

# CiViTAS

Cleaner and better transport in cities



## CIVITAS in Europe

**'A proven framework for progress in urban mobility'**

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# Foreword

## European cities lead the way

Cities play a central role in achieving Europe's broad sustainability targets. Major reforms in the organisation of mobility are a fundamental prerequisite, because of the sheer size of the populations concerned, high traffic densities and the concentration of economic activities in urban areas. Bold and positive moves can help to ensure a better quality of the life for European citizens, and more sustainable economic, social and environmental performance.

However, when it comes to identifying the most appropriate instruments to promote such reforms, cities are confronted with a number of difficulties and constraints specific to the urban context.

The CIVITAS Initiative is consequently driven by the need to identify, demonstrate and promote instruments that move us towards sustainability objectives without overstepping legitimate political constraints. By concentrating on experimentation and the promotion of best practices, CIVITAS has aligned itself with the approach recommended in the 2006 Mid-term Review of the European Commission's 2001 White Paper on Transport, 'Keep Europe Moving'. This update advocates a comprehensive approach to transport policy, one that confirms the overall objectives of competitive, secure, safe, and environmentally friendly mobility, while calling upon the complementary involvement of national, regional and local governments, and citizens and industry.

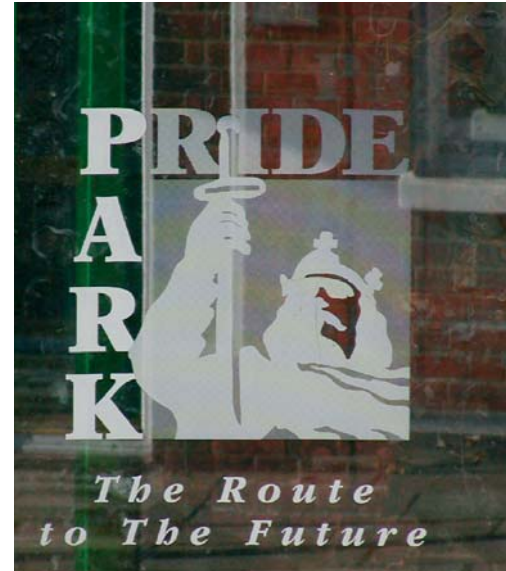
That is exactly what CIVITAS has strived to accomplish, by acting as a beacon in the promotion of new services and technologies for tackling pressing issues such as the mitigation of congestion, reduction of emissions, improvement of transport efficiency and the increased liveability of urban spaces. The range of policy measures deployed by CIVITAS has entailed co-operation across policy sectors and continuous dialogue with stakeholders, industries and citizens.

With respect to energy, CIVITAS supports the aims of the 2005 Green Paper on Energy Efficiency, 'Doing more with less', including reducing energy consumption through the purchase of clean fuel vehicles, public procurement of clean vehicles, improvement of traffic management, increasing use of alternative fuels, particularly in public transport and public fleets, and city centre access regulation favouring clean vehicles. These actions are also in line with the energy policy envisioned in the 2006 Green Paper 'A European Strategy for Sustainable, Competitive and Secure Energy', which argues for a substantial contribution by the transport sector towards reinforced security of energy supply, through the diffusion of alternative fuels, the reduction of energy demand, and the promotion of energy efficiency.

These achievements have been acknowledged by the European Commission in its 2006 Communication on 'Thematic strategy on urban environment', which stresses the role played by CIVITAS in helping cities achieve a significant change in modal split, through the use of cleaner vehicles, and tackling congestion.

The cities of the CIVITAS Initiative are seen as key stakeholders in European transport and energy strategies. Today, their good practices provide models for similar initiatives elsewhere and fundamental policy inputs for future EU-level strategy formulation. The CIVITAS stories presented in this document provide inspiration for future developments, while at the same time offering practical insights into the relevance of local specificities and their influence on successful implementation.

*Winchester: park and ride with pride*





# Introduction

*Bremen: intermodal integration*



## The CIVITAS Initiative

Effective urban transport systems are essential to economic activities and quality of life. They reduce social exclusion, support local commerce and are crucial to improved air and environmental quality.

However, today's urban transport sector is beset with problems, ranging from congestion, pollution and noise to land use issues and the financing of public transport systems. Many European cities have seen vehicle speeds decline by 10% over the last 20 years; today's average speed during peak hours can be lower than in the days of the horse-drawn carriage. This represents a huge inconvenience in today's mobile society, contributing to the movement of people and services away from city centres and into the suburbs.

Surveys now indicate that four out of five European city dwellers see urban traffic congestion, accidents and pollution as very serious problems that need to be addressed urgently. Traffic noise by itself is now considered as big a problem as global warming. Furthermore, almost nine out of ten European citizens regard the current rate of petrol and diesel fuel use as the biggest transport-related problem in cities.

*Bristol: signing for access control*



Citizens agree: urban congestion, accidents, pollution and high noise levels are serious problems that need to be addressed now!

It is no surprise therefore that transport and mobility are key policy concerns for local authorities. In particular the cities in the new EU Member States have a huge challenge in front of them, due to the worrisome surge in private motorisation.

## The CIVITAS solution

In early 2000, the European Commission recognised the need for action on these and other pressing urban issues, launching the CIVITAS Initiative (City-VITAlity-Sustainability) to help cities test and assess new and integrated approaches that combined urban environmental, energy and transport issues.



## CIVITAS means progress

CIVITAS encourages the development and demonstration of ambitious, innovative solutions that directly address the transport, energy and environmental problems of Europe's cities. The CIVITAS Initiative supports integrated solutions, comprising a wide spectrum of effective transport measures, while promoting the sharing of ideas across national boundaries.

With CIVITAS, the European Commission seeks to support, evaluate and disseminate ambitious urban transport strategies that can have a real impact on the welfare of the European citizen.

CIVITAS is implementing and evaluating ambitious, integrated, technology and policy-based measures to help cities achieve more sustainable, cleaner and more energy efficient urban transport systems

CIVITAS became operational in early 2002, within the European Union's Fifth Framework Research Programme for Research and Technological Development (FP5). This first programme, referred to as CIVITAS I, included 19 cities, clustered under four demonstration projects: CIVITAS MIRACLES, CIVITAS TELLUS, CIVITAS TRENDSETTER, and CIVITAS VIVALDI.

In 2005, under FP6, the CIVITAS Initiative was further extended (CIVITAS II) to encompass seventeen new cities grouped in four demonstration projects: CIVITAS CARAVEL, CIVITAS MOBILIS, CIVITAS SMILE, and CIVITAS SUCCESS. Together, the 36 CIVITAS cities, spread over the entire European continent, have already received €100 million of European Union funding, while the total budget for the measures involved will eventually reach more than €300 million.

## Keeping up the momentum

As with the implementation of any truly ambitious approach, difficulties have inevitably arisen. Institutional structures, political and commercial interests, social and cultural pressures, attitudes that say 'we've always done it this way', all represent barriers to progress, not to mention technical aspects. Yet, the CIVITAS 'brand' has provided cities with the necessary recognition, support and validation to drive the process of change at local level.

*The CIVITAS family*



*The CIVITAS politicians meet the European Commissioner for Transport, Mr. Barrot, at the 2005 CIVITAS Forum*



## What CIVITAS does

The figures speak for themselves; cars cover about 75% of all kilometres travelled in EU urban zones. Increased car use has been accompanied by congestion, safety, environmental and health problems derived from transport pollution, as well as by a downward spiral of under-investment in public transport. Urban traffic produces 40% of transport CO<sub>2</sub> and nearly all of Europe's citizens are now being exposed to air pollution levels that exceed EU objectives for particulates.

The CIVITAS Initiative has four main objectives:

- To promote sustainable, clean and energy efficient urban transport.
- To implement integrated packages of technology and policy measures in the field of energy and transport in eight categories of measures.
- To monitor and assess the impacts of the measures.
- To build up critical mass and markets for innovation.

Two horizontal projects (CIVITAS METEOR and CIVITAS GUARD) support the CIVITAS demonstration projects and cities, undertaking cross-site evaluation and dissemination in co-operation with the demonstration projects.

The entire CIVITAS family comes together in a yearly CIVITAS Forum, an active platform for the exchange of ideas and experiences between the CIVITAS cities and other cities that are committed to introducing ambitious, clean urban transport strategies. The CIVITAS Forum, which is constantly welcoming new interested cities, now counts more than 100 members.

CIVITAS also provides a dedicated venue for the definition and discussion of ongoing policy issues. Decision makers elected from among CIVITAS city politicians gather in a Policy Advisory Committee (PAC) to develop policy recommendations for a long-term CIVITAS multiplier effect.

*Nantes: touring the CIVITAS delegates at the 2005 CIVITAS Forum*



## Keys and themes

CIVITAS is co-ordinated by the CIVITAS cities themselves; it is literally a programme 'of cities and for cities'. Participants say this is a key element for the success of the Initiative. Cities are also at the heart of crucial local public private partnerships. Thus, political commitment is a basic requirement, allowing cities to act as 'living laboratories' for testing bold new ideas.

CIVITAS has identified eight categories of measures as the basic building blocks for a successful integrated strategy. Each CIVITAS city chooses an appropriate set of measures from those building blocks and combines them to form integrated solutions for clean urban transport in cities. In addition, each city puts in place its own planning framework, ensuring political involvement and support, and establishing the necessary partnerships to ensure delivery of the plans. The eight CIVITAS themes are:

- Clean fuels and vehicles
- Integrated pricing strategies
- Less car intensive lifestyle
- Mobility management
- Access restriction
- Collective passenger transport
- Urban goods transport
- Transport information and management



## CIVITAS on target

So far, and by all accounts, the CIVITAS integrated approach to urban transport is proving a genuine success: CIVITAS has delivered a set of benefits far in excess of the concrete outputs originally foreseen. New political alliances and mechanisms for change, customer-driven planning processes, emerging public-private partnerships and, last but not least, technology solutions that drive change, are just some of the value-added outputs being delivered by CIVITAS cities.

In terms of concrete results, a number of noteworthy accomplishments were made possible by CIVITAS I. These include, just to name a few:

- A combined 8000 new clean vehicles circulating on our roads;
- A 10% traffic reduction induced by the Bristol by the Home Zone project in the Dings area;
- 44,000 passengers carried daily by the new electric bus lines in Rome;
- A 30% reduction of transport movements fostered by the coordination of goods delivery in the Kattegat River area of Göteborg;
- An important leap in cycling share in Graz thanks to an integrated package of bike-supporting measures;
- A 55% reduction in PM levels in the new clear zone of Cork, and
- Remarkable improvements in public satisfaction with public transport services in Rome (+10%), Nantes (+28%) and Stockholm (+8%).

