has placed a greater emphasis on the issue of energy saving.

3.1. Overview of the CIVITAS Initiative

The CIVITAS Initiative (“City-Vitality-Sustainability”, or “Cleaner and Better Transport in Cities”) was launched in 2000 by the European Commission as part of the 5th EU Framework Research Programme.

To date, more than 60 European cities have been granted EU funding to implement innovative measures in the area of clean urban transport with an EU-funded investment of 120 million euro. More than 800 innovative urban mobility measures have been designed, implemented and evaluated under this Initiative.²

² Science View Newsletter, September 2013
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Figure 11  CIVITAS demonstration cities co-financed by the EU since 2002

Source: www.civitas.eu

THE CIVITAS WORLD

CIVITAS Forum Network: this comprises more than 200 participating cities. By signing a non-binding voluntary agreement known as the CIVITAS Declaration, cities and their citizens benefit from the consolidated know-how, experience and lessons learnt of each participant in the Forum Network. The CIVITAS Forum Conference brings together politicians and technical experts once a year in one of the Forum Network’s cities.

CIVITAS National Networks (CIVINET)\(^5\): CIVINET has been created as a group of city networks that promote the CIVITAS approach at a local level, thus overcoming language and contextual barriers for local authorities and organisations interested in urban sustainable mobility. Members exchange information in their own language, mutually cooperate, and engage with the European

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\(^5\) At the date of this publication there are six CIVITAS National Networks: CIVINET España y Portugal, CIVINET Francophone, CIVINET Italia, CIVINET Slovenia, CIVINET UK & Ireland, CIVINET Dutch. Some other national CIVINETs are planned to start soon (Slovenia and Croatia, German Speaking, Hungary, Poland, the Netherlands and Flanders, and the Czech Republic and Slovakia) as was presented at the launch of the new era for CIVINETs, CIVITAS City Networks session at the CIVITAS Forum in Brest, October 2013.
Union and national governments on transport policy issues, legislation, regulations and funding. Each CIVINET City Network works independently but contributes to, and takes advantage of, the upper-level cooperation that is established through the entire CIVINET network with the purpose of sharing experiences, learning expertise and spreading each city network’s own approach to the other countries.

CIVITAS Thematic Groups: these have been established for each single thematic category of the CIVITAS Initiative with the purpose of serving as a community of practice. Together they are viewed as the basic building blocks of an integrated strategy leading to the implementation of more sustainable urban mobility. These CIVITAS Thematic Groups consist of a group of peers exchanging experience and knowledge on a specific topic, and each of them has a main contact point as well as links to other city representatives working on the same topic. Forerunners and well-experienced CIVITAS cities in specific areas of sustainable transport can be seen as a source of inspiration for other cities to capture interest, trigger reflection and support an interactive process.

CIVITAS Political Advisory Committee (PAC): its role is to determine policy priorities for cleaner and better urban transport and link these priorities to the current and future work of the CIVITAS Initiative. On these priorities, the PAC produces policy recommendations in the form of short “PAC Notes”. The PAC also proficiently contributes to other EC initiatives, linking them to the CIVITAS objectives. It defines important themes on urban transport policy to be discussed at events such as the CIVITAS Forum and, lastly, it organises the Network’s Annual Conference (including the selection of the host city for this event).

3.2. CIVITAS thematic categories

Since its early stages, the CIVITAS Initiative has structured and promoted its actions around eight thematic categories as illustrated below. This summarises their evolution since 2002 when the CIVITAS I edition became operational.

Table 2  Comparison of CIVITAS I, II and Plus programme thematic categories

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<td>New forms of vehicle use and ownership</td>
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</tbody>
</table>
While remaining substantially unchanged in the first two CIVITAS editions, a review in terms of focus and scope of these thematic areas has occurred with the CIVITAS PLUS edition, which has placed a greater emphasis on the issue of “energy saving”, while still upholding the general CIVITAS framework. It is worth noting that, in this third edition, energy saving spans all eight CIVITAS themes, including in particular clean vehicles and alternative fuels, energy-efficient collective transport, car-independent lifestyles and efficient goods distribution.

In the first CIVITAS edition, measures largely focused on the development and improvement of public transport as well as on the promotion of clean vehicles. In the second edition, most measures concentrated on the development of innovative soft measures aimed at managing transport demand through the introduction of integrated planning strategies. The third CIVITAS edition includes a large share of measures relating to access restrictions and energy-efficient freight distribution (see figure below).

**Figure 12** Number of measures by thematic categories implemented in CIVITAS I, II and CIVITAS Plus

In contrast, the data collected indicate a declining trend for Intelligent Transport System (ITS) measures which have seen their share diminish over the course of the three editions. Finally, public transport is worth mentioning as it broadly remains the main focus of intervention in all participating cities including the smaller ones.
3.3. Demonstrating innovative measures in CIVITAS Plus

With regard to the CIVITAS Plus edition, Figure 13 below shows that the vast majority of measures focus on mobility management by paying special attention to information and awareness campaigns (52 measures). These are followed by three horizontal measures that are dedicated to the promotion of clean vehicles and alternative fuels (42 measures), efficient passenger transport (42 measures) and, finally, efficient goods distribution (49 measures). It is of note that all of them have energy efficiency as their main target.

Final observations of interest may be made with reference to the distribution of resources spent per thematic category. As illustrated in
Figure 14 below, it comes as no surprise that alternative fuels and clean vehicles together with high quality energy-efficient passenger transport are the areas of intervention where, on average, the implementation of measures involves considerable expense.

This is chiefly due to two factors, i.e. the high level of investment needed to explore new technologies in relation to vehicles and fuels, and, just as importantly, the significant level of investment required to introduce innovation into urban PT networks. These two factors are widely applicable and increasingly interrelated.
Over 300 innovative measures have been introduced by 25 cities during CIVITAS Plus in the four years spanning 2008-2012. They are briefly presented and outlined in this section with reference to the CIVITAS thematic categories, while the main results and achievements following their implementation are analysed in the following chapter.

**Alternative fuels and clean vehicles**

Following the EU policy objective regarding clean vehicles and alternative fuels, several measures have been tested: supporting bus companies to renew their bus fleet with clean vehicles and establishing the accompanying infrastructure, adapting the PT fleet to use cleaner fuels like biodiesel, biogas, Compressed Natural Gas (CNG) or Liquefied Petroleum Gas (LPG), as well as equipping vehicles with the latest generation filters or engines (e.g. introduction of Enhanced Environmentally Friendly Vehicles (EEV) with emission standards equivalent to EURO emission standards level V to VI).

Measures can be grouped according to the dominant alternative fuel which is supported or implemented or according to the main effect of the measure regarding the promotion of biofuels (mostly biodiesel or bio-methane in PT fleets), electric vehicles, hybrid vehicles, LPG, methane or CNG (retrofitting); emission monitoring; energy efficiency management; and planning or research.

**Collective passenger transport**

Some measures in this thematic category consist of priority systems for public transport at traffic lights. These are installed in order to detect a bus or a tram approaching a traffic light, ensuring that the vehicles get a green light, if possible, as soon as they arrive at a junction. Others are related to the construction of reserved lanes for PT vehicles; these are segregated lanes exclusively for trams and/or buses before an intersection or along entire sections of the road network enabling PT vehicles to bypass congestion.
Cleaner and better transport in cities

All these can be accompanied by other measures to enhance the practicality and image of public transport, such as an introduction of integrated ticketing systems, real-time information systems (e.g. with GPS and traveller information online and at bus stops), the modernisation of PT shelters, improvement of the connection between different PT lines, improvement of the accessibility of bus stations by foot and by bicycle etc.

**Demand management strategies**

This thematic category includes measures such as the development of regulations for the access and parking of cars in sensitive areas of the city through restriction and regulation of parking space (e.g. using permit systems), pricing of parking spaces, restriction and regulation of access to sensitive areas (like historic city centres) for different user groups, pricing schemes for accessing sensitive areas, and definition of Low Emission Zones which only vehicles meeting defined emission standards are allowed to enter.

**Mobility management**

Measures under this heading include tools such as mobility plans, informing the public, education and campaigns.

**Safety and security**

A large variety of safety and security measures are targeted towards different groups of citizens. Safety is enhanced through the enforcement of speed management schemes; specific efforts are made to provide safe routes to schools, a safer environment for cyclists and pedestrians as well as safety measures for senior citizens.

Security measures consist of providing more secure spaces in PT systems, anti-theft programmes for bicycles, safety monitoring systems etc. The provision of a safe infrastructure is another aspect of this category aimed at prevention of traffic accidents through the application of safety principles on roads. Another pillar of this wide category is the improvement of safe behaviour of traffic users supported through measures like safety training for drivers.

**Car-independent lifestyles**

This category covers a fairly extensive and varied range of measures ranging from car-sharing or city bike schemes that offer alternatives to car ownership for urban trips to holistic transport planning approaches and the promotion of easy-to-use cycling and walking options for a wide variety of day-to-day trips.

**Urban freight logistics**

This group of measures covers the area of freight transport, its organisation in the most environmentally-friendly way as far as the city environment allows; this may include land use solutions or tracking the freight through the city and dealing with deliveries in a coordinated way in order to reduce the number of trips required.

Optimising goods deliveries can be achieved through several types of measures such as initiating a strong partnership between all stakeholders and at least some of the operators, e.g. by creating a voluntary charter to agree on concerted and harmonised activities for goods deliveries within a given city. Furthermore, cities implementing these measures may create logistics platforms which integrate trade, commerce and industry, logistics, services
and freight companies, e.g. within urban distribution centres that offer logistic terminals, room for storage and/or loading bays.

Transport telematics

The aim of measures in this thematic category is to optimise traffic and passenger flows and to improve management of traffic systems. This aim may be achieved through the introduction of various integrated real-time information systems on the traffic situation in urban areas (e.g. concerning parking spaces, congestion or public transport).

This category further includes measures such as integrated control centres using real-time information on vehicle use, car parking distribution, bus headways and passenger flows, or traffic signal control systems adjusted to a current traffic situation. Positioning systems may be used for goods delivery and PT vehicles to detect the exact location of these vehicles; they may also be used for the automatic production of authorised electronic freight documents and reports, status messages, computer-based tools about PT data offering real-time information on PT vehicles to users, etc.
4. Evaluating for policy development: the CIVITAS Plus experience

Within the CIVITAS Initiative, the CIVITAS Plus edition is the most comprehensive and wide. Over 300 measures have been implemented and evaluated by 25 cities with the aim of achieving more lively and sustainable urban environments through the reduction of the negative effects produced by motorised transport.

The evaluation conducted by local teams in the demonstration cities with the support by CIVITAS POINTER over five years of intense activity is at the basis of the results presented here. CIVITAS Plus measures have been evaluated in terms of their overall effectiveness; the common consolidated framework approach on which both impact and process evaluation are built ensures a consistently high quality of cross-site outputs.

In this chapter, the main findings of the evaluation process for each of the eight CIVITAS thematic categories (and related policy measures demonstrated within CIVITAS Plus, see table below) have been identified and presented in line with the following three key aspects:

4. the evaluation of results and success factors aims at identifying the contribution of each policy measure, classified by thematic category, in promoting a model of sustainable mobility in urban areas;
5. the identification of major drivers and barriers that have occurred at the various phases of a measure’s implementation aims at understanding more clearly why measures may succeed or fail; and
6. the reflection on further upscaling and transferability potentials aims at identifying key requirements and opportunities for further local exploitation and cross-site dissemination.

The outcome of this analysis forms the basis for policy reflections and recommendations.
### Table 3  CIVITAS Plus: thematic categories and policy measures

<table>
<thead>
<tr>
<th>CIVITAS thematic categories</th>
<th>CIVITAS Plus policy measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean fuels and vehicles</td>
<td>Vehicle modification or replacement</td>
</tr>
<tr>
<td></td>
<td>Alternative fuels</td>
</tr>
<tr>
<td>Collective passenger transport</td>
<td>Information, ticketing and tariffs</td>
</tr>
<tr>
<td></td>
<td>Accessibility, infrastructure and network</td>
</tr>
<tr>
<td></td>
<td>Public transport fleet management</td>
</tr>
<tr>
<td>Demand management strategies</td>
<td>Parking and park-and-ride</td>
</tr>
<tr>
<td></td>
<td>Regulative measures (access and LTZs)</td>
</tr>
<tr>
<td></td>
<td>Pricing (road charging, rewarding mechanisms and R&amp;D)</td>
</tr>
<tr>
<td></td>
<td>Cycling infrastructure enhancements</td>
</tr>
<tr>
<td>Mobility management</td>
<td>Mobility services</td>
</tr>
<tr>
<td></td>
<td>Mobility plans</td>
</tr>
<tr>
<td></td>
<td>Mobility marketing</td>
</tr>
<tr>
<td></td>
<td>Eco-driving</td>
</tr>
<tr>
<td>Safety and security</td>
<td>Pedestrians and cyclists</td>
</tr>
<tr>
<td></td>
<td>Public transport</td>
</tr>
<tr>
<td></td>
<td>Traffic management</td>
</tr>
<tr>
<td>Car-independent lifestyles</td>
<td>Car-sharing</td>
</tr>
<tr>
<td></td>
<td>Carpooling</td>
</tr>
<tr>
<td></td>
<td>Cycling services (bike-sharing, integration cycles and buses)</td>
</tr>
<tr>
<td>Urban freight logistics</td>
<td>New distribution schemes</td>
</tr>
<tr>
<td></td>
<td>Access restrictions and control</td>
</tr>
<tr>
<td></td>
<td>Freight partnership schemes and driver support</td>
</tr>
<tr>
<td>Transport telematics</td>
<td>Traffic management and control</td>
</tr>
<tr>
<td></td>
<td>PT fleet management</td>
</tr>
<tr>
<td></td>
<td>Parking guidance systems</td>
</tr>
</tbody>
</table>
4.1 Clean fuels and vehicles

37 measures have been implemented in CIVITAS Plus under this thematic category. The majority of these concern the replacement or modification of PT fleet vehicles and/or municipal fleet vehicles (24), while the remaining ones (13) deal with research on future provision of alternative fuels (focusing on strategy and optimisation of the process) or on changing user attitudes towards alternative fuels.

Table 4 Clean fuels and vehicles: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean fuels and vehicles</td>
<td>Vehicle modification or replacement</td>
<td>Gent, Ljubljana, Zagreb, Porto, Aalborg, Donostia-San Sebastián, Iasi, Monza, Bologna, Funchal, Bath, Gorna Oryahovitsa, Perugia, Skopje, Szczecinek, Craiova, Coimbra, Brescia, Craiova</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td>Alternative fuels</td>
<td>Gent, Gdansk, Tallinn, Brighton &amp; Hove, Bologna, Funchal, Vitoria, Brno, Skopje, Coimbra, Brescia</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>37</td>
</tr>
</tbody>
</table>

4.1.1 Vehicle modification or replacement

Results and success factors

The tests conducted on public fleets using new vehicles have shown fairly positive impacts on the environment. Results differ a lot in relation to the technology tested: assessment of CNG use in buses revealed a significant reduction in particulate emissions and indications that CO₂ and NOₓ decrease, while CO increases. For buses using LPG, the results for emissions were slightly different, with a marked increase in CO₂ but a decrease in CO, NOₓ and PM.

