

Intelligent Transportation Systems

Sustainable Mobility Pilot
Research

Projects in Touristic
Areas





Table of Contents

EXECUTIVE SUMMARY	4
SUSTAINABLE MOBILITY IN URBAN and TOURISTIC AREAS	6
The scope of the Topic	6
POLICY BACKGROUND	8
Measures to ensure efficient and sustainable mobility in Europe	8
RESEARCH CONTEXT AND PROGRAMMES	15
Key research areas and actions at EU and National levels	15
Benefits from key projects	19
What next?	30
OUTLOOK ON RESEARCH	35
What next?	35
REFERENCES	36

2





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transportation. However, different policies vary enormously in their effectiveness in achieving a reduction of pollution, and the time spans of the effects differ as well.

PRESS4TRANSPORT is funded by the European Commission's Directorate-General for Research under the Seventh Framework Programme for Research and Technological Development (FP7).

5



PRESS4TRANSPORT details:

This fiche is produced within the **PRESS4TRANSPORT** (*Virtual Press Office to improve EU Sustainable Surface Transport research media visibility on a national and regional level*) project. The overall aim of the project is to assist EU, National and Regional funded projects communicate their surface transport research results to the media.



in Europe are dynamically developing in the last decade due to the growth in tourism and the fast development is accompanied by increased traffic and rapid deterioration of the regions' natural resources on which tourism growth depends. Traffic congestions and the negative impact of transport on environment are recognized as the biggest risks to the sustainable development of the tourism sector. The problem is particularly acute in the resort complexes which expand to urban settlements during summer and early autumn.

Promotion campaigns need to be designed to identify the possible forms of sustainable mobility in the touristic areas and to promote them as a new service to the tourists and the citizens. General rules and objectives to obtain these results can be the followings:

- *The activities need to be supported by both municipal and regional administrations in the target region;*

- *Alternative modes of transport and eco-friendly tours and routes need to be promoted;*
- *A mobility management services is required.*

This paper aims to provide a **general overview** on the thematic of urban and sustainable mobility and on the related EU policies and research programmes. Also two examples of national and regional research programmes Moreover the activities of two projects developed in **Italy** and selected among the projects registered on the PRESS4TRANSPORT platform will be presented and compared. The examples of two Italian national and regional research funding programmes will be also presented.



POLICY BACKGROUND

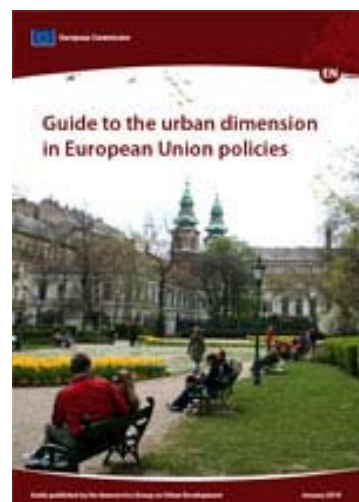
8

Measures to ensure efficient and sustainable mobility in Europe

A common challenge across Europe is then to find the right ways to ensure efficient mobility while at the same time reducing congestion, accidents and pollution. Various Community policies and programmes are covering the sustainable development of urban areas and protected areas like national parks or nature reserves, where sustainable issues are particularly required. The following **two guides** have been produced by the Commission in order to explain the relevant regulatory and financial framework:

1. *The urban dimension in European Union policies 2010*
2. *The urban dimension in other policies of the European Union.*

The first guide deals with the urban dimension and the instruments of Cohesion Policy and the second one with the urban dimension in other Community policies. The two guides recognize the important role that **local authorities** play in improving the environment, and their high level of commitment to genuine





progress. The European Union contributes to the sustainable development of urban areas through a range of policies and initiatives which cover many areas of activity. In particular, the **EU's Cohesion Policy**, through the **Structural Funds**, plays a key role in underpinning the development and revitalization of Europe's towns and cities. Large budgets have been invested by Community research programmes in the development of electric and hybrid vehicles, in testing those running on alternative fuels such as natural gas, as well as in advancing longer-term prospects for technologies such as fuel cells and hydrogen. The Seventh Framework Programme for research and development is continuing such support. Possible options that are being discussed, amongst others, in this context are:

- *de-taxing clean vehicles;*
- *placing an obligation on public administrations to*

spend a part of their vehicle purchasing budget on clean vehicles;

- *cities to introduce restricted access to central areas for polluting and high fuel-consuming vehicles, either by tolls or actual prohibition;*
- *specific certification and technical standards for clean vehicles.*

Such measures could prove to be more efficient than direct aid to industry and contribute furthermore to technological development in European industry. The EU supports and promotes an integrated approach to find solutions to sustainable transport but usually local authorities, rather than the EU, take the lead on urban mobility projects. In the following paragraphs the main policies for sustainable transport in **Europe** and in **Italy** will be described.