There is no doubt – CIVITAS has made a real and positive difference in cities all over Europe

CIVITAS project results have meant measurable direct benefit to citizens and business in the participating cities. Reduced congestion, better public transport, improved conditions for cyclists and pedestrians, and many other advantages are all contributing to improvements in the quality of urban life. And it is not only the citizens of CIVITAS cities who are gaining, as practical lessons learned are already filtering into other towns across the European Union.

## Assessment and dissemination

As part of the CIVITAS Initiative, separate activities are being undertaken to independently evaluate the impact of the different measures, to compare overall city results and to report lessons learned to users, politicians and the scientific community. The results of CIVITAS are disseminated through newsletters, workshops, via training activities and through the active involvement of the local, national and international media. Information on cities and their demonstration projects is posted on the CIVITAS website ([www.civitas-initiative.org](http://www.civitas-initiative.org)), along with links to individual project websites<sup>1</sup>.

<sup>1</sup> See Contacts page for details.

*Winchester: discounted parking fees as pricing strategy*



*Rotterdam: modern tram lines on the Erasmus bridge*





*Bucharest: one of the new energy efficient trolley buses*



#### Case Study

#### **Bucharest – extending and improving**

Bucharest has a long tradition in the field of clean and especially electric transport. CIVITAS has helped the local public transport operator to modernise its fleet by replacing polluting vehicles, including the preparation for the acquisition of eight new energy-saving, silent trams and 60 new trolley buses. Following success under CIVITAS, Bucharest is continuing the promotion of clean public transport with the extension and rehabilitation of buses and trolley buses.

# Clean fuels and vehicles

## New and Better Options for Cities on the Move

This theme deals with strategies for introducing into the market energy-efficient, cost-effective and clean public and/or private vehicle fleets, using alternative fuels, for passenger or freight, and providing the necessary energy infrastructure.

Clean vehicles are a highly cost-effective way to reduce greenhouse gas emissions, but the promotion of their use requires hard work and real determination. Experience gained during CIVITAS implementation suggests that a step-by-step approach, whereby clean vehicles are first introduced in large municipal fleets, then in small private fleets, and finally become an attractive consumer choice, is most advisable. Thus, cities and other local authorities can play a crucial role in promoting the long-term development and use of clean vehicles, through their ability to gather numbers of buyers in joint procurements. Financial and fiscal incentives, standard definitions and regulations at national and European level, represent a fundamental pillar for the successful introduction of clean vehicles.

Alternative fuels are now widely seen as an ideal option for city buses and car fleets. Their use supports the European energy strategy by strengthening the security of supply (reducing the need for oil imports) and by promoting fuel diversity, which lowers pollution due to road transport, and improves air quality while maintaining a high level of mobility for citizens.

New and improved technologies in this field are emerging all the time. Examples include an array of biofuels such as biodiesel, biogas and bioethanol and compressed natural gas (CNG), more common in continental Europe; liquid petroleum gas (LPG), more widespread in Italy and the UK, and electric or hybrid vehicles (often combined electric and petrol engines).

**CIVITAS means better vehicles for better cities, and everyone benefits!**

Projects dealing with clean public and private vehicles have proven to be extremely popular across the CIVITAS cities and have generated a surge of knowledge exchange.

*Barcelona: a new CNG bus*



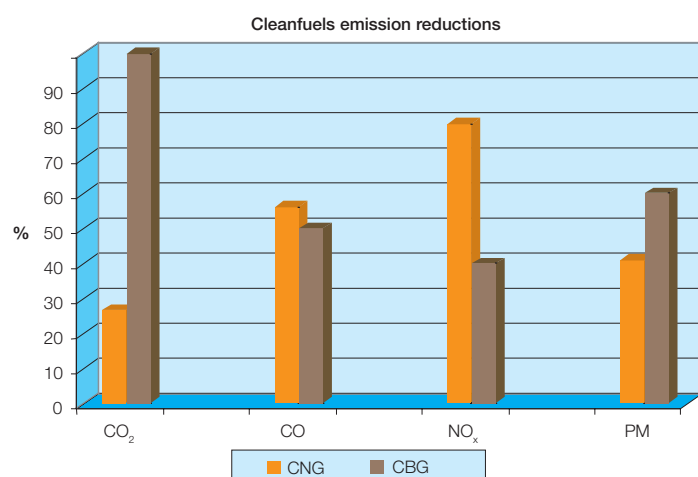


CIVITAS helped the cities to introduce more than 8000 clean public and private vehicles\* in 4 years!

\* Including CNG, biofuels, electric and LPG

While some cities already had experience in the field of clean vehicle operation (i.e. Rome, Barcelona, Rotterdam, Lille, Nantes, Graz and Stockholm), others have now introduced clean vehicles for the first time (i.e. Winchester, Cork, and Berlin).

Figure: Average emission reductions resulting from the conversion of conventional fleets to Compressed Biogas (CBG) and Compressed Natural Gas (CNG)



CIVITAS projects have also inspired vehicle manufacturers, private companies and citizens, leading to increasing acceptance and distribution of biofuels and bringing about significant further reductions in greenhouse emissions and noise in the city centres.

In all, CIVITAS has demonstrated unequivocally that alternative fuels are a technologically mature energy source and are sufficiently available and suitable for use both in public transport fleets and private cars. Importantly, CIVITAS has also helped introduce innovative incentives for companies and private citizens, providing compensation for somewhat higher clean vehicle operating costs. The result is that there are now 3,000 more private clean vehicles circulating in Europe.

Nantes: a new CNG bus



Lille: from organic residue to tank, the biogas cycle



### Case Study

#### Lille – innovative moves

Under Lille's innovative clean 'well-to-wheel' approach, biogas from household waste is used to power 128 of the city's bus fleet, and could ultimately fuel the entire fleet (400 buses). In 2004, work began on one of Europe's biggest biogas production plants, which will eventually fuel half the city's buses and the 84 vehicles of the municipal fleet currently powered by CNG. Lille is now investigating ways to further reduce energy consumption through the use of more biogas.

*Graz: a new biodiesel bus*

### Case Study

#### Göteborg – a comprehensive strategy

Göteborg began encouraging the use of clean vehicles in the early 1990's. CIVITAS has allowed the city to undertake several integrated projects, including the extension of an environmental zone for heavy duty vehicles and a large scale CNG promotion and incentive campaign, targeting car dealerships and leasing companies, fuel suppliers, environmental consultants, taxi and courier companies and general car users. In just four years, Göteborg introduced 3,000 new private clean vehicles, 200 clean municipal vehicles and 2 new heavy-duty CNG/biogas vehicles.

*Göteborg: fuelling clean freight vehicles*

## Obstacles overcome and expected

Success for CIVITAS has not come easily. The initial enthusiasm connected with the launch of the Initiative was followed by a certain disenchantment, mostly due to the realisation that many vehicles publicised by manufacturers in glossy brochures or at trade exhibitions were in fact not available – or available only under unaffordable conditions. On the other hand, this frustrating 'reality check' has stirred intensive discussions on the problem of higher operating costs, which has been and is still being addressed by manufacturers all over Europe. As a consequence, an increasing number of clean vehicle models are now being placed on the market at more affordable prices.

Consultation with the industry has also increased the degree of flexibility in the design of future models, ultimately leading to the reversal of the sluggish acquisition rate. From the second year of CIVITAS until the beginning of 2005, an impressive 2,600 vehicles were put into operation. Some cities even purchased more than originally planned. Co-operation at the European level has been, in this sense, pivotal, and forms of vehicle joint procurement are currently being undertaken by the CIVITAS cities.

### No impeding progress – CIVITAS learns and rebounds!

Though the benefits are clear, cities still face significant challenges in pushing to bring cleaner and more efficient vehicles into their fleets.

- Important framework and legal issues must be resolved and accompanying policy measures agreed before such Initiatives can be undertaken.
- Financial and economic impacts must be thoroughly studied and understood and administrations must have a clear handle on the necessary and available technologies.
- Implementing organisations must be fully committed to the success and all stakeholders must be involved, both in planning and implementation, including end users.
- Finally, co-operation and transparency are crucial throughout the process, making sure everyone has a say and that everyone will draw benefits.



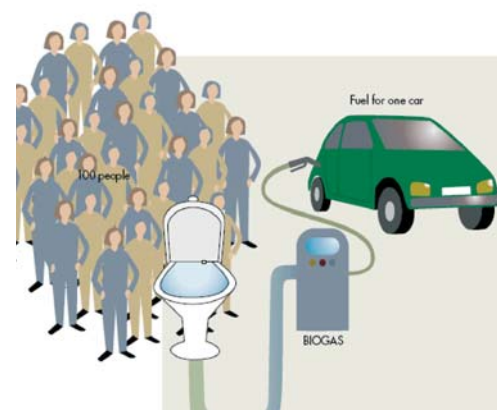
## Making a difference – CIVITAS results

Without any doubt, CIVITAS has helped to achieve real progress in bringing cleaner freight vehicles and passenger cars into our cities. Projects carried out by CIVITAS cities have been successful and have demonstrated the positive impact of alternative fuels and vehicles. The market now features a wider-than-ever variety of models that are reliable and competitive compared to conventional vehicles.

Fuel-wise, catalyst retrofit diesel is still the main propellant used in clean vehicles, followed by CNG, LPG, biodiesel and biogas. Electric vehicles initially drew widespread interest, but the acquisition of electric two-wheelers fell short of expectations. The marketing of hybrid vehicles, on the other hand, has been much more successful, compensating for the partial disappointment in the electric vehicle sector.

The clean vehicles market is still, however, far from robust. CIVITAS has helped substantially to strengthen it, and has also brought to light critical issues such as the importance of regulation, harmonisation, and appropriate tax and incentive adoption. Coherent actions at the European level are now urgently needed. The standardisation of common European definitions for clean vehicles is another prerequisite for market expansion, one that requires co-operation between institutions, car manufacturers and fuel suppliers. The European Commission can also play a role in encouraging joint procurements, sharing experiences and supporting research and technological development in the area of innovative clean vehicle technology.

*Stockholm: from toilet to tank, the biogas cycle*



### Case Study

#### **Stockholm – ever cleaner and quieter**

The city of Stockholm represents a reference in the field of low-emission fuels and vehicles in Europe. CIVITAS has given the city the opportunity to push forward its agenda by purchasing an increasing number of clean vehicles. Since 1996, Stockholm has been using biogas from sewage to fuel clean vehicles. In 2005, the city opened a second biogas/water treatment plant, currently supplying 130 buses, 9 waste-collection trucks, and about 1,000 cars and vans. Results include CO<sub>2</sub> emissions reduced by 1,900 tonnes/year, significant noise reduction and more than 90% of drivers 'satisfied' or 'very satisfied'. Bioethanol is also increasingly used in Stockholm as a blend in diesel engine buses. Thanks to CIVITAS, more than 200 cars have been replaced by new clean vehicles, and another 123 ethanol buses are now being added to the city's fleet.