The results support conclusions from previous CIVITAS editions, that the use of alternative fuels has great potential to reduce vehicle emissions and is an attractive option for PT operators. However, investment costs are generally high, especially for those fuel types which require the building of new refuelling stations. The successful introduction of alternative fuels depends on issues of taxation, legislation and regulation, supply reliability, and general technical and operational competency.

From an economic perspective, additional efforts are needed to further exploit benefits while curbing the level of expenditure. There are significant investments required. Maintenance costs for the introduction and running of clean vehicles (hybrid in particular) are significantly higher than those for traditional vehicle types, and clean vehicles are only rarely (e.g. in the case of CNG vehicles) found to justify the investment. In this context, hybrid vehicles are of particular interest as they have great potential to reduce fossil fuel consumption and environmental emissions in the long-term. In terms of cost, the retrofitting of buses to use dual-fuel was found to be a cost-effective way of extending the life of buses currently in service while, at the same time, lowering emissions.
Drivers and barriers

A strong political will to implement and support these measures is a major driver, together with a set of organisational factors aimed at fostering and smoothing the process of implementation. Barriers are more diverse and are concentrated especially in the planning and preparation phase: technological gaps, absence of legislation, lack of political support and proper planning.

On the technological side, an intense knowledge of these issues and experienced staff play a key role as drivers (or, conversely, as barriers). The success of these measures substantially depends on the general technical and operational competency of the people implementing them.

Upscaling and transferability

For those applications that proved to be more effective in terms of results (retrofitting and use of some specific biofuel blends), upscaling is crucial: apart from testing a small number of innovative vehicles, the real challenge lies in the roll-out to the whole PT fleet of a particular city in order to achieve tangible results in terms of emissions and fuel consumption savings. Political will remains the key factor in determining these decisions.

As a rule, measures regarding the modification or replacement of vehicles are transferable to other cities, especially where the PT fleet counts for a large part of the city transport infrastructure and the fleet is in need of major maintenance efforts and/or replacement. However, there are two key issues that need to be addressed in this respect. Experience with the technology is essential and it is therefore of particular importance to engage appropriate participants. The second issue is financial as the modification and replacement of vehicles requires substantial investment.

4.1.2 Alternative fuels

Results and success factors

This category covers non-vehicle-related measures, including research studies aimed at investigating possibilities and feasibility of using alternative fuels, measures aimed at influencing user attitudes towards alternative fuels, measures for the development of optimised techniques, and strategies for the future provision and use of alternative fuels.

The most relevant impact of this category, however, relates to social aspects: measures aimed at increasing awareness of clean fuels and vehicles have contributed widely to the continued growth in numbers of public and private purchases of cleaner vehicles. Some minor and long-term effects can be expected on the economy: results confirm that these measures may have some influence on public attitudes towards alternative fuels, thus helping to stimulate the regional market for these vehicles.

Drivers and barriers

Despite being different in nature (political lack of interest, scarcity of financial resources to be invested and lack of transport operators' involvement) the barriers that affect the process of implementation of measures aimed at exploring future possibilities for the provision of
alternative fuels present such a significant impediment that none of these measures achieved their targets in the end.

For measures dealing with awareness-raising, technological barriers act as primary obstacles; these were combined with financial, cultural, spatial, political and organisational barriers both at the preparation and implementation stages.

Political drivers (support, interest and timing) play a key role in all these measures, in particular in the implementation phase. Other drivers are related to the availability of technology and, generally, to institutional and planning aspects.

**Upscaling and transferability**

The use of more environmentally sustainable fuels can, in principle, be upscaled and transferred to most situations. However, there are possible limits in relation to operating conditions, costs involved in implementation, operational and performance characteristics, fuel availability and the extent to which fuel meets environmental objectives. In addition, other factors likely to play a role include legacy systems, training and public/political acceptance. Cities that have achieved valuable results have indicated that they will upscale measures and have consequently assessed the potential for such upscaling. It is, however, worth noting that decisions on some measures will depend on how the regional economy changes following the global economic downturn.

In contrast to the aforementioned, it is not easy to transfer measures promoting alternative fuels to other cities because a number of conditions need to be met. The switch towards clean fuels can be hampered by legislation at the national level. The relative attractiveness of fuel alternatives depends on issues of taxation, legislation and regulation, supply reliability, and general technical and operational competency.

### 4.2 Collective passenger transport

52 measures have been implemented under this category; these address a variety of applications and issues related to public transport. They are equally distributed between information, ticketing and tariffs (22) and accessibility, infrastructure and network (22). A small number of measures is related to PT fleet management (8).

**Table 5**  
**Collective passenger transport: policy measures (number) and demonstration cities**

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collective passenger transport</td>
<td>Information, ticketing and tariffs</td>
<td>Aalborg, Bologna, Brescia, Brighton, Brno, Coimbra, Craiova, Donostia - San Sebastián, Iasi, Ljubljana, Skopje, Tallinn, Ústí Nad Labem, Utrecht, Zagreb</td>
<td>22</td>
</tr>
<tr>
<td>Accessibility, infrastructure and network</td>
<td>Bath, Brescia, Brno, Donostia - San Sebastián, Gent, Iasi, Ljubljana, Monza, Perugia, Szszecinek, Tallinn, Utrecht, Vitoria-Gastiez, Zagreb</td>
<td></td>
<td>22</td>
</tr>
<tr>
<td>PT fleet management</td>
<td>Craiova, Donostia - San Sebastián, Funchal, Iasi, Monza, Tallinn, Utrecht</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>52</td>
</tr>
</tbody>
</table>
4.2.1 Information, ticketing and tariffs

Results and success factors

Cities that have implemented information measures on public transport monitored the impacts of these measures on behaviour, society and economy, while measures on ticketing and tariffs have been mainly evaluated in relation to their impacts on users’ acceptance and awareness and on transport quality.

Measures regarding PT information were generally well accepted by the public. A high level of respondents liked the information provided at PT stops and in vehicles. Economic assessments were conducted for two measures: providing real-time information at bus stops for the blind and partially sighted showed a very positive benefit-cost ratio.

In relation to ticketing measures, acceptance and satisfaction of PT users was generally high, in particular where passengers had no previous experience of vending machines and e-ticketing systems. From an economic perspective, measures involving transport ticketing usually require substantial financial outlay. However, all these measures showed that benefits outweighed costs.

Drivers and barriers

The main barriers are technological in nature: integration and homogenisation of ticketing systems, hardware and software issues and real-time data problems may hamper ticket integration overall. Where several operators are involved, arrangements among them or between operators and authorities have to be made and this represents an additional barrier. Drivers are diverse in nature, but mainly relate to organisational aspects: the involvement of the various stakeholders together with well-planned interaction stages are crucial factors for success.

Upscaling and transferability

As a rule, the upscaling of these measures is both feasible and wanted. Most of the cities plan to upscale information measures to all PT vehicles and stops. The upscaling of integrated ticketing and the use of modern technology is also technically possible as well as being appreciated by users. The general trend is to expand the territories of integrated ticketing.

While there is a high transferability potential of these kinds of measure, the main condition for success is that ticketing systems can be integrated. This requires well conducted research, cooperation between the stakeholders, realistic financial planning and a reasonable time schedule.
4.2.2 Accessibility, infrastructure and network

Results and success factors

Public transport accessibility measures are intended to improve accessibility for disabled and elderly people. They are targeted at a small group, which is why no high impacts on ridership can be expected. However, users in the target group do strongly appreciate these measures. Cost-benefit analysis indicates that benefits substantially outweigh costs.

Public transport infrastructure measures (modernisation, improvement or reconstruction of bus stops or stations) increase the quality of public transport; high levels of satisfaction among PT users have been registered in relation to the improved quality of PT services.

Public transport network measures (new bus lines, new on-demand services, creation of intermodal nodes or corridors, etc.) deal with the intermodality (and its strengthening) of all transport modes and promotional activities. These measures are usually well received and contribute to an increase in the perception of the quality of the PT services in question. All the cities that have measured the impact of measures in relation to the number of PT passengers or modal split show an increase in these values. The effect of these measures on PT uptake appears to be significant (i.e. 4-10% increase in the use of public transport between 2009 and 2011). Similar results have been recorded regarding the satisfaction with PT services (with a share of satisfied PT users over 70%). Most of the measures demonstrate valuable improvements to the transport system and energy savings.

Drivers and barriers

Public transport measures often face institutional, financial and spatial barriers, which are mainly concentrated in the initial phases of implementation. The operational phase does not reveal any particular obstacles. Activities and operations needed and implemented for finding and/or creating a suitable location for interventions often require extra investments and/or institutional adjustments; it is therefore understandable that political drivers play an important role. Besides, political commitment is also a key driver in all phases of implementation.

Upscaling and transferability

As a rule, the reorganisation and redesign of the PT network and infrastructure can be carried out on any scale, including demand-responsive transport systems in low-serviced areas and at off-peak times. Most of the cities that have implemented such a measure, plan to further roll this out throughout the whole city. As PT infrastructure measures are usually quite costly, further upscaling can be facilitated through the involvement of and support by the public authority.

The assessment of the transferability potential of PT infrastructure, network and accessibility highlights that, if these measures need spatial adjustments, they might not be particularly easy to transfer: a wide variety of institutional, organisational and financial hurdles will have to be overcome.
4.2.3 Public transport fleet management

Results and success factors

These policy measures focus on the improvement of PT services in terms of quality and their economic efficiency, and they often affect PT passengers only indirectly, i.e. in terms of social acceptance. They aim at improving management systems of the PT fleet and enhancing information systems and working conditions of drivers.

Positive results are observed in relation to the rate of success of PT fleet management measures: better PT services indirectly improve acceptance and usage of public transport, provided that relevant communication and information systems are chosen that take into account the characteristics of targeted passenger groups. Indicators of transport quality show an increase (20-25%) in punctuality, a decrease in drivers’ time losses (with operating costs reducing by 2.5%) and an increase in accessibility of targeted areas by about 30% in some cities. Also, PT employees appreciated their improved working conditions. A cost-benefit analysis showed positive results.

Drivers and barriers

The most frequently mentioned barrier during the preparation phase was the technological barrier, followed by institutional and organisational barriers. Half of the measures mentioned a financial barrier during the implementation phase. During the operational phase only technological and organisational barriers were mentioned more than once. Lack of political commitment, urgency and drive were experienced in various cities.

Upscaling and transferability

Measures relating to PT fleet management are usually well accepted by users and stakeholders, and are therefore frequently intended to be further upscaled. With regard to transferability potentials, the considerations made with regard to information and ticketing measures are also valid here: the transferability potential is quite high; however, the main condition for success is that systems can be integrated. This, in turn, requires well conducted research, cooperation between the stakeholders, realistic financial planning and a reasonable time schedule within a stable organisation.

4.3 Demand management strategies

Within this thematic category, four groups of policy measures have been piloted: some of these relate to parking regulations and park-and-ride schemes (10), some are based on access management and LTZ schemes (9), others are feasibility studies or test beds regarding new charging schemes or rewarding mechanisms (4). Cycling infrastructure enhancements are also included within this category (8).
Table 6  Demand management strategies: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demand management strategies</td>
<td>Parking and park-and-ride</td>
<td>Bologna, Brescia, Donostia - San Sebastián, Funchal, Gent, Perugia, Utrecht</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Regulative measure (access and LTZs)</td>
<td>Bologna, Brighton, Craiova, Funchal, Gent, Gorna, Iasi, Perugia, Vitoria-Gasteiz</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Pricing (road charging, rewarding mechanisms and R&amp;D)</td>
<td>Donostia - San Sebastián, Ústí Nad Labem</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Cycling infrastructure enhancements</td>
<td>Aalborg, Donostia-San Sebastián, Gent, Iasi Monza, Szczecinek, Ústí nad Labem, Vitoria-Gasteiz</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total</td>
<td>31</td>
</tr>
</tbody>
</table>

4.3.1 Parking and park-and-ride

Results and success factors

Parking measures have proved to achieve positive results in the transport system by significantly rebalancing parking supply and demand and resulting in fewer cars looking for parking opportunities in congested areas. Thanks to time-based tariffs, these measures have generally achieved positive results by decreasing parking demand in such areas and, furthermore, by reducing illegal parking.

Park-and-ride measures also show positive results: the percentage of users has increased after the implementation of these measures, as has awareness. Overall it can be said that, where applied, these measures obtain positive results in relieving the pressure of traffic and pollutants in central areas.

Drivers and barriers

Barriers mainly occur in the preparation phase: finding the political support for potentially unpopular measures, such as parking charges, has proved to be difficult. Securing the right place for park-and-ride facilities was a spatial barrier faced by many of the measures. Planning barriers generally consisted of delays due to higher levels of government being involved as well as delays due to a mandatory tendering procedure. In addition, cultural barriers (increased parking fees, negative past experiences with similar facilities) played quite a prominent role and were mentioned in relation to almost all of the measures.

Drivers were mentioned most frequently in relation to the preparation phase, but were also said to influence the other implementation phases of the measure: political support and commitment, funds availability and sharing objectives with stakeholders were among the most mentioned.
Upscaling and transferability

Whenever a measure proposes to introduce a payment system to change parking behaviour, considerable opposition from the general public and politicians is to be expected. Important conditions for succeeding in these cases are political support and a clear dialogue with the public.

If the measure aims to deliver new park-and-ride facilities, it is often difficult to find suitable locations which, in turn, can lead to delays and planning problems.

4.3.2 Regulative measures (access and LTZs)

Results and success factors

As a rule, access restrictions and LTZs have positive effects by significantly reducing the percentage of vehicles entering the limited area, achieving a change in behaviour of drivers as well as increasing pedestrian modal shares. Where environmental data have been measured, pollutant emissions have shown significant decreases.

Overall, these measures are successful. This is due to innovations in policy and delivery as well as to new technology; however, success almost always depended upon consultation and engagement. It is crucial not to base initial approval of the measure just on citizens’ support. Support can, in fact, increase after implementation as citizens experience the benefits. Important conditions for success are political support and a clear dialogue with the public/target group.

Drivers and barriers

Measures on access management and LTZs often have unpopular consequences for the public (in financial and spatial terms). Therefore, political support and excellent communication with the public are powerful drivers. At the operational stage, the quality of data collection, measurement and technology are also important.

Upscaling and transferability

Most of the piloted policy measures are complete in themselves and therefore not likely to be upscaled; some, however, are part of cities’ future plans.
As far as transferability is concerned, if the measure proposes the introduction of a payment system to enforce the access limitations, it will face strong opposition from the general public and politicians. Moreover, the feasibility of this kind of measure depends to a large extent on local/national legal aspects, such as privacy legislation regarding the use of cameras and data. Moreover, European legislation has to be taken into account at this stage.

4.3.3 Pricing (road charging, rewarding mechanisms and R&D)

Results and success factors

In many CIVITAS Plus cities (especially the smaller ones), there is little (or no) tradition of traffic management. In these cases it has been necessary to start with studies and reviews so that policy makers can reach reasoned decisions as to which policies and measures can
best tackle the problem of increasing transport demand and related congestion, environmental damage, noise and delays. The principal conclusion is that parking and access management studies are inherently similar throughout different cities and that there are therefore many opportunities for knowledge sharing.

**Drivers and barriers**

Despite being a very important issue and a powerful tool, road pricing is not normally expected to command public or political support. Citizens and stakeholders must be informed and considered as “part of the solution and not as a problem”. It is crucial not to base approval of the measure just on citizens’ support, at least not initially. Support may increase after implementation as citizens experience the benefits of lower congestion and pollution. On the whole, trial schemes are desirable on a large scale rather than in the form of small technology demonstrations.

**Upscaling and transferability**

Research and development measures show strong transferability potential. However, it is worth noting that expertise in carrying out the research is of utmost importance in, for example, the development and use of (computer) models. The involvement of the right partners with the appropriate expertise is crucial. Ex-ante studies require a significant effort in data-gathering in order to ensure that research and models are able to produce sound and consistent outcomes.

**4.3.4 Cycling infrastructure enhancement**

**Results and success factors**

The aim of these policy measures is to encourage travel by bicycle by enhancing the quality and/or convenience of cycling infrastructure. Generally, the provision of new cycle facilities led to an increase in the number of cyclists, improved safety and very positive levels of support, even though rates varied a lot between different sites. From an economic perspective, in the long-term, some of the infrastructure interventions were shown to be beneficial.

These measures, due to the positive image of cycling, achieved a high level of success.

**Drivers and barriers**

The enhancement of the quality and convenience of cycling infrastructure are hampered by several barriers at the various stages of the measures: in the preparation phase, cultural aspects form a major problem. First, the perceived lack of safety of cycling and, second, the fact that cycling is still in some cases seen as a sporting activity and not as a transport mode. In the implementation stage financial and planning barriers are more important, while at the operational phase cultural aspects are most influential.

Following from the considerations above, it is not surprising that in the preparation phase political and cultural drivers are most frequently mentioned. Stable political support resulting in tailor-made legislation and combined with very early workshops proved effective in involving potential stakeholders and generating new ideas.
Upscaling and transferability

Wider improvement and provision of cycle and pedestrian infrastructure were considered feasible as part of future city-wide transport policies in most of the cities that have implemented such measures. This will bring greater benefits to active travellers by way of well-connected networks, a safe cycling environment and improved security.

Generally, measures aimed at the construction of new and/or improvement of existing cycle infrastructures are suitable to transfer to other cities. However, three aspects have to be taken into account in this regard:

- The topography of city: if the city or the site is hilly extra investments, e.g. in synergies with vertical transport, are probably necessary. To avoid unpleasant surprises, gaining a detailed insight into costs and feasibility of the plans is necessary.
- Where cycling and walking is not culturally supported and there is a lack of suitable legislation, measures cannot be successful without political support. This is also needed to approve extra investments and to ensure a meaningful involvement of stakeholders.
- Lastly, it is helpful if cycling and walking is embedded in the mobility system and is seen as a part of a multimodal system. This does not mean that a whole network has to be created at once – little steps are sometimes very efficient – but it always has to be with a multimodal perspective in mind.

### 4.4 Mobility management

Mobility management measures continue to be a growing area in planning for sustainable transport in cities (with 69 measures in total), and they can be classified into four groups: mobility services (25), mobility plans (23), mobility marketing (15) and eco-driving (6).

#### Table 7 Mobility management: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobility Management</td>
<td>Mobility services</td>
<td>Aalborg, Bath, Brighton &amp; Hove, Iasi, Monza, Ústí nad Labem, Ljubljana, Brno, Porto, Funchal, Gdansk, Tallinn, Utrecht, Vitoria-Gasteiz</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Mobility plans</td>
<td>Aalborg, Brighton &amp; Hove, Donostia-San Sebastián, Iasi, Monza, Ljubljana, Gent, Zagreb, Porto, Bologna, Coimbra, Craiova, Gorna Oryahovitsa, Perugia, Szczecinek</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Mobility marketing</td>
<td>Iasi, Gent, Ljubljana, Zagreb, Brno, Bologna, Gdansk, Tallinn, Brescia, Coimbra, Perugia</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Eco-driving</td>
<td>Vitoria-Gasteiz, Tallinn</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
<td><strong>69</strong></td>
</tr>
</tbody>
</table>

#### 4.4.1 Mobility services

**Results and success factors**

Mobility services are aimed at **encouraging travel by public transport through ICTs**: real-time passenger information (RTPI) by mobile phones or at bus stops, personalised traffic
information, improved traveller information as well as traffic information provided on websites or by SMS and email messaging.

The major effects are those related to transport systems (i.e. increases in PT users) and society (measured by levels of acceptance and appreciation). Overall, the 25 mobility services measures were found to have achieved substantial increases in awareness of sustainable transport issues and in associated behavioural changes.

Drivers and barriers

The implementation of mobility services faced institutional (hierarchic structures and time consuming procedures), technological (websites and software functionality, lack of extensive technology adaptation, Wi-Fi supply, etc.) and organisational barriers.

While political barriers were rarely mentioned, political support was seen as a driver at all stages. Important drivers at the latter stage are the organisational aspects: local government provision of extra funding, cooperation between the various measure partners, etc.

Upscaling and transferability

Some cities feel that upscaling is not applicable; other cities, where upscaling is planned, plan to extend the measure to other types of users or add new features. Sometimes, although initially planned, upscaling had to be postponed due to the economic situation.

Theoretically, mobility services can be established and transferred everywhere, even though this is not always easy because of the need for investments (not only financial, but also in terms of personnel, time, awareness raising and technology). This only seems possible with political support and the support of the stakeholders involved.

4.4.2 Mobility plans

Results and success factors

Mobility plans tend to be implemented in four forms: company/organisational travel plans to influence commuters, school and work travel plans to influence students and workers, personalised travel planning for individuals, and city-wide mobility plans with the objective of identifying and implementing strategies to shift travel behaviour to more sustainable modes. Mobility planning activities can trigger the creation of new organisational entities and arrangements (mobility work groups, mobility centres etc.).

In general, a shift to sustainable modes and increased awareness has been registered especially among employees in relation to whom a decrease in car usage has been observed. Having said that, it is worth remembering that this may also be a result of the recession. It is worth pointing out that a number of projects found that drivers and passengers are reluctant to change their behaviour due to social factors such as independence, social status or transport behaviour, but they may be willing to adopt more eco-friendly attitudes (eco-driving or switching to less polluting vehicles).

It can be argued that the inclusion of key stakeholders, a common understanding of the need to solve traffic and environmental problems, and a well-planned implementation process are key conditions for success. Other key success factors are the requirement for measures to
be embedded in the city’s planning strategy, the drive to increase citizens’ awareness, and the wise and efficient spending of funds.

Drivers and barriers

Mobility plans and their implementation are hampered by political, involvement and financial barriers. Involvement is the most dominant barrier at the implementation and operational stages. Success is instead based on a bundle of drivers due to the complexity of these measures and positive synergies among different factors. Organisational drivers are mentioned less frequently in relation to the later measure stages, while the political barrier (e.g. lack of previous local decision-makers’ consultation for political approval, lack of matching visions between politicians and technicians regarding the sustainable development agenda) is mentioned more frequently.

Upscaling and transferability

Some cities think that travel plans need to be tailored to specific travel behaviour, location and needs of organisations, i.e. that they cannot be upscaled in general terms. The general experience gained, however, should prove useful in future. Other cities broadly agree that travel plans can be applied to any trip generator centres, i.e. not just educational and business establishments but also shopping centres and hospitals. However, it should be recognised that transport plans should not focus just on switching from cars to other modes; an equally valid objective is to get drivers to change to less polluting vehicles (for example hybrid cars).

To a large extent these measures can be transferred easily to other cities.

4.4.3 Mobility marketing

Results and success factors

The objectives of mobility marketing is to encourage a shift towards more environmentally friendly modes (cycling in particular), improve air quality, reduce pollution and promote new travel ideas or projects.

Fifteen marketing campaigns have been implemented, often in collaboration with a marketing company and/or the local PT company, aimed at the general public or at key target groups or at individual travellers. These schemes involve the coordination of promotional activities and information campaigns to increase awareness, stress the environmental benefits of sustainable and collective modes of transport as well as walking and cycling, and discourage the use of cars, especially single-occupancy vehicles. In general, these objectives have been met: data on modal shift and users’ perception are positive; however, abandoning the car is still an insurmountable step in some contexts.

Drivers and barriers

The main barriers in mobility marketing are institutional, organisational, cultural and involvement aspects. The most frequent barriers at the preparation stage were institutional and organisational, cultural and involvement, which is also the most mentioned at the implementation stage.
On the other hand, there is a stable pattern of drivers, with involvement and organisational drivers influencing all the stages. At the operational stage, a well-established involvement of stakeholders was regarded as a driver for almost half of the measures. At the implementation stage, political support was mentioned as a driver for about a quarter of the measures.

Upscaling and transferability

As with mobility plans, these measures can be easily transferred to other cities: it is important to note that awareness campaigns, target group approaches, involvement of actors, etc. are closely linked to marketing and require expertise. Also, the provision of information must be simple and easy to understand.

4.4.4 Eco-driving

Results and success factors

The objective of eco-driving is to reduce average speed levels and minimise acceleration and deceleration, thereby reducing fuel consumption, polluting emissions, noise and costs – not only of fuel but also in terms of reduced maintenance as well as fewer accidents. On the environmental side, eco-driving training was found to be effective in reducing fuel consumption in the short term, although longer term analyses indicate that the impact is reduced over time. It would be useful to do a follow-up study, to see how long the skills persist among the citizens trained and whether they continue to be used.

Six projects (targeted both at fleet drivers and citizens) have promoted more responsible and efficient driving which, under certain circumstances, can be more effective than trying to induce a modal shift. Fuel saving and speed reduction are the two targets achieved by these measures; accident numbers and noise levels decrease as a consequence. Where they were undertaken, cost-benefit analyses show that the measure is effective both socio-economically and financially.

Drivers and barriers

For eco-driving programmes the main barrier is a mixture of culture and communication (low attendance of courses). As far as drivers are concerned, well-established training programmes, equipment and communication proved to be real success factors.

Upscaling and transferability

To be transferred to other cities, eco-driving requires strong support at strategic level, either within companies, and/or within the municipality. The presence of frontrunners is extremely important, as well as an attitudinal switch of the car drivers involved and well-functioning technical support.

Options for upscaling could include training courses for electric vehicles in order to compare results with standard cars.
4.5 Safety and security

This thematic category cuts across all eight CIVITAS themes as safety and security are closely related to all modes of transport. From a sustainability perspective, PT and soft modes (vulnerable users who are cycling and walking) are, however, the main fields of intervention. The aim, in fact, is to improve the safety and security of these eco-friendly modes in order to attract more users by progressively reducing their car-dependency.

Some measures (13) have been implemented to provide safer environments for pedestrians and cyclists, others (7) concern security for passengers at stations and in vehicles, and the remaining ones (13) are traffic management measures.

Table 8 Safety and security: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety and security</td>
<td>Pedestrian and cyclists</td>
<td>Aalborg, Bath, Brighton &amp; Hove, Brescia, Gent, Gent, Ljubljana, Szczecinek, Tallinn, Vitoria-Gasteiz, Zagreb</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Public transport</td>
<td>Gent, Ljubljana, Zagreb, Gdansk, Craiova</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Traffic management</td>
<td>Aalborg, Brighton &amp; Hove, Donostia–San Sebastián, Ústí nad Labem, Ljubljana, Bologna, Utrecht, Coimbra, Perugia</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>33</td>
</tr>
</tbody>
</table>

4.5.1 Pedestrians and cyclists

Results and success factors

Safety improvement measures are generally targeted at pedestrians and cyclists as well as encouraging active journeys. Proper use of traffic signals, signage and street furniture can prevent potential pedestrian accidents and promote safer driving behaviour. Soft interventions without infrastructure construction can effectively encourage modal change. In comparison to the development of a safe district, the most effective method of reducing accidents in an area is to carry out a safety campaign.

Drivers and barriers

Improving safety for pedestrians and cyclists is hampered by several barriers in the various stages of the measures. At the preparation stage the financial barrier was mentioned in about the half of the measures. At the implementation stage, the problems shifted to institutional and organisational barriers. At the operational stage, a wide range of barriers were identified, although the technological barriers seemed to be more important than the others. Among drivers, political and organisational drivers were the ones mentioned most frequently as being conducive to reaching the goals of these measures.
Upscaling and transferability

Cycling and walking measures can be upscaled. Similar cycling campaigns can be conducted in all schools in the city, new public space designs can be applied to several junctions in the city, a new LED lighting system can be rolled out city-wide, and innovative cycling priority measures can be extended to other areas. Some other innovative solutions aimed at improving pedestrian and cyclist safety at crossings showed potential for further implementation.

Easily transferable measures for safety improvement aimed at increasing awareness include educational programmes in schools, workshops on safety, a cyclist platform to bring relevant stakeholders together for an exchange of experiences, etc. It seems fair to assume that there would be no objections against the improvement of the safety of pedestrians and cyclists. However, priorities in assigning public space, such as the construction of lanes for cyclists and pedestrians in certain areas, may be a controversial point.

4.5.2 Public transport

Results and success factors

The measures related to this category concern improvements in security for PT passengers at stations/stops and in vehicles (with video surveillance systems) and information campaigns focused on safety. Different target groups are addressed: youngsters, older people, people with a disability or limited mobility and cyclists.

On the whole, these measures have a high level of success. It is, however, important to stress that they require cooperation between authorities and operators and often also legislative changes regarding the protection of personal data (visual recording). Surveillance systems did not lead to substantial decreases in the costs arising from vandalism.

Drivers and barriers

Measures implemented to improve the safety and security of public transport have to grapple mainly with institutional and financial barriers, especially in the preparation and implementation phase, and mostly with technological barriers in the operational phase of the measure. They very often rely on camera technology, which may entail legal issues.

The organisational driver is most influential on the progress of these measures; this is immediately followed by the involvement driver. Safety measures often target specific groups like school children, the elderly, the disabled, etc. If these groups are not being targeted well, this presents a significant barrier for the measure.

Upscaling and transferability

PT safety and security measures can be easily upscaled. Regarding transferability, many of PT security measures rely on camera technology and are theoretically transferable; however, their transferability potential depends to a large extent on local/national laws such as privacy legislation regarding the use of cameras and data.
4.5.3 Traffic management

Results and success factors

The wide variety of these measures include speed reductions, educational campaigns and safety related services for residents, driver training to improve driving skills and an evaluation of existing infrastructural and non-infrastructure actions and situations to improve safety.