Stockholm: one of the congestion charging gantries



#### Case Study

### Stockholm – moving forward on congestion charging

Prior to congestion charging, Stockholm had already introduced a number of measures to improve traffic flow, but the new scheme, started as a trial in August 2005, was regarded as a potential break-through measure when carefully accompanied by increased public transport services such as park-and-ride sites, expanded bus and light rapid-transit train services. The city managed to overcome all legal issues and proceeded with the actual implementation of congestion charging in the city centre from January to July 2006.

Exactly as expected, traffic declined dramatically, with average daily reductions of about 22% (equivalent to 100,000 passages over the charged area). A consequence of traffic decline was improved accessibility and travel times, with surveyed travellers reporting grown confidence in the expectation that a journey could be made within a given period of time. The congestion charging also led to significant emissions reductions, as in the case of NO<sub>x</sub> (-8.5% in the inner city and -2.7% in Stockholm City), PM<sub>10</sub> (-13% in the inner city and -3.4% in Stockholm City) and CO<sub>2</sub> (-8.5% in the inner city and -5.4% in Stockholm City). Estimates seem to finally indicate that the congestion tax has increased public transport travel by about 4.5% and has led to a 5-10% reduction in the number of accidents within the charge zone. In spite of the initial public opinion's opposition, the continuation of congestion charging was approved by a public referendum in September 2006, with a final decision by the Swedish national parliament now expected for 2007.

# Integrated pricing strategies

## Paying a fair price for urban transport

Pricing strategies are demand management and revenue raising measures based on the introduction of area-wide or citywide pricing schemes that can be implemented in combination with innovative use of parking pricing and public transport.

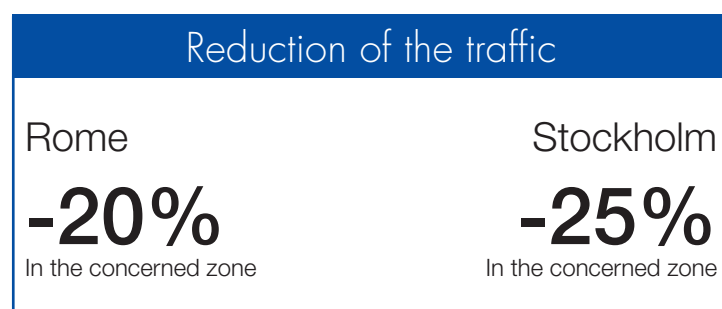
Urban pricing schemes make CIVITAS cities cleaner, safer and more efficient places to live!

The use of financial incentives and disincentives mostly targets the congested and polluted urban environment, and affects peak traffic times, specific modes and user groups. The generated new revenues can be used for investments in transport improvements or flow into the general city budget. Drivers may be charged manually or when they pass through Automatic Number Plate Recognition (ANPR) gates.

The objectives and benefits of road pricing schemes are manifold. First, and in recognition of the 'user pays' principle, they increase the overall economic efficiency of the transport system by internalising costs generated by drivers. They also contribute to the liveability and sustainability of cities, protecting the environment and reducing pollutant emissions. They can play an important role in increasing safety and reducing the impact of transport on human health and, finally, road pricing schemes can create revenue.

Gaining public and stakeholder support for the use of financial incentives inevitably involves a phased approach. Consequently, the implementation of road pricing remains an ongoing endeavour.

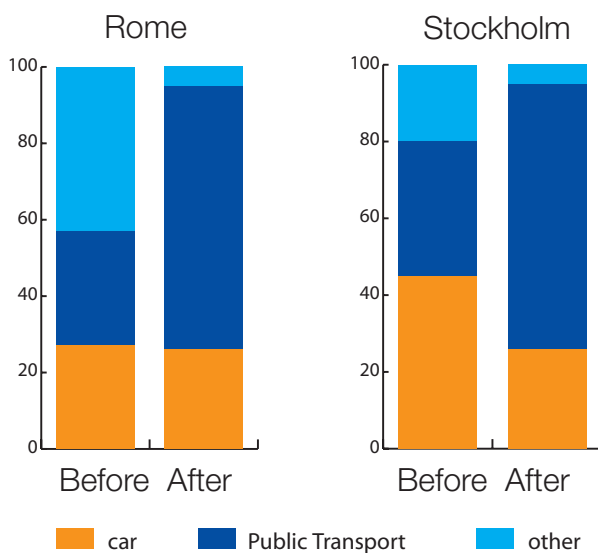
Figure: Traffic reductions in Rome and Stockholm since the introduction of road pricing schemes.



The experiences of CIVITAS cities have confirmed the potential of road pricing in urban areas as a full-fledged transport policy instrument.

More and more local authorities are now considering it as a new means to reduce emissions and congestion in the urban environment.

*Choice of Mode in priced areas as a result of road pricing*



*Bremen: easy ticketing with the 'BOB' smartcard*



#### Case Study

#### **Bremen – making it easier to behave better**

Only 30% of all Bremen citizens use public transport frequently. About 70% of all citizens rarely or never use buses, trams or trains. The public transport operator has implemented innovative ticketing schemes to improve access to public transport for infrequent users who are not familiar with networks, schedules and fares. When entering public transport vehicles, prepaid 'BOB' smartcard users can electronically enter their destination area and the number of passengers on a touch screen, and the system will do the rest. Ticket information is stored on the smartcard and transferred to a main database, while the passenger's bank account is charged at the end of the month. Within the first three months after launch, more than 8000 citizens had registered as BOB ticket holders.

#### Emissions reduction in priced areas as a result of road pricing Stockholm:

| Rome         | Stockholm             |
|--------------|-----------------------|
| CO -21%      | CO <sub>2</sub> -40%  |
| PM -11%      | PM -13%               |
| Benzene -37% | NO <sub>x</sub> -8.5% |

Another popular form of road pricing is parking pricing, with motorists paying directly for the use of parking facilities. Parking pricing is a way to rationalise urban space, reducing congestion and influencing mobility behaviour. Under CIVITAS, it is used as a demand management strategy to reduce vehicle traffic in given areas, as a parking management strategy to reduce parking problems at a particular location, to recover parking facility costs and to generate revenue for other purposes, such as improvement to certain areas.

In addition, the CIVITAS cities have used parking pricing as an incentive to the use of clean vehicles and alternative fuels.

Public transport pricing is also important, as road pricing can only work if public transport is affordable and of sufficient quality.

*Winchester: informing about the parking discounts*



## Breaking through barriers

The implementation of several road pricing or 'hybrid' road pricing schemes has highlighted a number of barriers. In Stockholm, for example, a large majority of citizens was opposed to road pricing before the scheme was implemented, but this opposition was observed to decrease over the trial period, as the charging system tested in the city has been shown to reduce traffic and encourage more environmentally friendly transport solutions. The public referendum of September 2006 confirmed this growing support, with the majority of voters backing the retention of the charging scheme.

Attempts to implement road pricing schemes have also pointed out an acute need for harmonised regulation and coordination at higher political levels. The unclear legal situation regarding the status of congestion charges and their destination in public budgets has occasionally slowed down the decision making process, while the strong interdependence between urban pricing and national highway toll systems has complicated decisions and choices regarding technology and regulation. In the case of one city (Rotterdam), this actually led to the outright cancellation of the scheme.

Furthermore, the lack of acceptance by citizens has played a significant role and has been a tough barrier to implementation, especially at scheme outset (as in Rome). Parking pricing schemes typically enter into conflict with established privileges of users defending individual benefits against the general public interest. Hence, resistance from residents fearing the loss of a commodity or retailers worrying about sales decreases have characterised the implementation of pricing schemes.

Despite these obstacles and associated delays, figures confirm that road pricing measures clearly lead to more sustainable, cleaner and more efficient urban transportation. Road pricing measures have been shown to have a substantial positive effect on liveability altogether, thanks to the reduction of circulating cars, the mitigation of noise and the improvement of air quality.





In Berlin, a conceptual approach for an emission-based inner-city road pricing scheme for heavy-duty vehicles was developed. As result of the developed scenarios road pricing will not be implemented in Berlin, because other measures like parking regulations and environmental zones are considered to be more effective to reduce emissions.

### No progress without risk

Meanwhile, Rome's time-based road pricing measure was aimed at evaluating and assessing design and technologies linked to an access restriction and road pricing scheme. It also looked at the feasibility of a new road pricing policy aimed at tourist coaches.

The variability in the level of success of road pricing systems, ranging from acceptable to delayed to weak and, finally, outright abandonment, illustrates the considerable uncertainties and risks involved. Political commitment and public support appear to be crucial. The existence of clear examples of good practice is however a strong argument in favour of road pricing feasibility and efficiency.

*Berlin: paying for parking made easy*



*Winchester: publicising the new pricing scheme*

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- Do you park regularly in a Winchester City Council car park?
- Do you believe in **MIRACLES**?

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Hampshire County Council Winchester City Council CIVITAS MIRACLE

#### Case Study

##### Winchester – pricing preference for clean vehicles

The city of Winchester has implemented an important variable parking pricing scheme in its main city car parks. The main objective was to promote and support the use of energy efficient vehicles by providing season ticket discounts of 75% or 50% for vehicles with the lowest CO<sub>2</sub> emissions and free parking for electric or hybrid vehicles. 11% of season ticket holders took up a discount during CIVITAS, and there was a significant rise in the proportion of clean vehicles in the city. The scheme has since been extended to include residents parking permits. Another aim was to discourage long stay parking in the city centre and encourage use of the Park and Ride (P+R). To achieve this, costs were significantly increased for all-day parking at selected city centre car parks, while costs remained low at Park & Ride. As a result, ticket sales at the seven busiest city centre car parks decreased by 16%, whilst at Park & Ride sales increased by 43%, confirming that the charging policy has been effective.

# Less car-intensive lifestyle

Rotterdam: the new speedy water taxi



## Case Study

### Rotterdam – new forms, changing habits

Rotterdam regulates commercial traffic in the city centre through an innovative city logistics system that includes a 25 km-long underground pipeline system for the transport of chemicals in the industrial port zone. A key aspect of Rotterdam's policy is to stimulate new forms of vehicle use and ownership, including bicycle use and expanding water-borne passenger transport. A water taxi service with six high-speed boats is now operational. The local car sharing scheme has been extended with 19 new pick-up and drop-off locations, 19 new vehicles and 270 new members. Rotterdam has also introduced an innovative underground pipeline system for the transport of chemicals in the industrial port zone.

## New forms of vehicle use and ownership

The promotion of less car intensive lifestyles aims at introducing new mobility services based upon a variety of strategies such as car free housing, sustainable leisure and recreation transport, shared use/ownership of cars, motorised two-wheelers and bicycles, and innovative means of passenger and freight transport.

Attempting to create a less car-intensive culture among citizens is a major priority for the CIVITAS Initiative. The impacts of increasing car use are a big problem for most European cities, so part of breaking the negative urban transport cycle involves introducing new ways to give citizens access to cars without owning them.