Other than the development of a safe district, the most effective method of reducing accidents in an area is to carry out a safety campaign. The installation of monitoring systems at pedestrian crossings close to schools is another effective way of reducing traffic accidents. Furthermore, functional transport infrastructure including road markings plays an important role in improving safety for the pedestrians, especially school children, as does effective traffic regulation.

Drivers and barriers

At the preparation stage, technological, planning, positional and other barriers were not considered important, but political and institutional barriers were faced by one-third of all measures. The implementation stage showed a decrease in the number of barriers mentioned in comparison to the preparation stage. Organisational and involvement barriers were the first and second most mentioned barriers at this stage. The operational stage showed a significant increase in cultural barriers. For the majority of the measures political aspects were mentioned as a driver: in some cases the enthusiastic approach of institutional parties and stakeholders resulted in successful implementation; organisational aspects were mentioned most as a driver at the operational stage.

Upscaling and transferability

In theory, measures concerning the improvement and proper maintenance of existing provisions like traffic signals, zebra crossings, etc., are relatively easily transferable. In practice, however, this requires maintenance plans funds, i.e. a host of strategic decisions to be made by city departments and/or companies.

Safety measures targeted at road users usually address specific groups like school children, the elderly, the disabled, etc.: these measures have strong transferability potential provided they use the right triggers for the target groups. By contrast, there is always the potential of strong opposition to measures aimed at speed restriction. Thus, citizens' involvement, education about 'speed and danger' and the use of 'local champions' are very important. Measures on driving and/or safety courses have strong transferability potential, although they need to be very target group specific.
4.6 Car-independent lifestyles

The provision of alternatives to car ownership is an essential component of any comprehensive strategy for transport in and around European cities. Among these, car-sharing (11) and carpooling (2) are the two groups of policy measures considered. Parallel to this, bike-sharing schemes (8) are emerging in urban areas as a valid alternative for the promotion of this behavioural shift. They are aimed at attracting more users to cycling but also to public transport, thanks to improved intermodality supported by the cycling option.

Table 9 Car-independent lifestyles: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Car-independent lifestyles</td>
<td>Car-sharing</td>
<td>Aalborg, Bath, Bologna, Brescia, Coimbra,</td>
<td>11</td>
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<tr>
<td></td>
<td></td>
<td>Donostia-San Sebastián, Gent, Monza,</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Perugia, Utrecht</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carpooling</td>
<td>Craiova, Perugia</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Cycling services (bike-sharing,</td>
<td>Aalborg, Bath, Donostia-San Sebastián,</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>integration cycles &amp; buses)</td>
<td>Funchal, Szczecinek, Utrecht</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>

4.6.1 Car-sharing

Results and success factors

Schemes to establish or promote car-sharing are partly new (or an assessment of new) schemes and partly upgrades of (or promotions of) existing car-sharing schemes.

The core objective of establishing/assessing and expanding/promoting a **car-sharing service** was fully or partly achieved in every scheme. These measures also added value in raising the awareness and importance of sustainable transport in a more general sense.

The experiences made under these schemes suggest that new car-sharing schemes can be successfully implemented to reduce private car use and deliver other economic and environmental benefits. Successful car-sharing schemes require relevant changes in people’s attitude towards mobility and car ownership. In some areas these aspects are so deeply rooted that it is a real struggle to avert the trend. Needless to say, due to the huge effort required by citizens in changing their daily habits (not only in terms of planning of trips, length and timing, but also in terms of family daytime organisation), pervasive awareness campaigns and marketing actions are essential for such measures to stand any chance of success. Together with these actions, the other main element considered relevant for success is to specifically target users: knowing users’ habits, needs and preferences (for instance in selecting locations) is the best starting point to a successful implementation.

In addition, one specific prerequisite has been highlighted as the main condition for the success of a car-sharing scheme: the engagement and support of stakeholders (regarding political, legal and financial aspects).
Drivers and barriers

During the implementation of these measures, some contextual factors are considered to act as drivers (high congestion levels, costs/shortage of parking spaces, high costs of owning a car or other specific constraints). However, if these particular conditions are not present, positive results are equally achievable by strengthening the role of some other levers: financial incentives to users and free trials proved to be fairly effective in promoting these measures.

Upscaling and transferability

Alternative car use implies a paradigm shift from car ownership to mobility services. Such a paradigm shift is not easy to accomplish and usually requires profound changes: not only in people’s mind, but also in terms of organisation and legislation. In theory, this type of measure is transferable to other cities (every city likes to come up with new ideas, new programmes, etc.), but to initiate them and conduct them properly is not easy and requires a number of important conditions to be taken into account.

4.6.2 Carpooling

Results and success factors

It is remarkable that both carpooling measures faced more problems in the implementation phase than the other measures. These consisted in institutional, organisational and financial barriers; however, despite these barriers, both measures were implemented successfully.

Drivers and barriers

Software technology supporting the car-pools proved to be a driver at the implementation stage, together with the involvement of key stakeholders (the municipality and the company that runs the city carpooling).

Upscaling and transferability

The success of the two carpooling schemes suggests that there is further appetite to expand these services to other companies, universities and public bodies, where the availability of on-site parking is limited (or needs to be reduced), the location is less central or not conducive to walking and cycling, and access to public transport is limited. This type of measure is transferable to other cities. The key factor of success in relation to carpooling is a recognised demand for the service by the target groups.

4.6.3 Cycling services (bike-sharing, integration cycles and buses)

Results and success factors

Cycle rental points are highly visible and could therefore improve the green image of the city as well as encouraging more citizens to try cycling without making a large commitment. Users of rental cycles tended to show high levels of satisfaction and acceptance and value the services. Strengthening communication through bike racks and decorated buses to catch
Cleaner and better transport in cities

people’s attention in combination with targeted information campaigns and brochures has proved to be a decisive factor of success.

Drivers and barriers

At the preparation stage, political and institutional barriers were encountered, but during the implementation and operational phases these seemed to become less important. At the implementation and operational stages political barriers were not encountered at all. At the implementation phase organisational barriers occurred most frequently; other important barriers were technological and involvement barriers. At the operational stage, organisational barriers were no longer mentioned and cultural barriers were most frequently encountered.

Involvement was seen as a driver in one-third of the measures at the preparation stage; at the implementation stage, involvement was considered to play a much smaller role, but at the operational stage it was again regarded as a relevant driver. Political drivers were considered less important as they were not included in the three most mentioned at the implementation stage.

Upscaling and transferability

All these policy measures have upscaling potential to be further exploited: new target groups can be addressed and more cycles and stations can be installed.

In theory it is possible to transfer measures of setting up rental bike schemes to every city. However, in practice this is not that easy because there are a number of conditions that need to be met. For example, it has to be safe to cycle, there have to be enough sites for rental bikes (space consuming), it is preferable to have a variety of bikes (for men, women, children, sport, etc.), the bikes have to be reliable and well maintained, and the payment system must be simple and easy to understand. Setting up cycle rental schemes requires substantial investments of money, time, space and organisation. Therefore, a well conducted feasibility study is necessary.

4.7 Urban freight logistics

More than 20 measures have been introduced in various cities to improve sustainable freight delivery. These measures can be grouped into three main categories: new distribution schemes (11), access restrictions and control (7), freight partnership schemes and driver support (3).

Table 10 Urban freight logistics: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban freight logistics</td>
<td>New distribution schemes</td>
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<td>11</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ljubljana, Perugia, Utrecht, Vitoria – Gasteiz</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Access restrictions and control</td>
<td>Aalborg, Bath, Brescia, Brighton &amp; Hove,</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Craiova, Gent, Zagreb</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Freight partnership schemes and driver support</td>
<td>Iasi, Tallinn, Utrecht</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>21</td>
</tr>
</tbody>
</table>
4.7.1 New distribution schemes

Results and success factors

Eight of the 11 measures focused on the concepts of **bundling or consolidating deliveries** (e.g. consolidation centre, merchandise pick-up points, central buffer zones, virtual logistics platforms, proximity areas). The other three promoted the development and utilization of **cleaner vehicles for freight distribution**.

An analysis of data supplied by logistic providers indicates that using more energy-efficient freight distribution methods (including use of electric vehicles) resulted in half the fuel consumption and the predicted reductions in emissions of pollutants. But it is worth noting that the purely environmental methodologies did not take account of the potential wider benefits (for instance, back-loading recycling on the return leg of the journey, i.e. reduced numbers of waste collection trips). From a transport point of view, reductions in freight movements were observed but no measure reported any actual delivery time savings.

The schemes were well received by both stakeholders and residents in some instances, while in others public acceptance decreased during implementation: this could indicate that the public do not perceive freight delivery transport as being a problem.

From an economic point of view costs, especially for clean vehicles, are likely to be too high to attract private investment and these measures are therefore only viable for public ownership. These operational costs could be optimised by subcontracting the operations to an established logistics provider that already has suitably located depots and fleets of clean vehicles.

Drivers and barriers

The measures encouraging the implementation of new freight operating modes or distribution schemes were hampered by several barriers at various stages. Lack of stakeholder involvement was identified as the main barrier during the preparation stage, followed by organisational barriers and political barriers. At the implementation stage and at the operational stage organisational barriers were considered the most influential. On the drivers’ side, the same conclusions were drawn: political support (in different forms), involvement and good organisation were considered to be important drivers: they were identified for half of the measures.

Upscaling and transferability

New distribution schemes can have good upscaling potential, and in general there are always possibilities for other cities to develop new distribution schemes. However, local constraints in the urban structure can play an important role. Regardless of the levels of implementation (which was sometimes not successful) these measures have provided valuable insights into the importance of planning, communication, research, testing and, especially, meaningful collaboration between stakeholders. The results and experiences from these projects provide valuable guidance for future logistics and freight distribution schemes.

The bundling concepts used in distribution models could be adapted for non-traditional goods, which could include construction materials, fresh and perishable goods. However,
further piloting is required to evaluate potential demand and benefits. Integration with pre-existing services could be beneficial. An analysis of success factors highlights the fact that cities should take the opportunity of combining measures to maximise benefits.

4.7.2 Access restriction and control

Results and success factors

Regarding changing the pattern of freight activity and reducing the levels of through traffic into city centres there are different solutions: to physically alter the road network by reconfiguring streets and access and by creating pedestrian zones. Other options include blocking access permanently (if the access points are not shared by PT) or regulating it through the installation of bollards. Delivery corridors or loading bays can be placed on the rim of pedestrian zones and accessed through secondary streets with lower traffic loads and further regulated. Introducing speed limits can assist with calming traffic flow.

Access restrictions need to be regulated to maximise their impacts and enforced to ensure that freight operators and drivers modify their behaviour. Regulating freight access in restricted areas (based on emission standards of vehicles or weight) can, in fact, encourage freight operators to reconfigure their fleets in order to optimise access and meet their customer demands. Vehicles can be granted different access rights into a pedestrian zone and permits can be issued based on category of usage.

The actual and predicted impacts on transport were well documented and it is evident that the restrictive measures reviewed contributed to localized reductions in traffic flows. Only three measures reported environmental impacts with slight improvement in local air quality and CO₂ reduction.

Surveys of local businesses indicated that there had been a slight increase in acceptance levels since the traffic network had been amended. But, on the other hand, commercial operators in many cities highlighted that perceived negative impacts associated with the measures would reduce their overall effectiveness. The lack of acceptance and concern associated with vehicle access restrictions impacted on the development of two schemes.

Drivers and barriers

The involvement of stakeholders during the implementation phase was mentioned as the main barrier: it can be concluded that a high score of involvement barriers often coincides with a relatively high score in relation to problem-related barriers. As the implementation of measures involving access restrictions is funded on the basis of political decisions taken by the local administration, it is obvious that political support is absolutely necessary. Political context is the most frequently mentioned driver at the preparation stage, together with organisational aspects (frequent and well organised meetings).

Upscaling and transferability

Access restrictions of freight vehicles have no significant upscaling potential, as restrictions are usually applied to the whole of the LTZs. Any further future upscaling might focus on extending the area of managed deliveries beyond the city borders. Furthermore, these might
entail the promotion and image improvement of clean vehicles in urban freight fleets through more restrictive environmental regulations. With regard to transferability, political support is vital for the implementation of this type of measure. In addition, time window restrictions and zoning often play a role, as do access taxes, standards for vehicles, etc.

### 4.7.3 Freight partnership schemes and driver support

**Results and success factors**

One scheme under this heading attempted to initiate new logistic partnerships in conjunction with hard measures; others were concerned with the development of technologies as part of city-wide re-routing strategies to support vehicle and drivers.

The provision of incentives (i.e. tax exemptions or additional parking spaces) to improve freight operations can encourage stakeholders to sign Freight Quality Partnerships aimed at contributing to increasing the success of the measure.

Although it can be argued that the development of in-vehicle and roadside support technologies for ‘freight’ drivers and vehicles could contribute to city-wide re-routing strategies, new innovative technologies (including real-time data) take a long time to be developed; moreover, there are no guarantees that they will be used by drivers.

The associated set-up costs were not quantified although it was suggested that the development of navigational software and storage of GPS files on a server was considered relatively inexpensive in comparison with the installation of signage. Freight partnership measure may have an economic impact on the companies performing supply and distribution activities.

Societal impacts of freight partnerships were identified from a survey among stakeholders (traffic drivers, freight operators and shopkeepers). This showed that acceptance levels increased after implementation of the measures. Vehicles’ and drivers’ support measures showed that, overall, drivers were aware of the possibilities of the new navigation systems: lack of awareness was therefore not a key factor in relation to the number of downloads. However, results highlighted the complexity of implementing navigational tools and the unpredictability associated with personal preferences.

**Drivers and barriers**

The most relevant barrier for the organisation of freight distribution schemes was insufficient partnership arrangements, which made it difficult to develop a strategy to improve goods distribution throughout the city before and during the implementation of the measure. Positional drivers are mentioned as being the most influential, particularly at the preparation stage. An important driver for vehicle and driver support measures, in all implementation phases, is planning (i.e. a well-planned process). Technology is also a relevant driver for these measures because it is important to have real-time data available as well as well-established IT-support.

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6 Freight Quality Partnerships aim to bring together public and private sector parties involved in freight transport and logistics to discuss problems, identify and implement solutions with the intention of improving the sustainability of freight transport activities in an economic, social and environmental sense (Allen, 2010).
Upscaling and transferability

Any upscaling of Freight Quality Partnership measures would primarily focus on maximising the engagement and commitment of stakeholders to signing Freight Quality Partnership either city-wide or within other designated corridors.

Regarding transferability, potentials are good but one has to be aware of the number of factors involved: these, however, can be encouraged by way of improved communication (websites, workshops, posters, press etc.). Measures aimed at driver support are transferable but it is important to have real-time data available as well as well-established IT-support.

4.8 Transport telematics

A variety of policy measures are combined under this thematic category. Despite their different targets and objectives, they are all heavily reliant on technology. The measures can be sub-divided into three groups: traffic management and control (signal control systems to optimise traffic flow, the implementation of RTPI services, 20), PT management (development of priority lanes for public transportation, design of priority signals for public transportation at intersections, implementation of passenger information systems for public transportation, 5) and parking guidance systems (6).

Table 11 Transport telematics: policy measures (number) and demonstration cities

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measures</th>
<th>Cities</th>
<th>N°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transport telematics</td>
<td>Traffic management and control</td>
<td>Aalborg, Bath, Bologna, Brescia, Coimbra, Funchal, Gdańsk, Monza, Perugia, Skopje, Szczecinek, Tallinn, Ústí nad Labem, Utrecht, Vitoria-Gasteiz</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>PT fleet management</td>
<td>Craiova, Iasi, Ljubljana, Monza</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Parking guidance systems</td>
<td>Aalborg, Bologna, Donostia–San Sebastián, Monza, Utrecht</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>31</td>
</tr>
</tbody>
</table>

4.8.1 Traffic management and control

Results and success factors

Traffic management and control plays an essential role in urban transport systems. Its purpose is to maximise road network potential to meet current and future mobility needs in cities. These policy measures consist of the installation of traffic monitoring devices and implementation of traffic control systems to interconnect those devices in order to optimise traffic condition and flows.

A wide range of impacts result from traffic management and control measures, and positive results have been generally achieved for almost all measures. Most of the traffic management and control measures were designed to improve traffic operations and transport service. These measures have proved to effectively improve transport
performance, reducing travel time, accidents and fuel consumption. The provision of priority to PT vehicles was effective in reducing journey times and improving reliability.

The success rate of these measures is very satisfactory. Notably, in all cases, every single measure was focused on one or more specific item(s) of traffic information and control service(s) (such as traffic surveillance, traffic light control, PT priority and public safety awareness). Evaluation shows that, if these measures were combined, a comprehensive traffic management and control system could be developed and the integration of the implementation of such measures could be a valid option.

Drivers and barriers

At the preparation stage, technological aspects were a major problem and were mentioned as a barrier (e.g., the Galileo satellite navigation system was not available and GPS/GPRS needed to be implemented using the standard technology). Political and financial barriers and the complexity of the problem itself were also mentioned as important barriers (e.g., the lack of space available for monitoring in the Headquarters of the Municipal Police). The implementation phase showed that barriers related to technological aspects still occurred in about half of the measures. Organisational and technological barriers also affect the last phase (operation) of measures.

At the preparation stage, political aspects were the most frequently mentioned drivers. At the operational stage, important drivers mainly related to organisational aspects and to a lesser extent to technological aspects.

Upscaling and transferability

Upscaling for traffic monitoring and control measures, in particular extensions in area coverage, are possible for measures which have been applied only at limited locations.

There is transferability potential of this kind of measure; however, to a large extent this depends on local and national circumstances.

The first relates to legal aspects such as privacy legislation regarding the use of cameras and data; European legislation has to be taken into account at this point.

The second is the need for the proper functioning of technical applications, which play an important role, and the requirement for experienced companies to be involved in the work.

4.8.2 PT fleet management

Results and success factors

Measures under this heading consist of the development of priority lanes for public transportation, the design of priority signals for public transportation at intersections.

PT priority measures have generally improved the efficiency of the transportation system. Moreover, PT has proved to be more effective when information is provided to travellers. Furthermore, the use of information technology in transport monitoring and control, such as adaptive traffic light control for PT priority or dynamic traffic information displays, is proving effective.

Improvements in average vehicle speed varied a lot among different contexts. The evaluation results show that the establishment of a traffic monitoring control centre is effective in
improving service reliability of public transport: the sole application of a vehicle tracking system is less effective in comparison.
The impacts of most of the measures on transport efficiency (fuel consumption reduction, transport safety and society awareness) were generally positive.

Drivers and barriers

The number and frequency of drivers and barriers reduced from the preparation stage to the implementation and operational stages. At the preparation stage, a spatial barrier was mentioned for two of the five measures. Both moderately successful implemented measures faced difficulties in fitting priority lanes for public transport. At the implementation stage, technological barriers were mentioned most (punctuality and synchronization of the traffic light system in order to create a green interval for PT buses). At the operational stage, three of the five measures faced barriers that were related to technical difficulties. This situation led to a shortening of the operational period.

Political (high commitment of the municipality towards the improvement of traffic conditions in general and public transport in particular) and organisational drivers were mentioned for some measures at the preparation stage. At the implementation stage, involvement and political aspects were mentioned, while at the operational stage, a small number of drivers were mentioned (political, institutional and technological).

Upscaling and transferability

Upscaling of PT priority measures can be considered and looks promising. However, specific traffic conditions and infrastructure in a proposed extension area, together with other context factors, need to be carefully considered.

The transferability potential of the measures is limited whenever cities lack the space or if there are institutional barriers or planning regulations preventing the creation of such space. By contrast, the transferability potential is larger in case of more technical solutions like the synchronization of traffic lights. However, as before, the quality of the technical applications plays an important role and the involvement of experienced companies is essential.

4.8.3 Parking guidance systems

Results and success factors

Significant results have been achieved by decreasing the number of vehicles entering inner city centre areas and reducing traffic queues searching for parking.
In some contexts, despite low numbers of car park occupancy, public awareness is satisfactory. The few calculations that have been conducted on environmental aspects show a remarkable reduction in CO₂ emissions.

Drivers and barriers

Cities faced a variety of barriers (the requirement of external expertise due to the complexity of innovative parking systems, delay, and the tendering procedure requiring a contract with an external party). During the operational phase, barriers were also related to financial issues with extra actions needed to connect parking owners in the same scheme.
Regarding drivers: some are mentioned significantly more than others. During the preparation phase four measures were identified as having a political driver (the political will to study and investigate sustainable mobility issues, the commitment to presenting a progressive city etc.).

Technological drivers were experienced during the preparation phase, while during the implementation and operational phases, some measures had the same drivers as in the preparation phase. Other cities, by contrast, experienced different drivers such as drivers relating to planning and the involvement of stakeholders.

**Upscaling and transferability**

Most of these measures are complete in themselves and are not likely to be upscaled: the only exception are some measures that, due to high parking pressure in adjacent zones to the centre, have led to a plan to extend additional zones to reduce long-term parking.

These measures have reasonable transferability potential although they show a wide range of barriers very specific to local circumstances. However, the drivers showed rather a clear transferability picture with political support and technology as powerful drivers.
5. Recommendations for sustainable urban mobility

Chapter five outlines the main recommendations made in this deliverable for the promotion of sustainable mobility across Europe.

Section 5.1 discusses the four main dimensions of policy measures (sustainability, timescale, territorial areas and stakeholders) that can be used as a filter to aid understanding of the contribution of each CIVITAS Plus policy measure. Section 5.2 deals with the set of policy areas that have been identified in relation to the planning of future mobility actions.

Section 5.2 concludes by stressing the importance of Sustainable Urban Mobility Plans (SUMPs) which represent one of the principal actions where, at EU level, a widespread and shared awareness about a new sustainable model of urban mobility can be developed and encouraged.

5.1 CIVITAS Plus policy measures: main dimensions

Following chapter four, a number of conclusions can be drawn regarding the potential contributions made by CIVITAS policy measures towards more sustainable mobility. Four major fields of analysis are of particular importance with regard to the implementation of public policies, i.e.:

- the extent of the contribution that the thematic policy measures can make towards achieving the overarching objectives of environmental, social and economic sustainability;
- the time frame during which the measures generate their impacts;
- the territorial scale (local, urban or metropolitan) at which the most significant impacts are most likely to occur; and
- the principal stakeholders that the policy measures need to involve.

5.1.1 Sustainability

The notion of sustainability (in its environmental, social and economic components according to the definition agreed in 1987 by the Brundtland Commission and summarised below) can be used not only as a benchmark against which to measure the contribution that the CIVITAS Initiative has made to the promotion of a higher degree of sustainability in urban mobility, but it also acts as the core principle that has guided the implementation of single policy measures that, as part of a broader and complex implementation process, have collectively led to more sustainable urban mobility.
THE DIMENSIONS OF SUSTAINABILITY

In 1987 the Brundtland Commission, established by the Union Nation, defined sustainable development as “development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs”. Three interconnected components of sustainable development were considered: ecological or environmental, social or human, and economic, i.e.:

- The economic approach to sustainability is based on the concept of guaranteeing the maximum flow of income while at least maintaining the stock of assets or capital that yields these benefits. Interpretation problems arise with regard to the maintenance and mutual substitutability of the different kinds of capital (manufactured, human, natural etc.). Difficulties are also inherent in considerations of uncertainty, irreversibility and catastrophic collapse.
- The ecological view of sustainability focuses on preserving the resilience and dynamic ability of biological and physical systems to adapt to change. These systems may be interpreted to include all aspects of the biosphere, including cities. Viability of subsystems critical to the global ecosystem and protection of biodiversity are of key importance.
- The socio-cultural concept involves both intra- and intergenerational equity. Elimination of poverty and defending the rights of future generations are of central importance. Maintenance of the stability of social and cultural systems and reduction of destructive conflicts are to be pursued.

These three dimensions (environment, society and economy) of sustainability have been fully embedded into the policy measures that were implemented under the last CIVITAS Plus edition and have respectively been linked to the following overarching objectives:

- improving air quality, reducing oil consumption and GHG emissions, increasing liveability or urban environments (environmental dimension);
- raising citizens’ and stakeholders’ acceptance of the implemented policy measures (social dimension); and
- improving public authorities’ capacities to control management and investment costs of the implemented measures (economic dimension).

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A comprehensive and comparative overview of the impacts produced by the CIVITAS Plus policy measures for each dimension of sustainability is shown in the table below.

Table 12  CIVITAS Plus policy measures impact on sustainability

<table>
<thead>
<tr>
<th>CIVITAS thematic category</th>
<th>Policy measure</th>
<th>Impact on sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clean and fuel vehicles</td>
<td>Vehicle modification or replacement</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Alternative fuels</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td>Collective passenger transport</td>
<td>Information, ticketing and tariffs</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Accessibility, infrastructure and network</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>PT fleet management</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td>Demand Management Strategies</td>
<td>Parking and park-and-ride</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Regulative measures (access and LTZs)</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Pricing (road charging, rewarding mechanisms and R&amp;D)</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Cycling infrastructure enhancements</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td>Mobility Management</td>
<td>Mobility services</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Mobility plans</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Mobility marketing</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Eco-driving</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td>Safety and security</td>
<td>Pedestrians and cyclists</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Public transport</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Traffic management</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td>Car-independent lifestyle</td>
<td>Car-sharing</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Carpooling</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Cycling services (bike-sharing, integration cycles and buses)</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td>City logistics</td>
<td>New distribution schemes</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Access restrictions and control</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Freight partnership schemes and driver support</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td>Transport telematics</td>
<td>Traffic management and control</td>
<td>![Impact symbol] ![Impact symbol] ![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>PT fleet management</td>
<td>![Impact symbol]</td>
</tr>
<tr>
<td></td>
<td>Parking guidance systems</td>
<td>![Impact symbol]</td>
</tr>
</tbody>
</table>

Note: positive ![Impact symbol] / negative ![Impact symbol] / neutral ![Impact symbol]

As illustrated above, the environment is a dimension where all policy measures implemented have yielded positive results. This applies, for example, to clean vehicles whose increased deployment combined with a higher use of alternative fuels has allowed significant savings in pollutant emissions. That said, further steps towards profitability of these clean technologies will still need to be taken.

Analogously, policy measures targeting collective passenger transport have also reported significant environmental improvements, while other important gains in this domain have been attained through the implementation of demand management strategies, such as, for instance, park-and-ride, LTZs and access restrictions.
Further environmental advances have been achieved through those policy measures that have encouraged cycling as a modal choice, either by improving the cycling infrastructure or increasing the availability of bike-sharing systems and their integration with collective passenger transport.

**Logistic and freight distribution** as well as **transport telematics** are further groups of policy measures that have shown significant eco-friendly potential. However, in most cases, the impact of these measures has turned out to be small even though further achievements might be possible through upscaling of these measures.

The assessment of environmental indicators has proved to be more problematic only when evaluating the impact of those measures aimed at **changing travel behaviour**, such as, for example, mobility management measures (mobility plans, mobility services, etc.) and car-independent lifestyle measures (car-sharing and carpooling).

Concerning the **social dimension**, **social acceptance** represents one of the key aspects to be considered and pursued. Looking at the CIVITAS Plus experience, and also considering that structural behavioural changes take time to happen and only work if they are adequately backed by awareness and acceptance, this component has produced satisfactory and convincing results. Citizens living in CIVITAS Plus cities have, indeed, demonstrated a positive attitude towards innovations in urban mobility which has, in turn, facilitated an easier shift in favour of more sustainable travel behaviour. Nevertheless, some policy measures still require additional efforts in terms of marketing and dissemination in order to effectively and pervasively raise the level of public acceptance of any proposed interventions.

Lastly, results regarding the **economic dimension** can also be considered promising. Although only a few groups of measures have undergone a full and extensive evaluation in terms of their economic impacts, the majority of the measures implemented have reported convincing outputs in relation to the costs that municipalities and public entities are required to bear to implement the measures.

Moreover, **pricing policies**, which are usually most sensitive in terms of public acceptance, have encountered positive reactions – if not at the planning stage then certainly as soon as their effects have started to be visible and tangible. This confirms that, provided they are adequately supported by marketing actions and promotion as well as by an involvement of all stakeholders from the initial phase of the planning process, even measures that are traditionally considered controversial can be successfully implemented.

In terms of economic sustainability, more critical situations are, instead, evident when measures involve significant infrastructural developments. This is clearly visible in the case of measures that: (i) have tested and promoted clean vehicles and fuels, (ii) have increased accessibility by expanding the PT infrastructure and network and (iii) have been concerned, at least to some extent, with the construction and improvement of cycling and walking networks and facilities.

In conclusion, CIVITAS Plus appears to have achieved promising results through the implementation of policies that correctly address the main problems affecting the participating cities. The analysis of the results of the implementation also provides useful information about major shortcomings and areas where improvements are needed.

Communication and stakeholder involvement are key to the success of all policies, but for some of them they are a prerequisite for implementation. Additional steps can be taken to improve marketing actions, and more efforts are required to evaluate the economic impacts.
in terms of monitoring these, identifying the right indicators for each specific policy and policy evaluation. Although challenging, these efforts would allow more reliable and comprehensive evidence on costs and benefits of the demonstrated measures to be pulled together, which, in turn, can be useful for facilitating upscaling, transferability and acceptance.

5.1.2 Timescale

The given timescale is a major determinant in securing successful measure implementation. In this respect, the analysis distinguishes two major types of impacts, i.e.:

- **the time required to implement the measure.** This is heavily influenced by the nature of the measure to be established (hard or soft measure) and the degree of smoothness of the implementation process, which is determined by the type and number of barriers that might emerge during the process; and

- **the time required before the effects of the measure implemented become visible and tangible.** In fact, as is often the case, for example, with technology innovation measures that involve the use of clean fuels and clean vehicles, a measure can require a relative short time to be implemented, but its impacts appear only in the medium term.