Car sharing, or car clubs, as they are known in some countries, represent an innovative service aimed at providing easy and efficient access to cars without having to own one. Car pooling is another popular choice that involves the shared use of a car, in particular for commuting to work, often by people who each have a car but choose to travel together. Good examples of car sharing and car pooling Initiatives can be found in many countries, such as Germany, the UK and the Netherlands in particular, where many initiatives have led to the successful establishment of specialised companies, new services, public awareness campaigns and dedicated infrastructure for new forms of vehicle use. European projects have generated several successful examples of car sharing and car pooling measures.

Surveys show that car sharing is now providing a valuable service in many European cities, with each shared car replacing four to ten private cars, a great step forward for sustainable urban transport.

## Thanks to CIVITAS

1,350 new car sharing members  
more than 300 new car sharing vehicles

## Car/km reduction due to car sharing

Bremen: -500.000 car/km per year  
Berlin: -900.000 car/km per year



## Keeping it simple

Most of these measures are based on the same fundamental concept: make sure that things are simple and easily understandable to the potential user. The ultimate goal is to convince as many people as possible that using the private car is not always necessary. This is no easy task, considering the actual prevailing view of the car as a preferential, almost sacred means of mobility.

Comparing the costs of owning a car against the costs of using a car has become a central element in the marketing approach for car sharing and pooling schemes. The aim is to convince people of the real economic benefits of new forms of vehicle use.

**CIVITAS means transport doesn't have to be the way it's always been!**

## Car sharing...

Under the CIVITAS Initiative, car sharing schemes have been implemented in a number of European cities. While these schemes continue to expand, new measures continue to be introduced in others. The basic idea is that the actual use of a car is no longer directly linked to its ownership. Thus, a single car has multiple users and is therefore used much more efficiently. Car sharing members always drive less than people who own a car.

Car sharing is based on the simple concept of vehicle pick-up and return. Reservations are obligatory and can be made via call centres or via the Internet. The car can be opened with a magnet smart card or by using a PIN code. The ignition key is left inside the car together with a special card that is used to purchase fuel.

## ...and car pooling

Car pooling differs from car sharing in that the driver of the car is also the owner, but instead of driving alone, he or she carries one or more passenger who do not necessarily own cars. Again, the concept is simple and cost-effective.

*Aalborg: car sharing vehicles*



### Case Study

#### **Aalborg – a wide-ranging approach**

Aalborg has successfully implemented a number of CIVITAS measures, radically increasing the attractiveness of its public transport system through the extensive integration of services. This includes the introduction of a new car-sharing scheme. Commercial car sharing was introduced through CIVITAS in 2004 using a public private partnership model. An experienced car sharing company oversees the running of the scheme, which now counts 200 new members and 11 new vehicles, and keeps growing. Pick up sites are located 500 to 1,000 metres apart in areas with high population density and near public transport interchanges.



*Bremen: visiting a new car sharing parking area***Case Study****Bremen – leading car share city**

In Bremen, car sharing is an important part of the city's integrated mobility offer. The multi-purpose chip-card for electronic ticketing, car sharing access and electronic purse for shopping is just one example. In May 2005, the scheme had more than 3,500 subscribers, one of the highest car sharing communities in Germany. A new specific offer for the business community has contributed to the additional growth of the service, adding 700 new members and 33 new vehicles.

Six CIVITAS cities have implemented car pooling and related measures. All have had the same general aim, that of reducing private car use and increasing occupancy rates of vehicles by offering incentives, such as reserved lanes and parking spaces. The result is fewer vehicles on the road, reduced congestion and environmental impacts.

**Real work in the details**

The practical implementation of car sharing and car pooling measures has frequently required solving problems of 'technical planning', that is the practical availability and accessibility of facilities and services. Culture and lifestyle issues also need to be addressed and public awareness activities have led to an increased public acceptance and ultimate success.

A fundamental task, before any new initiative can be launched is the realistic appraisal of demand, especially amongst the identified target groups. These generally include educated, central-urban and middle class travellers. Appropriate and acceptable locations must be identified for car sharing stations.

Legal and funding issues in the 'grey area' between public transport and taxi services have also posed hurdles in some cases.

**CIVITAS helps European cities  
overcome tough obstacles**

*Berlin: new service of collective passenger transport***Case Study****Berlin – fewer cars doing more work**

Berlin has successfully introduced a novel scheme whereby commercial vehicle fleets are made available for car sharing by private individuals. Under CIVITAS, these vehicles formed a 'Metropolitan Fleet Car' service. The city has also tested the technological elements of a new collective passenger transport service, called 'Car Modal'. After a testing period, the city identified a high-potential market segment for this service, comprising elderly and disabled people. In total, Berlin has introduced more than 300 car sharing vehicles.

On the other hand, car sharing and car pooling have received a significant boost in terms of high-level political commitment. And certain synergies have been well exploited in terms of integration within existing public transport services. Various cities have also come together and shared experiences, providing a valuable resource for new cities that want to improve their urban environments and the quality of life of their citizens.



# Mobility management

## Good behaviour makes sense

Mobility management is an innovative demand-oriented approach to enhance and promote sustainable mobility. It is based on information, co-ordination and motivation, it complements traditional, infrastructure oriented transport planning, and it can be applied to a range of target groups.

Mobility management initiatives are often referred to as ‘soft measures’, and include new ways of managing mobility demand, such as awareness campaigns, and travel plans. For example, these measures are designed to encourage people to use public transport or bicycles for a journey that would previously have been made by car, or not to make the journey at all.

Guiding citizens’ transport choices and behaviours can be accomplished through new and creative approaches, including original marketing campaigns and education for children. These ‘soft measures’ are often more cost-effective than infrastructure modifications.

CIVITAS supports new and innovative approaches, keeping users up to date and on the right track!

## Letting cyclists rule!

A major goal for the CIVITAS Initiative is getting people out of their cars and onto their bicycles. More people riding bikes, perhaps in combination with public transport, means improved air quality and reduced congestion in city environments. Using the bicycle or walking is also part of a healthier life style.

In several countries, such as the Netherlands, Belgium and Germany, cycling is already a widely used form of daily transportation. In other countries, such as Ireland or Spain, it is very limited. CIVITAS has thus supported both realities by strengthening existing cycling initiatives or launching new cycling projects.

### Increased number of cyclists:

Lille: +15%

Cork: +10%

Graz: + 6%

Graz: cyclists at the Rathaus



### Case Study

#### Graz – making cycling a better choice

The experience of Graz shows that a well-planned, long-term approach to increasing safety for cyclists does increase the share of cycling and results in a more attractive city. Graz has undertaken major initiatives aimed at alleviating traffic congestion by increasing the attractiveness of cycling and making it easier to combine cycling with public transport use. Measures involved new strolling zones, new safer junctions with main roads and 30km/h speed limit in about 80% of the whole road network. The promotion of cycling continued with new ‘Bike & Ride’ facilities, a new electronic route planning that helps cyclists to plan fast and safe bicycle trips, a series of information campaigns, organised tours, and other events organised together with professional bicycle retail shops. Originally, Graz also initiated a bicycle training programme in real life conditions involving all primary schools. The overall strategy has increased cycling from 8% in 1982 to 14% in 2004.

Nantes: cycling in the new lanes



*Rotterdam: cycling on the Erasmus bridge**Nantes: 'Park and Ride' for bicycles***Case Study****Nantes – not forgetting the business and student community**

Nantes is working to promote the use of public transport through company mobility plans, which involved 2,200 municipal employees and 11,000 private sector employees, and by getting the business community more involved in the process. The travel plans, which were prepared after consulting the employees, called for, among other things, a 50% reduction of PT fare for employees with an annual pass, removal of employee car park spaces, new safe bicycle park spaces at work for commuters and visitors, and a car-pooling software. Furthermore, Nantes promoted cycling with university students by offering yearly rent of bicycles (currently a fleet of 280) along with services like repair, safety check-ups, and bicycle tours.

## Managing mobility

Mobility management involves a variety of measures, including new trip planning tools on the Internet and new ways of marketing public transport.

Mobility management can be a tool for changing travel patterns. School-based awareness campaigns usually involve analysis of the travel demand and of the school neighbourhood in terms of traffic safety, and help raise awareness of not just students but also parents and teachers.

By setting good examples, city administrations can also work to convince private companies to get involved in mobility management. Today, for example, most companies do not consider trips to and from work to be their responsibility and some even offer financial incentives to employees who drive their cars to work.

Other mobility management measures involve providing better information to the public on public transport routes, schedules and, to put it simply, how to go from A to B and how long it takes. These sorts of measures, integrating information on a variety of services requires the commitment and co-operation of operators and the harmonisation of several data sources.

### Smart travel – promoting alternatives to the private

Communication, information and marketing are indeed important when trying to increase the use of public transport and other sustainable transport modes. It takes time to change people's behaviour. Information and promotional campaigns are cheap and efficient, especially when combined with infrastructure measures. People in job or housing transition are often an interesting target group.

In Winchester the number of employees involved in workplace travel-plans increased from 4,000 to 12,000.

In Rome promotional campaigns led the number of private companies' employees using public transport to increase by 12%.





## Getting it right the first time

Mobility management measures are strongly dependent on the quality and adequacy of the information provided and the communication channels chosen to reach the target audience. Inadequate user needs assessment can represent an important barrier to successful implementation.

Mobility management often requires the overcoming of established habits, lifestyles and behaviour patterns. This calls for their careful analysis in order to achieve real change. Moreover, the high visibility of mobility management measures makes them particularly susceptible to critical reactions from the general public and the media, underlining the need for thorough preparation. Solutions that are not well thought through can have counterproductive effects, generating negative public opinions and, ultimately, political opposition.

‘Quick and easy’ solutions are not always the best answer

As far as cycling is concerned, the implementation of new measures often requires a cultural change in terms of the role of the bicycle. In spite of the relatively low cost of infrastructure such as bike paths, difficulties remain in securing the necessary funding, and obtaining the political support to re-allocate the necessary space. This underlines the need for an explicit political commitment to making cycling a key transport mode within local transport policy.

*Berlin: youngsters expressing opinions*



### Case Study

#### **Berlin – getting users on board**

In Berlin, customer and user participation has been a major focus of work. This included the organisation of special events aimed at eliciting user feedback for the project leaders on the acceptance of new measures. Participation was promoted through a series of mediated meetings in which different stakeholders, and particularly youngsters, had the opportunity to express their views on innovative initiatives the city of Berlin was planning for cleaner and better transport.

*Bristol: TavelSmart incentive gifts*



### Case Study

#### **Bristol – working closely with the households**

The city of Bristol's innovative TravelSmart initiative encouraged people to leave their cars behind. The scheme targeted households, offering tailor-made information and support to allow people to walk, cycle, and use public transport more often than before. TravelSmart relied on the early identification and successive matching of individual household needs to motivate travellers to think about their day-to-day travel choices. The measure has achieved significant changes in travel behaviour among the target population, with substantial increases in walking, cycling, and use of public transport, and car trips reductions between 9% and 12%.