Specifically for policy measures that are characterised by a short-term implementation but are associated with medium- to long-term effects, three more factors need to be taken into account, i.e.:

- the **maturity** of the technology, which potentially reduces risks and uncertainties about any expected impacts;

- the **complexity** of the decision-making process for setting up regulatory actions (institutional levels involved, number of stakeholders, public acceptance and barriers), where a higher number of decision-makers involved proportionally increases the difficulty in agreeing on a specific measure; and

- the **flexibility** of the solutions and the possibility of adjusting the measure in the course of the implementation phase according to new and/or unexpected needs and/or changes.

Equally importantly, other measures that can be classified as short term in terms of their implementation have shown to be time consuming in achieving their expected impacts.

This applies, for instance, to pricing policy measures in relation to which a number of problems have been identified during their implementation stage, in particular:

- difficulties due to incomplete harmonisation that still exists among the fiscal policies regarding road vehicles of the European Member States and the long process involved in the adoption of economic regulations, both in the European institutions and in the Member States (e.g. concerning marginal cost road pricing, public services, freight transport pricing, etc.); and

- the problem of acceptance of these types of measure.

Given these preliminary considerations, the experience under the CIVITAS Plus edition has confirmed that a thorough assessment of the timescale both for implementing a policy measure and for achieving real impacts is a crucial step for rendering the planning of sustainable mobility actions successful. In this respect, a few basic principles can be highlighted.
Short to medium-term implementation times are usually required to establish measures like access regulation or parking strategies (including guidance systems), renewal of a PT fleet, traffic and mobility demand management services, and bike-sharing schemes. However, each of these measures requires a specific start-up time before it starts being effective and before its impacts become tangible.

Short-term effects have been identified in the case of measures introducing passenger and freight access restrictions as well as in the case of traffic management measures, while long-term impacts have been observed in relation to parking and park-and-ride measures and bike-sharing schemes. Reasons for that are the long time it takes for actual changes in behaviour to occur and the multifaceted and complex interrelations that these measures have with other measures that need to be planned in synergy.

CIVITAS Plus measures demonstrate that policy planners and decision-makers have to carefully consider not only the time needed for implementation of a measure, including the preparatory studies and stakeholders' consultation, but also the time needed for the measures to show optimal effect.

5.1.3 Territorial area

Evaluating the scope of the measures and their territorial area of implementation helps analyse their territorial impacts. Although all policy measures have essentially addressed the urban dimension, some of those proposed in CIVITAS Plus have proved to be better-performing than others, depending on their scope and area of implementation.

The policy measures with the strongest local connection are certainly those related to the improvement of cycling and walking infrastructures (including those targeting increased safety levels) and to access regulation. The vast majority of the remaining measures apply to the entire urban area while, for some, the impacts have been observed to be more effective if implemented on a wider scale.

A larger scale of implementation is required not only by those measures that have a direct or indirect influence on long-distance and/or interurban demand, but also by those measures that involve decision-making and investment levels that go beyond the boundaries of local authorities; e.g. in the case of the measures addressing intermodality and integration between different modes (integrated ticketing, park-and-ride, integration of cycling and buses) or those modifying travel habits (mobility plans and services, and pricing and rewarding mechanisms). Another good example of the latter is the testing of new, clean vehicle and fuel technologies and measures regarding freight partnerships. In this respect, it is worth underlining that measures promoting city logistics (access restrictions and control) have been deployed on a metropolitan scale.

5.1.4 Stakeholders

A stakeholder is any individual, group or organisation affected by, or able to affect, a proposed project and its implementation (GUIDEMAPS 2004a). This includes the general public as well as businesses, public authorities, experts and special interest groups.
Transport policies, in fact, potentially have significant impacts on people’s attitudes and lifestyles (i.e. changes in mobility patterns), industry production (vehicle, engine and component manufacturers, energy utilities) and public services (public transport, freight facilities). For this reason, they generate a lot of attention from both public (authorities, politicians, decision-makers) and private (operators, businesses, local communities) stakeholders.

A comprehensive list of potential stakeholders is provided in the table below.

**Table 13 Typical stakeholders involved in transport projects**

<table>
<thead>
<tr>
<th>Government/Authorities</th>
<th>Businesses/Operators</th>
<th>Communities/Local Neighbourhoods</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Union</td>
<td>National business associations</td>
<td>National environmental NGOs</td>
<td>Research institutions</td>
</tr>
<tr>
<td>Ministry of Transport</td>
<td>Major employers</td>
<td>Motorist associations</td>
<td>Universities</td>
</tr>
<tr>
<td>Other national ministries</td>
<td>Private financiers</td>
<td>Trade unions</td>
<td>Training institutions</td>
</tr>
<tr>
<td>Regional government</td>
<td>International/national businesses</td>
<td>Media</td>
<td>Experts from other cities</td>
</tr>
<tr>
<td>Local authorities</td>
<td>Regional/local businesses</td>
<td>Local authority forums</td>
<td>Foundations</td>
</tr>
<tr>
<td>Neighbouring cities</td>
<td>Local business associations</td>
<td>Local community organisations</td>
<td></td>
</tr>
<tr>
<td>Local transport authority</td>
<td>Small businesses</td>
<td>Local interest groups</td>
<td></td>
</tr>
<tr>
<td>Traffic police</td>
<td>Retailers</td>
<td>Cycle/walking groups</td>
<td></td>
</tr>
<tr>
<td>Other local transport bodies</td>
<td>Utility services (e.g. electricity, telecommunications)</td>
<td>Public transport user groups</td>
<td></td>
</tr>
<tr>
<td>Other local authority bodies</td>
<td>Engineers/contractors</td>
<td>Transport users</td>
<td></td>
</tr>
<tr>
<td>Politicians</td>
<td>Transport operators/providers</td>
<td>Citizens</td>
<td></td>
</tr>
<tr>
<td>Other decision-makers</td>
<td>Transport consultants</td>
<td>Visitors</td>
<td></td>
</tr>
<tr>
<td>Partnership bodies</td>
<td>Car-sharing companies</td>
<td>Citizens in neighbouring cities</td>
<td></td>
</tr>
<tr>
<td>Project managers</td>
<td>Bicycle rental operators</td>
<td>Disabled people</td>
<td></td>
</tr>
<tr>
<td>Professional staff</td>
<td>Other mobility providers</td>
<td>Landowners</td>
<td></td>
</tr>
<tr>
<td>Emergency services</td>
<td></td>
<td>Transport staff</td>
<td></td>
</tr>
<tr>
<td>Health &amp; safety executives</td>
<td></td>
<td>Parents/children</td>
<td>Older people</td>
</tr>
</tbody>
</table>

Source: GUIDEMAPS, 2004

As observed in most of the cases, communication and involvement of stakeholders and politicians can considerably influence the success of measures’ implementation. Stakeholders can become important drivers as they can support a measure in several ways: bringing experience, insight and knowledge in the fields of action concerned, providing financial resources, offering power and capability to influence the existing administrative, legal and planning framework, contributing in setting priorities, etc. Furthermore, political stakeholders are able to market, enforce and enhance a project.

A personal involvement of key politicians has, in some cases, been an engine for the implementation of specific CIVITAS measures. For example, the mayors of Skopje and of
Tallinn were both strong supporters of ICTs in transportation and that is why they paid special attention to these measures and therefore contributed to their success. Some politicians provide a “good example” like in the case of Bologna, where a new mobility councillor removed permits for all councillors to access the municipality headquarters located in the historical centre.

In the majority of cases, the involvement of political stakeholders has been limited to the municipal level, but there are some countries where the regional administration is quite strong and substantially influences decision-making processes. In those cases there has been communication between municipal and regional politicians through ad hoc meetings and, in some cases, by regional decision-makers presenting CIVITAS activities to the media.

Exchanges and communication between CIVITAS Plus cities and their respective national governments were found to be few and far between. This could be considered a limit of the CIVITAS Plus experience, and more active communication between national governments and decision-makers could increase visibility, create stronger awareness and push for those changes in the national transport policies that are also important for the success of local measures.

One of the lessons learnt from CIVITAS Plus cities is the importance of involving all main groups of local stakeholders as early as in the planning phase and address potential barriers from the initial design of the measure in order to achieve a higher level of acceptance. This is particularly relevant in cases where it is clear from the early planning stages that the stakeholders involved have different and/or conflicting objectives. Conflicting interests, if not managed and resolved, can lead to serious implementation problems later on.

Even though the early involvement of stakeholders cannot completely avoid conflicts around the proposed measures arising, it can positively contribute to a smoother implementation process and should be a prerequisite for the proposal of new policies.
5.2 Policy areas

The experience of the CIVITAS Initiative has highlighted the contribution of each policy measure to the promotion of a sustainable mobility model at an urban scale. Its evaluation has also pointed out the existing interplay between, on the one hand, the implementation process of the measure and, on the other hand, the timing (short, medium and long term), territorial scale (local vs metropolitan) and involvement of all relevant stakeholders as a success factor (drivers) in rendering the policy measure operational and effective.

The following conclusion are drawn on the basis both of the results obtained under the CIVITAS measures implemented as described in the previous chapter four and the progress made in the context of the EU Common Transport Policy. The latter places particular attention to the three actions that the White Paper (2011) identifies as priority actions on the urban scale, i.e. developing SUMPs at a wider EU level, setting up a framework for road user charging and further promoting urban logistics.

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**WHITE PAPER 2001**

**ANNEX 1 LIST OF INITIATIVES: INTEGRATED URBAN MOBILITY**

1. **Urban Mobility Plans**
   - Establish procedures and financial support mechanisms at European level for preparing Urban Mobility Audits as well as Urban Mobility Plans, and set up a European Urban Mobility Scoreboard based on common targets. Examine the possibility of a mandatory approach for cities of a certain size, according to national standards based on EU guidelines.
   - Link regional development and cohesion funds to cities and regions that have submitted a current and independently validated Urban Mobility Performance and Sustainability Audit certificate.
   - Examine the possibility of a European support framework for a progressive implementation of Urban Mobility Plans in European cities.
   - Integrated urban mobility in a possible Smart Cities Innovation Partnership.
   - Encourage large employers to develop Corporate/Mobility Management Plans.

2. **An EU framework for urban road user charging**
   - Develop a validated framework for urban road user charging and access restriction schemes and their applications, including a legal and validated operational and technical framework covering vehicle and infrastructure applications.

3. **A strategy for near-‘zero-emission urban logistics’ 2030**
   - Produce best practice guidelines to better monitor and manage urban freight flows (e.g. consolidation centres, size of vehicles in old centres, regulatory limitations, delivery windows, unused potential of transport by river).
   - Define a strategy for moving towards ‘zero-emission urban logistics’, bringing together aspects of land planning, rail and river access, business practices and information, charging and vehicle technology standards.
   - Promote joint public procurement for low emission vehicles in commercial fleets (delivery vans, taxis, buses).
5.2.1 Lessons learnt from the CIVITAS Plus experience

The CIVITAS Plus edition confirms the effectiveness of many of the policy measures implemented, while at the same time highlighting the need for future new research.

Some policy measures seem to be more established in their practical implementation (for example, walking and cycling measures or measures supporting public transport), while others still require further and more in-depth technical and scientific investigation (this typically refers to measures linked to clean fuels and vehicles or to ITS). Other measures need to cope with new mobility models and lifestyles and call for a new vision of urban mobility services (as is the case with carpooling and car-sharing).

Finally the development of strategic planning tools and close attention to participation, sharing and acceptance of the policies implemented are of paramount importance as well as being a prerequisite for a successful implementation of the policies concerned. That said, and building on the results of the CIVITAS Plus edition, this section provides some general, pertinent suggestions of possible areas for effective future plans and developments aimed at achieving a higher level of sustainability in mobility and transport.

Soft transport modes: cycling and walking

Urban and metropolitan areas suffer from high levels of pollution although alternatives to private transport are already available.

In particular cycling offers considerable potential for replacing car trips and, compared to other transport modes, carries significant personal and societal benefits. An additional advantage lies in the fact that cycling involves much lower economic costs than investments in any other mode of transport.

CIVITAS PLUS SUGGESTIONS ON CYCLING AND WALKING

- Cycling and walking are not to be seen as standalone activities but as part of the whole city infrastructure. Multimodal connections with bus stations, train stations, residential areas, and shopping and business districts are crucial. When several cycling and walking interventions are implemented at the same time or in short intervals, the impacts of interventions can be far greater due to their synergistic effect.

- A long-term city plan for sustainable transport with specific attention on cycling and walking is strongly recommended. The plan should include both hard and soft measures. Such a city plan would act as an official framework for all cycling and walking measures.

- Public engagement is important to support a change in modal shift from private car use to cycling and walking. Political support is vital for the implementation of successful cycling and walking measures. Strong involvement of and communication between different partners/stakeholders as well as value-guided leadership are essential for the success of cycling and walking measures.

- Increasing the number of people cycling in a city requires strong political conviction and resolution. This conviction must be present at the highest political and management levels in order to set concrete and quantitative objectives towards boosting cycling uptake. To be successful, politicians must clearly express their vision regarding cycling and its benefits, while at the same time offering solutions that deal with possible disadvantages.
Cycling policy is not only an issue of transportation, but it is an issue across many different policy fields and for most political parties. With a broad commitment from the various policy departments, cycling initiatives can more easily be integrated into long-term political ambitions to raise air quality, cut carbon, improve public health, and improve the quality of life and the general feeling of safety by having more people on the streets. A strong commitment within the various areas of administration also helps maintain ongoing and beneficial relationships with stakeholders including police departments, cycling communities, car owners associations, PT companies and organisations involved with retail and shopping.

A shift in traffic policy towards a more bike friendly city on a more human scale includes necessary changes in administration which may require either an alteration of the professional set of values or the addition of new competencies. From CIVITAS MIMOSA, 2013a.

Public transport in urban areas

Improving public transport relies on a mix of policies, where economic measures on the supply side need to be supported by adequate transport demand management policies for managing demand in a sustainable way and with specific attention being paid to those measures that are most capable of reducing car use.

CIVITAS PLUS SUGGESTIONS ON PUBLIC TRANSPORT

- A positive attitude from the authority towards public transport is a precondition for success, as is the involvement of key stakeholders.
- The funding of measures is an important issue for agreements between PT operators and public authorities. In spite of the fact that some measures seem to be a clear success, including from an economic perspective (e.g. purchase and implementation of ticket vending machines, electronic ticketing, and in some cases on-demand transport thanks to substantial savings in operational costs), a substantial subsidy is usually needed for these kinds of measures. Good financial planning is therefore a necessary factor that determines the feasibility of a measure.
- Some European countries have only little experience with the latest technologies in PT services; in these circumstances, sharing experience with other cities can help significantly. It is recommended that the exchange of experience among cities be supported and relevant databases be established.
- Modern technologies aimed at increasing travel comfort also for passengers with specific mobility requirements such as blind people (“talking stops”), including the close cooperation with representatives of these groups is essential for a successful implementation of such measures. Ensuring technology compatibility among different technological systems and other measures (such as the expert system, GPS data output, communication system, driver communication, ticketing, positioning, RTPI, etc.).
- Supporting exchange of methodologies and experience regarding evaluation among cities might be helpful, including exchange and use of results of other surveys conducted in each city by different institutions (usually universities or research institutions).
- The research and development stage is important should include a survey of requests of PT users in order to avoid setting up a service which does not address the needs of users.
- When implementing Dial & Ride systems, it is advisable to undertake a demographic study on the target group. E.g. if there is a high share of people with low computer literacy and...
Internet skills, it is necessary to adjust the booking system and offer, e.g. telephone services, instead of Internet-based services only.