*Barcelona: access restriction with retractable bollards*

# Access restriction

## Limited access zones protect cities and citizens

Access restriction is another demand management strategy that aims to protect inner city areas and other sensitive zones by introducing access control allowing only certain vehicles (e.g. clean and energy efficient vehicles and collective transport vehicles), by regulating parking management and promoting cycling and walking.

As such, this kind of measure is particularly relevant for cities, which are the jewels of our European heritage and often need special protection for a variety of reasons (e.g. environmental deterioration, traffic congestion, cultural heritage preservation). At the same time, society continues to become ever more mobile. Limiting access is therefore a very sensitive issue.

The reclamation and reallocation of road space for pedestrians and cyclists has been a major means used by CIVITAS cities to calm and reduce road traffic.

Access restriction measures can actually help to improve mobility while reducing the negative impacts of traffic. The ultimate goal is a higher quality of life and more attractive and accessible city centres. A key to the success of such schemes is the co-operation and approval of all stakeholders, including the business community.

CIVITAS is helping to preserve and protect our unique European heritage

An increasing number of European cities are now engaged in the implementation of demand management strategies based on the concept of controlled access and involving the restriction of traffic in certain urban areas.

Access restriction policies vary a great deal, depending on defined criteria. Typical examples include closure of sensitive city areas and other sensitive zones to less clean or less energy efficient vehicles or to freight vehicles above a certain weight, or to private vehicles owned by non-residents of the restricted area or to all motor vehicles of any kind.

### Case Study

#### Rome – a CIVITAS city without equal

Rome has developed the largest operational access control zone in Europe and is implementing a full range of traffic management solutions aimed at improving traffic conditions in the inner city. Work towards the completion and extension of the successful access control system and an integrated road-pricing scheme is continuing. Impacts have been noticeable, with traffic flows inside the controlled zone having been reduced by 20%. This has been accompanied by a 7% increase in public transport use, an 18% reduction of private car use, a 10% increase in moped traffic, and a 12% increase in pedestrian trips.



The objectives of such strategies often include improving air quality, safety and public health, decreasing congestion, reducing noise, and preserving and improving the urban landscape.

The most radical way to reduce traffic in cities is of course to forbid it altogether. But a total ban on vehicles is often neither desirable nor feasible. For example, shops and businesses need deliveries, the disabled need access, residents may need to drive to their homes, etc. Yet, access can be restricted. Most restricted zones are usually small or may be crossed by streets where cars are allowed.

## Clear zones, environmental zones and pedestrian zones

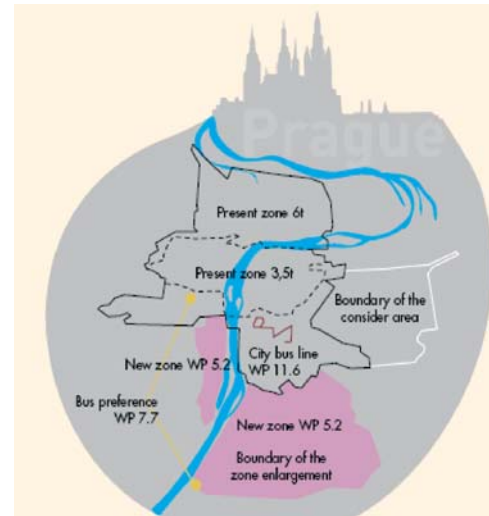
‘Clear zones’ tend to be areas where typically a variety of tools are used to improve environmental conditions. These can include vehicle access controls, spatial design that reduces the physical ‘footprint’ of roads, removal of parking spaces and the use of retractable bollards (short dynamic vertical posts designed to block vehicle access into restricted areas).

In several cities, clear zones have been set up and enforced access control regulations and control devices, principally retractable bollards and systems that recognise number plates.

*Stockholm: strolling zone*



*Prague: a map of the restricted zone*



### Case Study

#### **Prague – no transit lorries in the environmental zone**

Prague's transport policy focuses on increasing the use of public transport, improving traffic infrastructure and regulating car traffic, particularly in the centre of the town. Prague has already introduced restricted lorry access to the inner city. There are now two environmental zones, one in the centre of the city where access to vehicles weighing over 3.5 tons is restricted, and another outside this inner zone where access restriction applies to vehicles weighing over 6 tons. CIVITAS also defined new zone borders, based on evolving transport needs and the latest research results.



*Gdynia: the remodelled Swietojanska street***Case Study****Gdynia – fewer cars, more people**

Gdynia is transforming its city centre into a vibrant and clean urban transport area, following the successful comprehensive remodelling of 2 km of the main central street. The city has reduced the number of parking places, and thanks to campaigns that encouraged the use of public transport and bicycles, the redesign has resulted in a 25% increase in real accessibility. Noise levels have also dropped.

Improving amenity, reducing traffic,  
safeguarding air quality and safety,  
in short, improving the liveability  
of our cities

'Pedestrian zones' represent the extreme form of access restriction, wherein no cars or other vehicles are allowed for most or all of the day. Exceptions are often made for delivery vehicles, taxis or for the disabled. The ultimate goal here is to create the conditions for a more pleasant environment, for shopping, living or touring.

*Bristol: a remodelled street in the Dings***Case Study****Bristol – new life through restricted access**

Through a series of door-to-door surveys, public meetings, and street layout trial events, local residents, designers, and the City Council's Home Zone team developed a master plan for restricting access while improving the environment in the Dings area in central Bristol. The new design features artworks and better street design. Adjacent land is now also being developed. These interventions resulted in a 10% traffic reduction.

*Cork: bollard control unit*



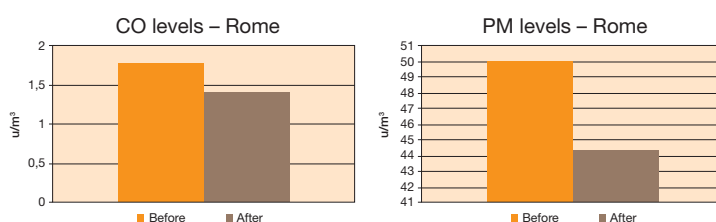
Evaluations show that once zones with restricted access are established, both citizens and businesses are more satisfied than before. The target areas are perceived as more attractive and vibrant. New shops, restaurants and cafés spring up in city centres and attract more visitors, while the price of real estate increases.

To look at just one example, in Pecs, the average size of outdoor terraces in the city centre has increased by 20%. Similar results have been seen in Gdynia.

Again in Pecs, the local media – mostly television – have become involved in the debate over car free zones, increasing public support. The key factor has been widely disseminated information on the positive results of the measures that were implemented.

In Göteborg, the environmental zone brought about a 10% reduction of CO<sub>2</sub> emissions and a 3% reduction of NO<sub>x</sub> emissions.

Figure: Traffic reductions in Rome and Stockholm since the introduction of road pricing schemes.



In Cork the implementation of clear zones had the following impacts on air quality:

PM levels: -55%  
CO levels: -39%

Pecs: Széchenyi Square, the heart of town



#### Case Study

#### Pecs – protecting the World Heritage Site

The City of Pecs' main priority is to reduce the unnecessary use of private cars. To achieve this, the city has introduced a mixture of parking restrictions, car-free zones, increased parking fees and new clean public transport vehicles. Pecs has turned large parts of its inner city, which features unique World Heritage site, into car-free zones. A zone-based parking system has also been introduced.

*Aalborg: the comfort of public transport**Kaunas: buses using the new intelligent transport systems*

### Case Study

#### **Kaunas – putting public transport in the spotlight**

Improving public transport is at the heart of the Kaunas mobility strategy, combined with soft measures as well as new financial, organisational and management schemes. Kaunas has made a major effort to develop new intelligent transport management. CIVITAS measures are part of the city's 'Public Transport Implementation Programme'. Elements include the planning of public transport connections, construction of new public transport network components, modification of the existing ticketing system through the introduction of fixed-term tickets for buses and trolley buses and the application of a more flexible tariff structure. All of these measures are helping to win new public transport customers.

# Collective passenger transport

## More people moving forward together

Almost all CIVITAS cities have put in place new measures to promote the use of public transport. High quality public transport ensures that cities are accessible and remain liveable.

CIVITAS supported a very large number of public transport measures, which are diverse in nature and entail varying levels of investment. Some of the most popular measures included:

- Innovative projects launched with regards to the use of integrated fares and easy ticketing with smart cards;
- The creation of mobility centres for a centralised information and coordination of public transport services;
- Initiatives to increase security onboard vehicles and at stations and stops;
- Regulation of roads and traffic so as to ensure priority public transport vehicles;
- Provision of new facilities such as park and rides;
- Integration with other modes, and the introduction of new services for special users, e.g. disabled people.

Some projects have suffered from technical problems, particularly those linked to new technologies. However, most schemes have now been fully integrated into the normal public transport services.

The introduced improvements have produced measurable increases in users' satisfaction with the public transport service, up by 10% in Rome, 28% in Nantes and 8% in Stockholm.

### CIVITAS and public transport – strength in numbers

The integration between different public transport services and the integration between public transport and other transport modes remains an important issue for policy-makers and travellers. Lack of integration is the source of bottlenecks and limits customer choice regarding seamless public transport solutions. There is certainly room for improvement within transport systems, between companies within modes, and between public transport and other modes, including taxi, bicycle and car.



Integration also refers to physical elements such as network and services design and the design of transfer points, integrated ticketing and tariffs, and information aspects, such as chain-based information. A recent EU-funded project, entitled 'Integration of regulatory systems in public transport reports on examples of public transport integration and demonstration, showing that integration and competitive market pressures can go hand in hand.

CIVITAS has improved the public image of collective transport

## Better quality and improved safety

Improving quality has been a main theme of many public transport measures co-funded under the CIVITAS Initiative. This has included the certification and introduction of new and innovative quality management systems for public transport, particularly targeting key priorities such as safety and security. Both vandalism and terrorism pose real threats to travellers, business and companies, as well as to the image of public transport itself.

*Barcelona: improved tram line*



*Bucharest: testing the GPS on a new bus*



### Case Study

#### **Bucharest – quality at the helm**

Traditionally, the use of public transport in Bucharest has been high, and has remained steady despite the increasing motorisation rate. To maintain and possibly increase the high share of public transport usage, Bucharest sought to improve service quality, while strengthening and 'cleaning' the local fleet. This was accomplished by providing better real time passenger information and fleet management through the introduction of a new GPS location system on 15 buses, by modernising the ticketing and payment system (smart card technology – piloted on 20 vehicles), by introducing 60 new energy efficient trolley buses and eight new energy efficient trams, and by modernizing 35% of the tram network infrastructure. Depending on the integration of the Bucharest public transport operators, the contactless smart card will be introduced throughout the entire city.

## Innovative transport ideas

In France, well designed new tramway systems are attracting new customers to public transport, among them many former car users. The introduction of these new systems has generally been accompanied by a package of measures to rebalance the modal split and the revitalise city centres. The tramway systems in Barcelona, Bremen and Nantes are good examples.

New systems such as these are of course expensive and are only cost-effective when heavy passenger flows can be accommodated. Lesser flows require other high quality solutions, such as that adopted by Rome, where a newly converted trolleybus system and the extension of the electric bus network have been successful in attracting large numbers of passengers.

## Good overall record

Not all experimental transport initiatives co-funded under CIVITAS have been complete successes. An environmentally friendly ferry introduced in Göteborg and an automatic 'people mover' in Rotterdam experienced serious teething pains, as did the flywheel-powered tram in Bristol. None of these projects can be said to have been completely successful. On the other hand, the electric buses and the battery-powered trolleybuses in Rome's historic centre have proven highly technically reliable, and Bremen's hybrid tram also looks promising. Another successful example, which also shows a productive case of public-private partnership, is the water taxi service implemented in Rotterdam.

Rome's new electric bus lines carry 44,000 patrons a day, while Bremen's hybrid trams transport an average 10,000 passenger a day.

Improvements to existing bus systems have also been quite successful, especially whenever implemented as part of a package with accompanying measures. For example, the park and ride systems in Bristol and Cork are good examples of combined infrastructure and parking measures. These include new bus lanes, improved interchanges and improved accessibility at stops.

*Lille: intermodal node*



### Case Study

#### **Lille – all parties contributing**

In Lille, CIVITAS measures are part of to the overall 'Urban Mobility Plan'. Citizens are encouraged to use public transport through a combination of measures, including improved service integration, integrated ticketing, and 12 new dedicated bus lanes. Public transport security has been significantly improved (+8%), with more security agents now on duty on public transport networks and better technical solutions for surveillance and localisation of trams and buses. CIVITAS has also helped to establish the new regulatory body (SMIRT, Syndicat Mixte Intermodal Régional de Transports), which will implement the new integrated network and ticketing scheme. After intensive negotiations, SMIRT has become an important body with financial decision-making authority. This lesson could be particularly useful for other French cities.





Despite these achievements, in many cities the number of new cars continues to grow, while, in some cases, public transport is literally fighting for its life. The implementation of public transport measures can be a real struggle, in particular in terms of technical and economic planning. Large-scale, high-cost public transport interventions are complex endeavours that require long implementation timescales and secured financial resources, notwithstanding the inevitable political fluctuations.

When designing a public transport system it is thus important to obtain good coordination and co-operation between the range of involved actors, transport authorities, public transport companies and operators, and to count on politicians with a long-term mobility strategy in mind. It is also crucial to listen to passengers' needs and opinions, for public transport shall actually adapt its service to the expectations of customers.

*Nantes: the new Nantes-Vertou rail line*



#### Case Study

#### **Nantes – better services, better connections**

The use of public transport is a priority in Nantes, promoted through a combination of management and infrastructure measures that have substantially improve the image of public transport. Examples of the first type of measures include company mobility plans and better awareness of the business community, which helped to orientate behaviours toward a more conscientious use of the car. The creation of public transport priority lanes was another important instrument used by Nantes, together with the operation of two 'chronobus' bus lines, which adopted quality-driven standards in terms of time-keeping, frequency, and comfort. From an infrastructural standpoint, Nantes introduced 185 new low-floor CNG buses with an advanced real-time passenger information system, a new Nantes-Vertou railway link served by a park and ride facility, and a new river boat running every 20 minutes and connecting Nantes with Rezé on the Loire River, while another riverboat service, on the Erdre River, will run initially every 90 minutes.

# Urban goods transport

*Barcelona: one street, many users*



## Case Study

### Barcelona – keeping goods delivery on track

Improvements in freight delivery have been successfully demonstrated through a genuine public-private partnership approach. A multi-use lane scheme has contributed to improvements in traffic circulation, with journey times down by 15%, while nighttime delivery to supermarkets using adapted vehicles has been achieved without an increase in ambient noise. Under the scheme, an operator makes two deliveries per week instead of seven. A pilot phase was highly successful, and four further schemes are now being implemented. Also, a pilot Internet portal was tested in collaboration with more than a dozen freight operators.

## City-friendly products and services to those who need them

Urban goods transport policies aim at introducing new concepts and solutions for freight, like innovative logistics services using clean and energy efficient vehicle fleets, dedicated infrastructures and information services.

These policies are acquiring ever-growing relevance in today's inner city areas, where streets, squares and pavements are packed with delivery trucks and vans. Here, living and working can often be a frustrating experience. Not only do these vehicles represent a real physical obstacle to free movement but they also cause noise and pollution. In many European cities, more than half of harmful emissions come from heavy goods transport.

Another challenge for cities is the advent of new distribution patterns linked to emerging information technologies. Today, for example, consumers can search worldwide, via the internet, for goods and services at the best possible prices, that were previously out of reach. Suppliers are competing to provide fast, 'just-in-time' 24-hour delivery services. The end result is longer, more frequent and less coordinated goods transport movements.

These changing transport patterns are a particular problem for smaller suppliers. Larger ones tend to fill large delivery vehicles and maintain efficient and well-established delivery routes.

CIVITAS recognises the importance of having better managed goods and services

The impact of unnecessary freight movements can be quite high in terms of energy consumption, noise and air pollution, and in terms of related impacts such as economic efficiency, quality of life and public health. Thus, optimising goods distribution and logistics services is a crucial element for any plan to improve urban transport.



CIVITAS cities have developed new concepts and are implementing real and effective measures to reduce delivery vehicle mileage within urban areas, curbing increasing freight movements that put stress on the environment and lead to unnecessary fuel consumption.

Measures taken under the CIVITAS Initiative include bundling of goods delivery, guided routes for goods delivery and the promotion of the use of clean vehicles. Measures relating to bundling of goods have included the use of inner city logistics centres, permits for certain types of delivery vehicles and restrictions on other types, and the promotion of closer contacts between companies to foster co-operation and bundling agreements.

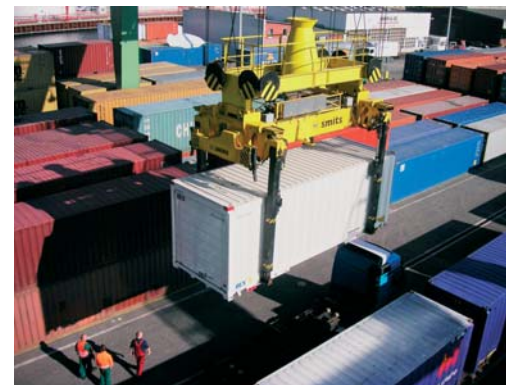
'Bundling' of goods to shops, restaurants and construction sites can dramatically reduce the number of vehicle movements. Unfortunately, the trend is now moving in the opposite direction, towards the 'atomisation' of deliveries, due to sharp increases in internet retail business.

### CIVITAS and urban freight measures – getting the logistics right

CIVITAS-backed logistics centres are aimed at the efficient pooling of goods for combined deliveries to customers. Bundled deliveries mean fewer delivery vehicles on the road, lower emissions and noise, and less street clogging.

Positive effects of better coordinated goods delivery have been found in several CIVITAS cities. Göteborg and Stockholm, for example, have been particularly successful. The aim of the Lundby Mobility Centre, one of two initiatives in Göteborg, was to establish contacts between wholesalers of office materials and other companies on the northern bank of the city's Kattegat River. Through voluntary agreements between 17 participating companies, the number of transport movements of office materials has now been reduced by at least 30%.

*Berlin: trimodal inner-city container terminal  
Berlin Westhafen*



*Göteborg: improving the load factor*

#### Case Study

#### **Göteborg – co-operation is everything**

Eight trucks participated in a pilot project aimed at increasing the load factor for goods distribution in Göteborg's city centre. The trucks were equipped with GPS systems and positive incentives were offered to those haulers that optimised their load factor. In parallel, five office suppliers and fifteen companies ordering goods in the Lundby city district joined a project to optimise their ordering routines. This translates in a two-fold gain, as suppliers are now co-ordinating their deliveries and reducing the number of trips by 41%, while purchasers are co-ordinating their orders, therefore requiring fewer deliveries.

Meanwhile, the Old Town Logistics Centre in Stockholm has implemented new logistics solutions to deliver goods to clients in the old city centre using small, clean vehicles. The objectives were to reduce the number of small direct deliveries (down by 3%), thus combating congestion, energy use and emissions. The project has been successful in reducing queuing and the number of trips, and in increasing the load factor by 13%.

The consolidation of deliveries in Graz resulted in a 45% reduction of delivery trips in the area around the largest local shopping mall.

### CIVITAS cities show the way

Another measure undertaken in Stockholm involved the creation of a logistics centre for construction materials. The aim, again, was to reduce the number of small deliveries, improving living conditions for local residents and the working environment.

In Rotterdam, a public-private partnership implemented a multi-core tube system as an alternative to road transport-based delivery in the metropolitan region. The system, in the Rotterdam harbour area, has helped to reduce road traffic through the use of underground space. It is reliable and cost effective and saves time when compared to conventional lorry and inland shipping deliveries. It has resulted in improved environmental performance and better accessibility.





## Against all odds – cleaning up city deliveries

The introduction of clean delivery vehicles in four CIVITAS cities is an additional measure that has helped to put pressure on vehicle manufacturers to develop and provide clean vehicle technology at more competitive prices.

Effective information campaigns, coordination of schemes, financial incentives and other assistance to participants are important elements of an integrated approach and can motivate potential partners in freight consolidation schemes. Parties who are not fully convinced can be swayed when benefits and services are included, such as new storage facilities, packing and unpacking of goods, displaying of merchandise and price tagging.

The importance of political commitment and backing in this area cannot be overstated, particularly in view of the profound economic implications of goods delivery for the local business sector. Partnership and the full involvement of key players is also a real prerequisite to success. All of this underlines the importance of broad co-operation, including local authorities, retailers, hauliers and local ports and distribution centres, in order to establish common objectives and to avoid the creation of unfair competitive advantages.

CIVITAS creating demand for efficient  
and well-coordinated goods distribution

On the whole, many CIVITAS measures aimed at improving goods delivery have been successfully implemented, although the establishment of logistics centres has been delayed in some cases. Also, 'clean truck' Initiatives in Bristol and Bremen could not be undertaken as the vehicles were not available. These cities therefore proceeded with other measures using conventional trucks. In spite of some setbacks, significant knowledge and expertise has been gained in all CIVITAS cities.