**Clean vehicles, clean fuels and eco-driving**

There is a general agreement that technology is the most promising and effective tool to reduce pollution and GHG emitted by transport activities. Nevertheless, **technological progress per se is not sufficient to reach this goal**, and the severity of pollution-related problems also requires implementing policies that can secure positive results in the short term, including incremental improvements of currently available technologies (e.g., the use of electric and hybrid vehicles or the development of eco-driving models both for private and public fleets).

**CIVITAS PLUS SUGGESTIONS ON CLEAN VEHICLES, CLEAN FUELS AND ECO-DRIVING**

- National and international standards for biofuels are needed to instil confidence in users and providers. Without such standards, the difficulties encountered in the implementation of some measures in ensuring consistent supplies of fuel will be replicated elsewhere. Contractual conditions were found to be necessary to overcome barriers associated with fuel provision.
- The promotion of alternative fuels for a more sustainable operation requires coherent consideration of taxation and legislative policies for the different fuel types at a regional and international level, as well as local political and management support.
- Policies are more acceptable if the public is aware of the negative impacts associated with car use and if they understand the need for measures to address these impacts. This is relevant for technology and fuel solutions too: car owners are more willing to pay extra for biofuels if they believe that biofuels are an effective solution to climate change (ITF, 2011).
- Retrofitting older municipal and public vehicles to use alternative fuels can offer a cost-effective short- to medium-term solution to allow current fleets to continue to be used beyond their current lifespan (in terms of EURO standards).
- Policies, incentives and technologies should be developed to encourage eco-driving, including refresher courses to ensure that short-term benefits continue into the longer term.
- Cities wishing to implement more sustainable vehicle fleets should have access to relevant technical and operational expertise to help specify, implement and maintain the fleets, as such expertise is often outside the scope of the traditional competences of their staff. Additional expertise is needed to develop effective awareness campaigns and to help overcome barriers of slow uptake of incentive schemes.
- Whilst the costs of hybrid vehicles remain higher than those of the most modern equivalent conventionally powered vehicles, the sustainability benefits are valuable and need to be promoted.
- Eco-driving is effective and should be included in national driver training standards as well as in training programmes.
**Develop ICT and transport telematics**

Advanced ICT can contribute greatly to co-mobility by improving infrastructure, traffic fleet management, facilitating better tracking and tracing of goods across transport networks and better linking of transit points and intermodal services. This will be made more practical and affordable by emerging technologies such as the use of the Galileo satellite positioning system.

**CIVITAS PLUS SUGGESTIONS ON THE INTELLIGENT TRANSPORT SYSTEM**

- There are several fundamental requirements for ITS measures in access and parking management. The first is to choose appropriate ITS applications: IT systems should be tailor-made and will be effective only if they respond to the specific city’s needs. Secondly, a completely new approach is to be avoided, as far as possible, in favour of a more established and tested approach. In the past, there have been too many examples of failures.
- The same is true for enforcement rules and protocols: it is better to take advantage of approaches that have been tried and tested elsewhere than to aim to generate new ones. In this present round of CIVITAS some cities have reported problems in getting bye-laws passed to allow for the enforcement or use of particular schemes, or that they had to undergo long trials of equipment. Whenever standards and processes used elsewhere can be adopted, this should be done in order to reduce or avoid these barriers.
- Finally, it should be ensured that the scope and the use of the ITS are clearly understood by users. Communication and information are a key to success.

**Alternative car use: car-sharing and carpooling**

This encompasses the development of eco-drive procedures in the road transport sector (freight and passenger) to reduce emissions and fuel consumption. **De-marketing of cars**, supporting **car-sharing and carpooling initiatives**, encouraging green logistics, promoting eco–driving and ITS are all soft measures that can play a highly effective role in strengthening the positive impacts of other hard measures and in some cases in mitigating their drawbacks.

**CIVITAS PLUS SUGGESTIONS ON ALTERNATIVE CAR USE: CAR-SHARING AND CARPOOLING**

- Feasibility studies are essential before starting measures in the field of alternative car use. These should contain topics such as possible target groups and their culture, possible participants (frontrunners) and their interests, spatial requirements, equipment needed, business models, and possible positive and negative effects.
- Where congestion, space constraints and other urban driving factors (such as high parking charges) are absent, the administrators or operators of alternative car use schemes should provide financial incentives or other motivations (such as free trials) to attract additional users; promotion and endorsement alone may be insufficient in these cases.
- Car-sharing schemes should target business users as well as private individuals, as this
increases both the utilization of vehicles across different time periods, and the number of subscribers. However, these schemes will need to improve the business offering according to user needs, for example in providing a corporate ‘pool’ card. Similarly, city or municipal authorities should target potential carpooling schemes at businesses located in suburban areas with limited parking or lack of public transport, as these will have a high demand.

- Car-sharing schemes should deploy more environmentally friendly vehicles where possible, as these help reduce pollution and emissions as well as private car demand. The higher leasing cost incurred for these vehicles can be offset by lower fuel consumption costs.
- City or municipal authorities should ensure that they are proactive in promoting (or continuing to promote) alternative car use schemes, as marketing and promotion are prerequisites for the attraction of private users and businesses to these services.
- Promotions through ‘word-of-mouth’ and strong community engagement, including the use of local ‘client ambassadors’ or ‘nudgers’, are more effective in sustaining usage of car-sharing schemes in the long-term. Administrators of such schemes should consider, for example, involving the local community in the introduction of people to these services and in determining the car-sharing locations; this can deliver sustained benefits compared to traditional ‘top down’ promotional campaigns. As with previous CIVITAS findings, scheme administrators or developers should ensure that all project stakeholders are engaged (and committed) to the deployment of alternative car use schemes.

**City logistics**

City logistics is increasingly becoming a key issue in maintaining sustainable cities. Just-in-time delivery with the elimination of warehousing and the growth of home delivery services have both led to an increase in the number and flow of vehicles on the streets. City-wide mobility plans, therefore, need to consider freight as well as passenger mobility.

Freight transport logistics, in fact, has an essential urban dimension. Distribution in urban conurbations requires efficient interfaces between trunk deliveries over longer distances and distribution to the final destination over shorter distances. The distribution process between production centres and customers within an urban area needs to be efficient and clean.

A holistic vision should cover freight transport and pay attention to aspects of land-use planning, environmental impacts (pollutant emissions) and traffic management (see the relationship between congestion, fuel consumption and air pollution).

Green logistics measures such as ICT (loading and journey management), regulation and restriction of access to urban areas, low emission vehicles and toll systems for light duty and heavy duty vehicles could optimise logistics chains for long and short journeys.

**CIVITAS PLUS SUGGESTIONS ON CITY LOGISTICS**

- Urban freight transport should be seen as a complex system / network of activities and stakeholders with different, often conflicting, interests. This requires for a participative approach, including all the key stakeholders (citizens are key stakeholders!). This participative approach will (i) conduct feasibility studies (including city specific circumstances); (ii) lead to shared problem recognition; (iii) explore alternative solutions; and (iv) lead to implementation, monitoring and evaluation of measures.
Stakeholder involvement should be maximised from the planning stage as partnerships underpin the success of sustainable logistics measures. Stakeholder collaboration may be stimulated through the acknowledgement of ‘real’ issues and through the provision of incentives, which could include the ability to negotiate for improved delivery access. Time needs to be invested to build collaborative partnerships (Freight Quality Partnerships) to ensure that information can be shared and potential problems identified.

Successful collaborative partnerships between appropriate stakeholders can lead to the formulation of high impact freight strategies that consider logistical needs for the city, businesses, transport operators and local residents.

Strategies need to be implemented gradually and communicated widely using a range of media outlets to maximise dissemination e.g. local media, leaflets, posters and the Internet. Any changes made to the local road network need to be communicated effectively through the use of clear signage to ensure that freight is redirected along the appropriate routes.

Regulatory measures need to be enforced to ensure that the planned benefits can be achieved.

More collaboration is required between different transport solutions operating within cities to optimise consolidation and bundling of deliveries.

### 5.2.2 Future research

With reference to additional actions of a more general and strategic nature, two topics deserve further research and a new understanding: integrated planning and sustainable urban mobility planning.

The challenges that cities need to cope with in the future and that have been outlined in chapter two of this document in terms of demographic, environmental, social and economic pressure, require the adoption of a **new planning approach that is capable of linking together and integrating in a holistic fashion the three following domains: land use, environment and transport.**

The pivotal role of urban mobility, as currently reflected in EU policy documents and in the financial support instruments currently in place or to be established in the framework of future EU research programmes (White Paper, Smart City, *regional development and cohesion funds to cities and regions*, Horizon 2020, etc.), requires the local authorities to adopt tools of integrated planning.

Spatial planning at urban and regional level can play an important role in the medium and long term both in slowing down the increase in distance travelled both by goods and passengers and in increasing the attractiveness of alternative modes by concentrating new developments on the rail or metro systems.

Integrated and strategic planning (in terms of land use, transport and environmental) would play a crucial role in overcoming these weaknesses. In this regard, not only local government levels but also national and international levels would be very important in supporting innovation, addressing resources and intended use, and promoting the spread of best practice with the aim of building a sustainable mobility model.

In the field of **mobility**, planning methodologies have been progressively improved and fine-tuned, leading to the establishment of an urban mobility planning approach that is clearly and
strongly inspired by sustainability criteria. Urban mobility has become an important factor in city development and the field where more sustainable and integrated planning is necessary in order to maintain a good quality of life. Several cities have produced their plans to integrate related fields like transport, land use, and energy; however, guidance and cooperation of authorities at the local level with regional and national authorities is generally needed.

**SUSTAINABLE URBAN MOBILITY PLANS (SUMPS)**

A strategic plan that builds on existing planning practices and takes due consideration of integration, participation and evaluation principles to satisfy the mobility needs of people today and tomorrow for a better quality of life in cities and their surroundings.

**What is its purpose?**
- ensuring the accessibility of jobs and services to all;
- improving safety and security;
- reducing pollution, greenhouse gas emissions and energy consumption;
- increasing the efficiency and cost-effectiveness of the transportation of persons and goods; and
- enhancing the attractiveness and quality of the urban environment.

**How does it work?**
A SUMP is a way of tackling transport-related problems in urban areas more efficiently. Building on existing practices and regulatory frameworks in the Member States, its basic characteristics are:
- a participatory approach;
- a pledge for sustainability;
- an integrated approach;
- a clear vision, objectives and measurable targets; and
- a review of transport costs and benefits.

Source: [www.mobilityplans.eu](http://www.mobilityplans.eu)

On the European level, **Sustainable Urban Mobility Plans** (SUMPs) have been proposed through several policy actions, and best practices across EU are progressively being collected.

The development of SUMPs represents one of the principal actions where, at EU level, the technical and scientific community of researchers and professionals can have a central role and significantly contribute in promoting, together with local communities, a widespread and shared awareness about a new model of urban mobility whose remit is sustainability objectives.
6. Conclusions

This sixth and final chapter considers the legacy left by the CIVITAS Initiative and outlines the way forward for shaping sustainable urban mobility in European cities.

Section 6.1 looks back at the experience of the CIVITAS Plus edition and summarises the lessons learnt from the participation in the programme with respect to the framework required for implementing sustainable mobility actions in terms of context, teamwork, target groups, tools and methodologies.

Section 6.2 integrates this reasoning by presenting those factors (cultural innovation, smart planning, roles of decision-makers and intervention priorities) that appear to play the largest role in shaping the planning and implementation of urban sustainable mobility in the future.

6.1 The CIVITAS legacy: lessons for future editions

Thanks to the participation in the CIVITAS Initiative, the cities co-operating in the five CIVITAS Plus Collaborative Projects\(^8\) have drawn valuable lessons from the implementation of sustainable measures and from their involvement in the Initiative. Results for each policy measure were presented in chapter four; in this chapter the focus shifts onto the lessons learnt from the participation in the programme in general.

Overall, the CIVITAS Plus cities share the same feeling: participation in large-scale European demonstration projects is quite challenging. However, their involvement has also been a great opportunity to implement large and innovative solutions in the field of sustainable mobility, and it has been proved that participating in the CIVITAS Project can have a positive influence on future funding.

The scheme below summarises the issues that should be taken into consideration in order to benefit from previous experiences (by learning from positive achievements, while avoiding mistakes that may lead to failure).

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\(^8\) Collaborative Projects are the groups in which CIVITAS demonstration cities gather together, sharing objectives and methods to achieve a real change in urban mobility towards sustainability.
6.1.1 Context

Context plays a relevant role in the successful implementation of sustainable mobility actions.

Political representatives must believe in the project and work towards its conclusion throughout their mandate. **Political support for the measures must be clear and well-defined in advance.** Measures must be viewed within a long-term context and must be adopted as a part of the global city planning process, not in isolation. A feasibility study for the implementation of the proposed project should be made available to the public. It has been proved that if there is a stable and strong transport strategy in place in a city, any political changes in city administrations might not be so disruptive in relation to measures’ implementation.

Although there is not yet a success formula for **local authorities, crucial factors certainly are consistency, persistence and flexibility.** The city should send out consistent messages on what it wants to achieve so that other parties can anticipate its actions (consistency); the city should not be discouraged when there is no instant success (persistence); the city should be able to respond to developments and changing needs in the market and other stakeholders (flexibility).

Another relevant aspect is the coordination between municipal departments: an integrated way of approaching the implementation of sustainable mobility initiative has to be ensured. **Internal cooperation among different departments and cooperation with other government bodies are key aspects** in ensuring the successful implementation of
measures and helping involve other partners. The alignment with existing regional and national strategies guarantees the further development of the measures implemented.

6.1.2 Teamwork

One of the most relevant elements in the implementation and evaluation process of a measure is the capability of working in partnership as well as team-building skills of the team in charge of the activities. Process evaluation tools such as Focus Group and Learning Histories workshops have proved to be valuable catalysts for working in partnership. It has been demonstrated that most of the measures need a strong (but also flexible) team with different capacities and responsibilities. The capacity of a team to change its work as well as its leader is a quality which helps projects succeed.

Cities have gained a lot of new European contacts through forums and workshops, resulting in higher availability and dissemination of knowledge; however, in the future, horizontal communication is something that should be organised in a better way at initiative level.

6.1.3 Target groups

Measures indirectly or directly address different targets: stakeholders and specific users.