*Bristol: consolidating deliveries*



### Case Study

#### **Bristol – combined freight services in the city centre**

Improved freight distribution has been achieved through the publication and circulation of a commercial vehicle driver's atlas, as well as the utilisation of community delivery points and an urban freight consolidation scheme. The atlas was designed to help drivers of commercial vehicles find the most appropriate routes to main freight delivery destinations. Under the city logistics scheme, which involves over 50 retailers, deliveries to the city centre are now consolidated, resulting in a reduction of 70% in vehicle movements and saving over 100,000 lorry kilometers.

# Transport information and management

*Cork: publicising the new pay-by-phone service*



## Case Study Cork

Cork's 'pay-by-phone' scheme is an innovative parking management system that can be accessed via mobile phone technology. Members of the public can easily subscribe to the pay-by-phone system, and then pay for street parking using their phones. The system administrator can also send a selection of pre-programmed messages to the subscriber. For example, users are reminded when their parking time is nearly up. The scheme can also be adapted to incorporate a matrix of user types so that the parking charges levied are able to discriminate in favour of cleaner vehicles. In all, 77% of system users were satisfied with the pay-by-phone scheme, and 99% reported the intention to keep using it.

## Information empowering urban travellers

Intelligent Transport Systems (ITS) cover an array of different ways in which information and communication technologies can have a beneficial impact on the transport system, therefore cutting across many of the other themes addressed by CIVITAS.

In short, it consists of innovative transport systems and traveller services, such as those for intermodal travel information, transport pricing and payment, road conditions, vehicle location and guidance and traffic management, that help to altogether support a more efficient operation and management of the transport system. Potential applications are consequently relevant both for public and private modes.

## Real-time information helps public transport passengers and staff

Ideally, travelling by public transport should be as easy and efficient as travelling by car. It should also be easy to compare travelling alternatives and to plan trips from door-to-door. The latest technologies make it nowadays possible to provide invaluable information to help travellers make the right transport choices and to get where they're going in the easiest and most efficient way.

Accordingly, a solution adopted by a large number of CIVITAS cities is the provision of information via electronic displays at bus, tram or metro stops, keeping track of delays and giving patrons an estimate of the waiting time for the next vehicle. These real time passenger information systems combine a variety of technologies to track the locations of public transport vehicles in real time, and generate predictions of arrival times along the route.

CIVITAS and ITS – easier and more efficient mobility for travellers



Real-time information tools were also widely used in CIVITAS through the internet, mobile phones, and mobility centres and kiosks. Here, travellers are offered the chance to efficiently plan their trips being constantly informed about lines availability, timetables, modal interchanges, trips duration, delays and traffic conditions. The notion of the 'informed traveller', who can make choices about when, how and whether to travel at all, fully emerges from measures such as the TravelBristol info centre, the Graz 'BusBahnBim' web system, the Aalborg kiosks, and the Winchester bus departure information system, just to mention a few.

### CIVITAS providing better transport information for better trip planning

Finally, the same information can be used by public transport staff to answer passenger questions on delays and to make recommendations on alternative routes.

All in all, several hundred real-time messaging devices at public transport stops, central stations and on board vehicles have been installed in various cities, making the use of public transport easier and more attractive. The success of this kind of technological support is confirmed by surveys in Rome, Graz, Rotterdam and Berlin, where the acceptance level among users was very high, averaging 77% and indicating widespread appreciation of more predictable and efficient transport services.

*Aalborg: keeping users informed*



#### Case Study **Aalborg**

Aalborg has set up real time passenger information services at 32 bus stops, while buses now have the priority, thanks to intelligent systems, at about 50 city cross-roads. Part of these initiatives involved the installation of special computers in 209 buses.

*Bristol: TravelBristol info centre*



*Berlin: real time passenger information*

## Real-time information helps traffic management

Information technologies were also heavily utilised to control the seemingly unmanageable network of roads, junctions, traffic lights and vehicles populating our cities. Traffic management effectively allows monitoring of the real-time traffic situation, which varies depending on congestion, weather, accidents, road works, time of day, etc., and accordingly controls the flow using that information.

Strong support and determination  
keep CIVITAS cities on track!

*Graz: modal choices at the Kunsthaus*

### Case Study

#### Graz

Graz's internet-based public transport route planner is now operational. The real time passenger information system arrival times of buses and trams has also been implemented at 120 bus and tram stops. Trams and buses have been equipped with on-board transmitters that report the location of vehicles to a computerised control centre every tenth second. This information is used to provide real time information to passengers, including delays and other incidents of interest. The information also makes it possible for central management to re-direct buses in case of accidents or to warn bus drivers about traffic jams. All of this has resulted in fewer disruptions and better traffic flow, further promoting the use of public transport.





A real-time picture of the traffic situation is also valuable for other users, such as taxis, delivery companies or car drivers wanting to find the fastest route, unoccupied parking or a connecting train.

The main challenge lies in the capacity to connect the data collected by various sources (e.g. public transport operators, big commercial fleet owners, road administrations) and estimate the situation in areas where too little information is available, in order to give a reliable picture of the real-time traffic situation, bridging the existing incompatibilities amongst management systems.

## Wide acceptance of the power of ITS

In general, the implementation of transport information and management measures has been less influenced by politics and strategy than some other types of measures, with relatively low levels of opposition from citizens and businesses. This seems to reflect the dominant consensus among all stakeholders concerning investment in ITS, now widely seen as an effective multi-purpose tool for achieving diverse objectives.

However, experiences in cities like Stockholm, Graz, Kaunas and Bremen show that the large number of involved stakeholders and the technical complexity particularly of traffic management systems lead to longer than planned timescales to build efficient services. As these may require several years to benefit from, it can be difficult to receive high-level political priority, and to accordingly secure reliable budgets.

On the other hand, transport information and management systems are altogether much less expensive than the provision of new roads (though operational costs tend to be rather high). Hence, the lesson learnt by CIVITAS indicates the necessity for local authorities to shift approach, from building roads to informing road users and managing road traffic, retaining throughout a strong lead in projects that are multi-layered and widely participated.

Rome: advertising the mobile payment system

**A Roma è più facile**

**Per pagare la sosta con il cellulare, iscriviti al servizio**  
 Poi basterà inviare un SMS al **3404312586** per pagare il parcheggio

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 numero verde 800 060606

### Case Study

#### Rome

The work performed in Rome addresses all the key CIVITAS concepts and objectives, including improving the dissemination of public transport information. The integration of transport management systems has been realised through a number of technical innovations. A prototype interface has been prepared for 'Telepay', an innovative mobile ticketing payment scheme. Technical, financial and organisational implications have been analysed. An information and advertising campaign has been developed. Customer care requirements have also been investigated and new ticket inspection procedures have been drafted.

Meanwhile, tourist information services have been tested in Rome, including both internet and PDA (Personal Digital Assistant)-based technologies. Trials have been carried out involving tourists, citizens and professionals. Early results seem positive, from both the technical and customer acceptance points of view. An agreement has now been made with the City Council's department of tourism to continue the service.

# Conclusions

## Moulding a success story

The CIVITAS Initiative represents a unique experience for all urban transport stakeholders, bringing together policy makers, experts, practitioners, businesses and users in an exciting quest for innovation. Initiated by the Directorate-General for Energy and Transport under the Fifth European Community Framework Programme (FP5) covering Research, Technological Development and Demonstration activities, CIVITAS supports integrated and bold energy and transport strategies for clean and sustainable urban transport. The success of this approach has been recognised by the continuation of the programme through FP6 and now FP7.

The nineteen CIVITAS I cities have been true pioneers, engaging in the demonstration and testing of novel measures as part of an ambitious collaborative programme. The nineteen cities carried out 212 transport-related measures, which involved some 100 public and private organisations and more than 500 experts. The result has been an extraordinary team effort, characterised by dedication, inventiveness, mutual support and, occasionally, some frustration. All European cities, both inside and outside the CIVITAS Initiative, national and European policy makers, researchers, businesses and citizens are the main beneficiaries of this learning process.

When asked why they participated, most CIVITAS I cities refer to the appeal of extra funding, but equal importance is placed on the benefits of long-term co-operation and knowledge sharing. With the support of CIVITAS, motivated individuals and organisations have built up networks of contacts for successful partnership. In a nutshell, it can be said that CIVITAS has fostered a process in which 'cities help cities', setting in motion a dynamic destined in many cases to survive the framework of the EU funding programmes and continue on a bi-lateral or multi-lateral basis.

## A CIVITAS bird's-eye view

The 212 demonstration measures implemented in the nineteen CIVITAS I cities combined for a total value in excess of €300 million (of which more than €100 million funded by CIVITAS), and can be categorised in eight themes.

All themes are well represented, although the bulk of the CIVITAS I efforts were placed on the improvement of public transport and the promotion of the use of alternative vehicles and fuels.

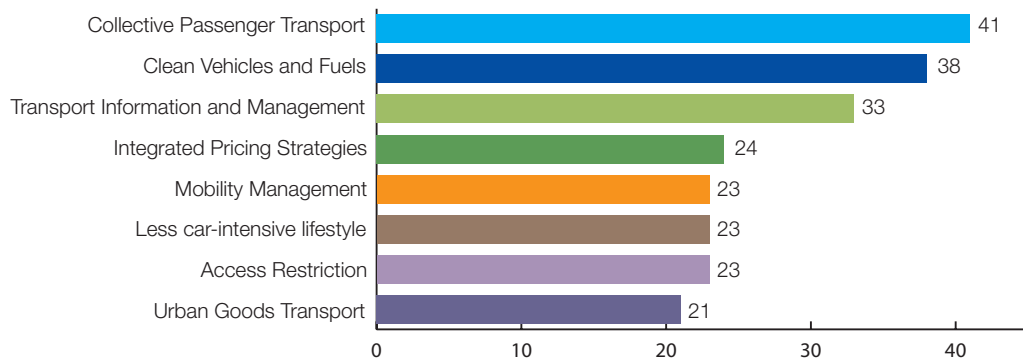
The implementation of measures was largely successful, despite the occasional delays due to technical, political or financial obstacles. Nearly 70% of the measures were satisfactorily completed, some 28% proved to be troublesome, while just 3% had to be replaced with alternative schemes or were halted altogether.

Rome: electronic gate in Trastevere



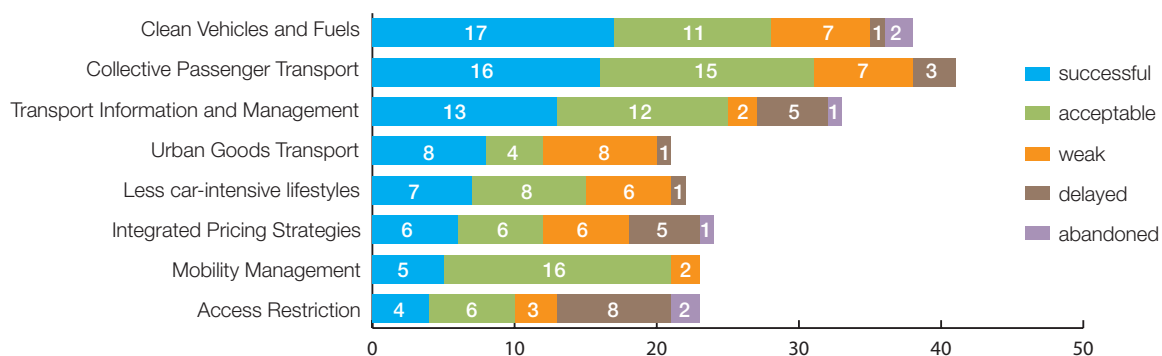
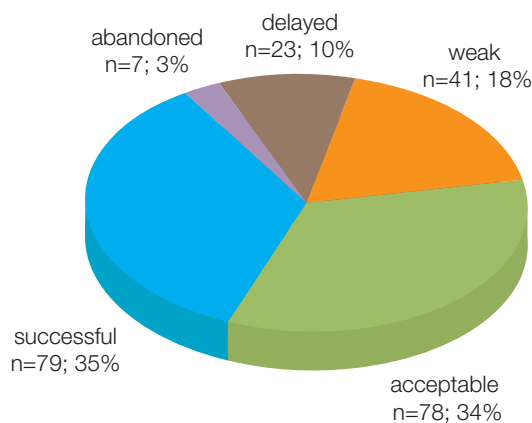
Winchester: "Park and Ride" facility



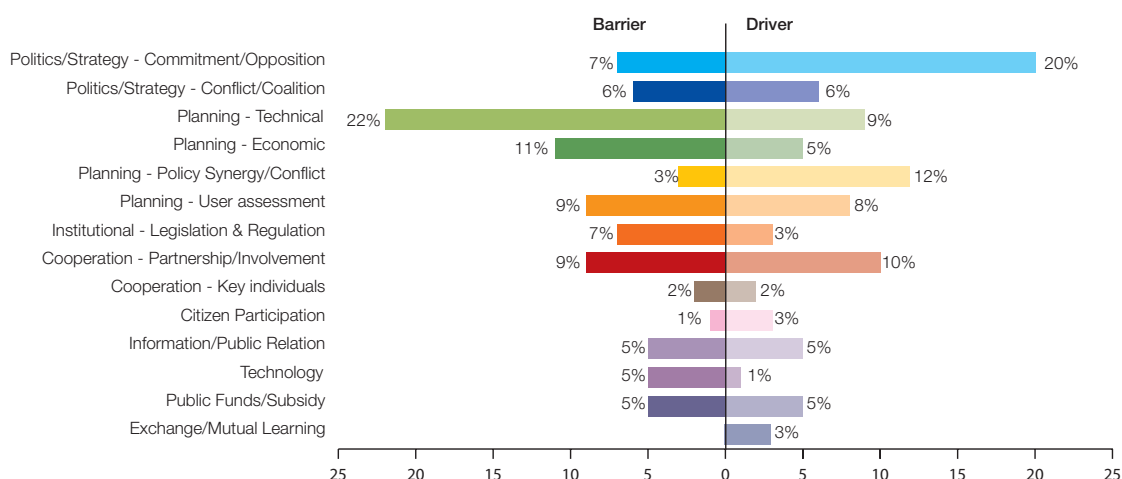


The project implementation processes were similar across themes, with the exception of 'integrated pricing strategies' and 'access restrictions'. These categories included new and risky applications, possibly due to their controversial nature. They also affected a broad range of stakeholders and mobility behaviours.

A number of factors had positive or negative effects on measure implementation. Planning technicalities, the lack of firm and reliable funding sources, and strong political opposition were all cited as significant barriers faced by the CIVITAS cities.



On the other hand, the strong commitment of responsible politicians, synergies between policies, the promotion of local partnerships, and the involvement of final users were identified as the main drivers of successful projects.



Cork: "Park and ride" facility



In terms of actual results, the work of the CIVITAS I cities has provided a real and measurable impetus to the development of more attractive cities and the improvement of quality of life for millions of European citizens. This was achieved through reduced congestion, less pollutant and greenhouse gas emissions, reduced energy consumption and lower noise levels.

The following table provides a visual overview of the impacts of each measure category across the main areas of investigation addressed by CIVITAS.

The analysis of CIVITAS I results makes it possible to generalise about the relationship between transport and energy policies and their likely impacts. This is also strongly dependant on the specificity of the local urban contexts. The table hereinafter accordingly shows a list of common goals of sustainable urban transport and the measures expected to be most effective in light of the experienced accrued in CIVITAS I.

| Measure Category                     | Transport | Energy | Environment | Economy | Society |
|--------------------------------------|-----------|--------|-------------|---------|---------|
| Clean Vehicles and Fuels             | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| Collective Passenger Transport       | ⬆         | ⬆      | ⬆           | ⬇       | ⬆       |
| Transport Information and Management | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| Urban Goods Transport                | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| Less Car-Intensive Lifestyles        | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| Integrated Pricing Strategies        | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| Mobility Management                  | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| Access Restriction                   | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |
| <b>CIVITAS I as a whole</b>          | ⬆         | ⬆      | ⬆           | ⬆       | ⬆       |

⬆ positive impacts    ⬆ neutral impacts    ⬇ negative impacts    ⬆ insufficient information





| Goals of sustainability and effective measures                                  |  |
|---|--|
| If the goal is to...  | ...effective measures are...   |
| <b>Reduce congestion</b>  | transport information and management<br>mobility management<br>access restriction<br>public transport promotion<br>goods distribution and logistic services<br>parking management<br>urban pricing                                     |
| <b>Reduce energy consumption and traffic emissions</b>                          | mobility management<br>cycling<br>car sharing and car pooling<br>clean vehicles and fuels<br>public transport promotion<br>urban pricing   |
| <b>Decrease local emissions and improve quality of life in city centres</b>     | access restriction<br>goods distribution and logistic services<br>parking management   |
| <b>Increase the market share of clean vehicles in private and public fleets</b> | car sharing and car pooling<br>access restriction<br>clean vehicles and fuels<br>parking management  |
| <b>Increase the efficiency of the transport system</b>                          | multimodal interchanges<br>mobility management<br>cycling<br>car sharing and car pooling<br>public transport promotion   |
| <b>Increase the attractiveness of public transport</b>                          | goods distribution and logistic services<br>transport information and management<br>multimodal interchanges<br>mobility management<br>car sharing and car pooling<br>access restriction<br>public transport promotion<br>urban pricing |
| <b>Decrease parking pressure</b>  | cycling<br>car sharing and car pooling<br>mobility management<br>parking management  |

Integration is a trademark of the CIVITAS Initiative, yet the real impact of the integration of policy elements can be hard to assess. Nevertheless, results on the ground and the opinion of experts seem to confirm the case for integration, with packages of policies yielding greater effects than the sum of policy elements implemented in isolation.

Last but not least, the life span of the measures implemented by the CIVITAS I cities goes well beyond the contractual duration of the programme. Impacts need time to build up, and to fully analyse and compare them, ongoing monitoring and evaluation becomes a necessity. Continuity of the CIVITAS Initiative is therefore crucial. The upcoming EU action for the evaluation and take up of the results of CIVITAS, the work of CIVITAS II and the future demonstrations of CIVITAS PLUS will help in this sense.

## Final remarks

In today's world, cities represent a primary source of pollution and energy consumption. CIVITAS has proven that coordinated and committed efforts to improve the quality of our urban environments can be effective and can contribute to a more sustainable development of the planet.

Investments both in ambitious urban transport policies such as fleet conversions, park and ride facilities and urban pricing, and in less cost-intensive interventions such as bus priority systems, awareness campaigns and car sharing are all important elements.

Graz: CIVITAS spot on Kunsthaus



The analysis of impacts at the broader city level has yet to supply conclusive evidence, due to the sheer size of the demonstration areas, the time-lag effect recalled above, and the inevitable influence of concurrent external factors (such as other policies or large scale events affecting the same area). On the other hand, when considering the analysis of impacts at a more localised level (e.g. a transport corridor, a new bus line, new pedestrian area), it is possible to assert that CIVITAS I produced extensive, measurable and encouraging results, suggesting that many of the measures are now ready to be transferred to other cities.

Next to the 'hard' figures produced by monitoring and evaluation is the perception of the CIVITAS I cities. These consensually agree that the large investments so far mobilised together with the European Commission to achieve a radical change in today's mobility culture and to improve the performance of urban transport systems, have yielded remarkable benefits that have gone across the three well known 'pillars' of policy sustainability: social, economic and environmental. The reclaimed amenity and liveability of many city centres, and the improved air quality and traffic conditions of many urban areas are becoming visible and are greatly contributing to raising the quality of life within CIVITAS I cities.

The urban areas affected by the packages of CIVITAS measures, see citizens that can today spend their leisure time in cleaner and safer environments, have more options and better access to collective and non-motorised means of transport, and have gained quality time while performing trips that were previously substantially longer. In turn, healthier and more mobile city dwellers have fuelled revamped urban economies, in which shops, bars and restaurants are thriving, transport operators finding new opportunities, and realtors witnessing value gains.

The CIVITAS I Initiative not only implemented a number of measures, but it also generated what many experts regard as an even more crucial, though less tangible, series of achievements. These include:

- Increased public confidence in the good sense and feasibility of innovative transport policies
- Exchange of knowledge in terms of technical design and practical applications;
- Creation of a network of international contacts, leading to new collaborative projects;
- Improved inter-institutional co-operation, a fundamental achievement in the area of public administration;
- Helped to achieve a critical mass for new technology adoption;
- Fostered the creation of a political dimension, today manifested by the network of politicians active in the CIVITAS PAC and CIVITAS Forum conferences.



CIVITAS has also proven a useful laboratory and a good investment for the European Commission. The continuing experience of so many dedicated cities is producing valuable information in terms of innovative solutions, emerging technologies, and policy impacts, and is conversely pointing out barriers to policy implementation, be they of political, technological or financial nature.

All in all, the message for the European Commission is that collaborative projects in which cities learn from each other, exchange good practices and evaluate results, are extremely productive.

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## CIVITAS means progress

Today's urban transport sector is beset with problems, ranging from congestion, excessive energy consumption, pollution and noise to land use issues and questions related to the financing of public transport.

The CIVITAS Initiative, launched in the early 2000, helps cities test and assess new approaches to urban transport issues. CIVITAS encourages the demonstration, testing and evaluation of ambitious, innovative solutions that directly address the transport, energy and environmental problems of Europe's cities.

Under CIVITAS I, 19 European cities implemented 212 measures and put in place the necessary planning frameworks, gathered political support and established crucial partnerships. Today, the CIVITAS cities are increasingly seen as European leaders in the implementation of integrated transport and energy strategies. Their stories, presented in this document, provide inspiration for other cities. At the same time they offer practical insights into local specificities and their influence on successful implementation.