As for the former, one of the most effective ways to successfully address the objectives is to include all the relevant partners and stakeholders from the outset of the project. The benefits of the involvement of key stakeholders in the process of addressing problems and challenges have been widely recognised. Some successful measures directly include a strong participative element, encouraging citizens and stakeholders to take part in planning and decision-making processes.

Another valuable asset in the projects is the ability to address the needs of a wide variety of target groups. Although mobility patterns are the sum of a number of individual wills which differ in terms of values, motivations, perceptions and requirements, common trends should be identified for certain target groups who share similar backgrounds and needs; an effective categorization and analysis of the target groups helps the provision of tailored actions, thus maximising the impacts of the overall strategy.

Public consent should be sought from the very beginning and gradually, especially for controversial topics. Moreover, better planning of the steps of citizens’ engagement is crucial: starting generally (with a brochure that addresses the general public) then moving towards individualised actions. During the most direct step (face-to-face discussions), appropriate communication tactics and approaches should play the most important role.

At the final stage, an investment should be made in efforts to communicate results. Sustainable mobility needs strong awareness-raising and communication campaigns. During the implementation of measures, clear information about the aims of the proposed actions and their progress should be provided to the population and any interested parties. Communication of results is also essential in order to highlight the effectiveness of the actions and thereby paving the way for future developments. Best practice recommends the creation of multiple channels of communication with all relevant actors; these communication channels include the use of both innovative technologies and social networks but also traditional means of communication.
6.1.4 Tools and methodologies

More effective tools and methodologies emerge from the experiences conducted by the cities involved in CIVITAS Plus.

**Integrating measures has proved to be of utmost importance.** Among the main lessons learnt is the importance and strength of implementing a set of measures covering extremely heterogeneous projects all linked by a strong common strategy; this approach is useful in creating synergies among all the measures. Integration has to be understood not only as the integration of different policy fields into one comprehensive urban policy concept – although this is one of the major innovations in CIVITAS. An efficient strategy includes a **balanced mix of push and pull measures**, which result in significant positives impacts at city level.

In the past, there has been a lack of practical use of analytical knowledge in taking urban planning decisions. This is especially true in most of the EU-12. There is a general need to **empower transportation planners by providing them with useful tools and frameworks to analyse complex transport-related issues**. Positive circumstances have proved to be those where the people in charge of the measures carried out research and studies to understand the state of the art of available solutions, choosing the best ones for the respective city.

An important lesson learnt regards evaluation itself. Evaluation was used to be fairly uncommon for traffic and transport measures. But thanks to the hard work conducted in performing evaluations, some key results have emerged: **evaluation provides relevant information about best practice, gives clear guidance on project upscaling and prevents future failures**. It is therefore crucial to make evaluation part of project planning.

Evaluation is worth nothing if it is not disseminated: therefore the results of the evaluation need to be circulated to colleagues, other cities and other governments. The process evaluation approach has finally convinced politicians and decision-makers that lessons can be extracted even if the results are not particularly satisfactory. It has to be borne in mind that showcasing good practice is essential, even if some of the measures have not been fully realised.

6.2 The way forward

Relying on the lessons learnt from the CIVITAS Plus experience as summarised in the previous section, this section 6.2 looks beyond this and into the future; it provides a contribution to the understanding of which determinants are the most likely to play a key role in shaping the planning and implementation of urban sustainable mobility in the future.

In particular, this section concentrates on issues of cultural innovation, smart planning and roles played by decision-makers at different institutional levels, and it provides a close look at those priority areas of intervention that cities’ decision-makers will necessarily have to consider.

6.2.1 Cultural innovation

With the end of the third CIVITAS edition and in the light of reflections on urban sustainable mobility measures that have been implemented, it seems that the more urgent and relevant
question for cities in Europe is not “Which changes are needed and what has to be done?” but rather “How should the changes required to achieve sustainable urban mobility be successfully implemented?”.

Push and pull measures as well as the ASI paradigm (avoid/shift/improve) to lessen car-dependency and attract more users towards sustainable modes are well-known in almost all European countries. There is a shared understanding about what has to be avoided, shifted and improved; however, the means of achieving this are less clear.

The reluctance towards introducing methodological changes is by far the most influential negative aspect in making innovative changes for a mobility culture: this is both a matter of gaining capacities and of being open to new dialogue, tools and partnerships. Nowadays, city administrations face tough challenges: shrinking resources and multiple responsibilities. This can lead to a bunker mentality where people are afraid for their jobs and unwilling to be open to new ideas and take risks. When the workload seems unmanageable, there is little eagerness to try out new approaches.

This is precisely the opposite of what cities need to be able to cope with the current challenges. Cities lose capital when their staff resists engaging in new debates and initiatives. Successful capacity building has to be engaging, accessible, inspiring, relevant and well-organised. New challenges have to be faced by building new capacities and expertise. Transnational exchange and capacity building can help open minds, convince stakeholders to take those first steps, and anchor the changes within the local administration.

The new mobility requires being receptive to a new vision of the city, new ways of working and consensus building. This means involving city stakeholder groups and being open to new business models and partnerships with the private sector, where risk and returns are shared. Green and sustainable solutions can be developed and explored with and by the inhabitants of the city and the business community as they, when the appropriate background knowledge is provided and a robust cooperation framework is agreed, are best suited to mediate the right solutions.

Multi-stakeholder involvement might hold a certain ‘fear factor’ at the beginning. But this reduces once stakeholders start talking. It is sound advice to start the dialogue early in the process, when the trenches have not yet been dug. It is important to keep the debate and issues open, so as not to send the participants running for cover before they have a chance to hear the viewpoints of the others.

6.2.2 Smart planning

The overarching condition to this cultural innovation is the development of a new concept of transport planning. The perception of the intense and dynamic connection between mobility (including logistics) and the quality of spaces in cities has to be strengthened. The underlying logic is twofold:

- to place mobility mind-sets at the heart of planning; and
- to look at mobility as a connector.

The complexity of mobility decisions, either for creating new infrastructure or for designing new strategies to optimise the existing infrastructure, requires a new policy-making process that is underpinned by a well-developed and shared understanding of mobility.
The concept of mobility mind-sets with the human dimension at its heart creates the best basis for developing these strategies and informing decisions about investment. To get there, a real change in mind-set is needed, among politicians, civil servants, the many special interest groups as well as citizens. But an evolution of the mind-set rarely happens of its own accord: **the processes of participation are among the best methods to drive changes forward**. Cities need strategies for the long term, beyond political terms, to give public servants the confidence and stability to develop and implement plans.

At the same time, mobility issues connect many of the challenges that cities are faced with, such as unemployment, land use, public space, segregation, lack of social cohesion, and a deterioration in health (due to pollution and inactivity).

A new concept of mobility is to use **mobility as a tool to link to other elements of the city and develop shared solutions**. This approach leads to positive effects in the end by developing mobility solutions that can also foster growth, jobs and social cohesion. All cities are looking for smarter solutions that provide cleaner mobility for their inhabitants by reducing emissions and eliminating mobility poverty.

New mobility can indeed contribute to green economic growth: employing mobility mediators (who engage citizens, businesses and schools) in cities could be a valuable step forward. In the near future, cities will need to plan for the emergence of new jobs: for instance, in customer services, public consultation or marketing.

### 6.2.3 Roles of decision-makers

In general, CIVITAS does not require the intervention of levels of governance above the local one, but the experiences conducted so far demonstrate that harmonisation of regulatory frameworks or funding activities is crucial for certain kinds of policy measures. The normative apparatus and the financial resources available for the implementation of such measures do require the support of higher levels of governance. Furthermore, for many policies the research and development component is also relevant.

The following scheme shows the main factors influencing decision-making and recommendation-making processes at different institutional levels.
Measures taken by cities might be influenced by the European level through EU legislation or EU-provided funds. National governments might be involved through national legislation and administrative procedures, through setting national-wide goals and the preparation of policies on how to reach goals (including cities’ activities), and by providing finances for investments in transport infrastructure and the operation of PT services.

Decision-making processes at the city level must then reflect local conditions while taking national and European factors into consideration. Local conditions depend on goals and policies decided by local politicians, financial and human resources, the functioning of city administration and communication with key stakeholders.
CIVITAS has the potential to influence not only local but also regional and national decision-making processes. The following table illustrates the main recommendations, showing how and in which way different levels of authorities can contribute to the implementation of measures.

Table 14  Roles of policy actors at different levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Roles</th>
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| Local, regional authorities | • key role in the implementation of transport measures at city level  
• involving stakeholders and promoting the culture for sustainable urban mobility  
• planning process and integration of urban policies  
• monitoring of measure implementation and feedback on the planning process |
| National government | • legislation and harmonising rules and regulations (e.g. ITS)  
• promoting and fostering new approaches for innovation in the transport sector, methods and tools for evaluation  
• selection for funding  
• strategic decisions concerning the use of national and European financial resources and opportunities |
| European Union | • promoting EU-wide best practices  
• promoting integrated approaches to planning (SUMPs)  
• promoting of ex-ante and ex-post evaluation methods and tools  
• promoting innovation (Horizon 2020 research programme)  
• harmonisation on rules and regulations  
• focused financing according to urban/metropolitan areas, critical areas, vulnerable (historical/environmental) areas |

6.2.4 Intervention priorities

The challenges that cities will have to cope with over the next decade and the role that urban mobility will play in shaping attractiveness and liveability of European cities require decision-makers at different levels to consider the following objectives:

- to **develop** policy **packages of integrated measures** aimed at achieving common and shared objectives, such as the improvement in air quality levels, the reduction of CO₂ emissions, the reduction of congestion levels and car-dependency;
- to **intervene in major populated cities**, which are critical areas where negative impacts of transport are jeopardizing European population's health. These negative impacts are (and unfortunately will remain in the future) more evident; but, at the same time, these are the contexts where solutions are more easily tested and implemented thanks to population density and the innate propensity of urban environments towards innovation;
- to **carefully consider each territorial peculiarity**, in particular those of the regions that are most affected by transport problems because of high population density and high trip rates (including satellite urban areas surrounding the inner core of
metropolitan areas), together with those regions that are most vulnerable because they are highly exposed to untenable levels of transport demand (sometimes also compressed in short time slots, as for touristic destinations); and

- to commit and contribute to the definition and development of **policy actions to be planned together with local entities and representatives** (including citizens and stakeholders) in order to achieve real results in changing mobility patterns and, most importantly, to work towards these being enduring and not only instant reflections of a single measure, project or initiative.
References

CIVITAS ARCHIMEDES Project, (2012), Deliverable 1.1, Development and experience of alternative fuel demonstrations in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012a), Deliverable 2.1, Development and experience of collective transport and intermodal integration demonstrations in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012b), Deliverable 3.1, Development and experience of travel demand management demonstrations in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012c), Deliverable 4.1, Development and Experience of Travel Behaviour and Travel Plan demonstrations in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012d), Deliverable 5.1, Development and experience of safety and security Demonstrations in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012e), Deliverable 6.1, Development and experience of innovative mobility support measures demonstrations in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012f), Deliverable 7.1, Development and experience of clean and efficient urban freight support measures in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012g), Deliverable 8.1, Development and experience of bus management and traveller information systems in ARCHIMEDES. Aalborg

CIVITAS ARCHIMEDES Project, (2012)h, Exploitation synthesis report, Transport & Travel Research Ltd

CIVITAS ARCHIMEDES Project, (2012)i, Innovative cities - Before and after CIVITAS, City of Aalborg


CIVITAS ARCHIMEDES Project, (2013a), Project Final Report

CIVITAS ELAN Project, (2012), Innovative cities - Before and after CIVITAS, Rupprecht Consult

CIVITAS ELAN Project, (2012a), Work and Lessons Learned related to Citizen Engagement, REC

CIVITAS MIMOSA Project, (2012), Innovative cities - Before and after CIVITAS, Interactions Market Research Ltd


CIVITAS MODERN Project, (2012), Innovative cities - Before and after CIVITAS, Municipality of Craiova

CIVITAS POINTER Project, (2013), Deliverable 2.5.1c, Final report on wider implementation of measures, TRG -University of Southampton, CDV

CIVITAS POINTER Project, (2013a), Deliverable 2.6.1, Overview of evaluation findings, Transportation Research Group, University of Southampton

CIVITAS POINTER Project, (2013b), Deliverable 2.6.3.1, Alternative car use, Cluster Report 1
Cleaner and better transport in cities

CIVITAS POINTER Project, (2013c), Deliverable 2.6.3.2, Clean vehicles and fuels, Cluster Report 2
CIVITAS POINTER Project, (2013d), Deliverable 2.6.3.3, Cycling and walking, Cluster Report 3
CIVITAS POINTER Project, (2013e), Deliverable 2.6.3.4 Logistics and good distribution, Cluster Report 4
CIVITAS POINTER Project, (2013f), Deliverable 2.6.3.5, Mobility Management, Cluster Report 5
CIVITAS POINTER Project, (2013g), Deliverable 2.6.3.6, Traffic Management & Control, Cluster Report 6
CIVITAS POINTER Project, (2013h), Deliverable 2.6.3.7, Public Transport, Cluster Report 7
CIVITAS POINTER Project, (2013i), Deliverable 2.6.3.8, Access and parking management, Cluster Report 8
CIVITAS POINTER Project, (2013l), Deliverable 2.6.4, Cost Benefit Analysis Report, Transportation Research Group, University of Southampton, UK
CIVITAS POINTER, (2013m), Deliverable 2.6.5, Process Evaluation Report, TNO
CIVITAS REINASSANCE Project, (2012), Innovative cities - Before and after CIVITAS
CIVITAS VANGUARD Project, (2011), Involving Stakeholders: Toolkit on Organising Successful Consultations, CIVITAS Handbooks, Mobiel 21, Eurocities
CIVITAS VANGUARD Project, (2012), The first 10 years of CIVITAS: Share your experience and improve the initiative - Survey analysis, Clemence Cavoli, University College London, Elke Franchois, Mobiel 21
EUROCITIES, (2008), Demographic change & urban mobility and public space, Brussels
European Commission (2009), Action Plan on Urban Mobility, Communication from the Commission to the European Parliament, the Council, the European and Economic and social Committee and the Committee of the Regions, COM(2009) 490, Brussels
European Commission (2010a), World and European Sustainable Cities - Insights from EU research, Directorate-General for Research, Brussels


European Commission, (2013) *Clean Power For Transport: a European alternative fuel strategy*


European Environment Agency, (2013a), *Every breath we take - Improving air quality in Europe*, EEA Signals 2013, Copenhagen

European Metropolitan Network Institute, (2012), *A Strategic Knowledge and Research Agenda on Sustainable Urban Mobility*, European Regional Development Fund


EUROSTAT, (2012), *Urban-intermediate-rural regions*, newsrelease, STAT/12/51


FORESIGHT FOR TRANSPORT Project, (2004), *A Foresight Exercise to Help Forward Thinking in Transport and Sectoral Integration*, ICCR

GUIDEMAPS, (2004), *Successful transport decision-making. A project management and stakeholder engagement handbook*

NOISE Project, (2012). *Noise Observation and Information Service for Europe*