Policies for sustainable transport in Europe

An essential function of the EU is in providing support through projects that help to identify, disseminate and exchange best practice in areas such as transport infrastructure, norm-setting, congestion and traffic management, public transport services, infrastructure charging, urban planning, traffic safety, mobility services for people and for goods, and co-operation with the surrounding regions. The European policy for transport is complemented by the **European policy on Information and Communication Technologies**. Some of the most significant past, current and future initiatives are described above.

Past and current initiatives

Sustainable mobility and urban transport are identified as

priority areas by the mid-term review of the White Paper *"European Transport Policy for 2010: Time to Decide"* and the Green Paper on *"Energy Efficiency or Doing More with Less"* makes clear that more needs to be done to improve energy efficiency in the transport sector, particularly the road transport sector.

Green Paper on *"A European Strategy for Sustainable, Competitive and Secure Energy Supply"* proposes major efforts to improve energy efficiency in the transport sector and to rapidly improve public transport in Europe's major cities.

Moreover, the *Thematic Strategy on the Urban Environment*

recognizes that action in the field of urban transport needs to be





taken at all levels (local, regional, national and European). The Green Paper on urban mobility identifies the challenges for sustainable urban mobility in Europe. Following the consultation on the Green Paper, the Commission is developing ideas for **concrete actions**, following a comprehensive, integrated approach to strengthen sustainable urban mobility.

11

The **intelligent car initiative** "*Raising Awareness of ICT for Smarter, Safer and Cleaner Vehicles*" aims at promoting communication technologies to improve safety and efficiency in transport. The European programmes for radio navigation by satellite, **EGNOS** and **GALILEO**, allow the development of unique positioning instruments which will facilitate urban mobility and generate levels of service suited to the current needs of citizens. A new *Directive on Clean Vehicle Procurement* will help

to increase market share for clean vehicles through public procurement measures.

More information on the Intelligent Car Initiative at:
http://ec.europa.eu/information_society/activities/intelligentcar/index_en.htm

The European Commission has also adopted on March 2010 the *first international regulation on safety* of both fully electric and hybrid cars. The revised **UNECE Regulation** will ensure the safety of electric cars by setting out how users of cars shall be protected from the high voltage parts of cars and prescribing test procedures that uses a standardized '*test finger*' to check protection all over the car.

Future initiatives

Following the consultation on the Green Paper, the Commission has developed ideas for concrete actions, following a



comprehensive, integrated approach to strengthen sustainable urban mobility in Europe. These and further concrete actions have been embedded into an overall “*Action Plan on urban mobility*” adopted by the European Commission on 30 September 2009. The Action Plan consists of twenty headings aiming to encourage and assist local, regional and national authorities to achieve their objectives for sustainable urban mobility. The vision of the document is to make urban transport easier, greener and better organized. In the course of 2012 the Commission will conduct an evaluation of the implementation of the Action Plan and will analyze prospects for continuing with it.

The following **actions** were also launched during **2009**:

- Funds will be granted for **new pilot projects** that result from a Call for Proposals that was closed in March 2009. These pilot projects reflect some of the

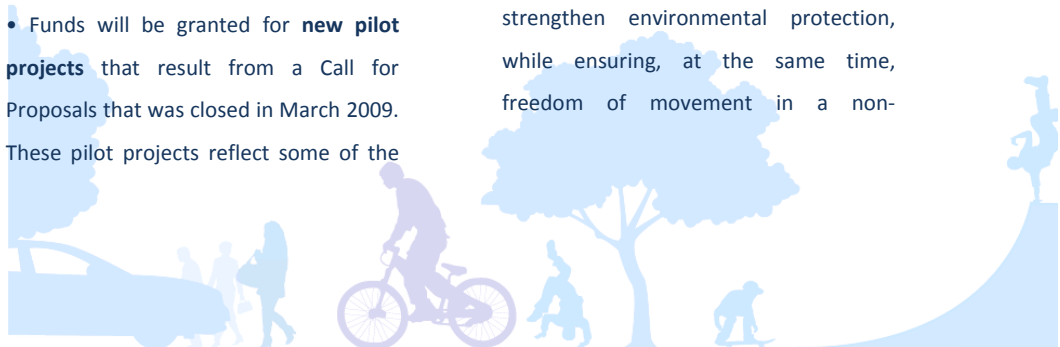
identified priorities: cycling and walking; freight transport, green zones; and actions to promote public transport;

- An **internet site** has been set up to help public authorities in their purchases of clean and energy efficient vehicles, e.g. cleaner buses for their public transport fleet. The site provides information and guidance for **green public procurement** and support lifetime calculations as well as joint procurement.

- The Commission has provided **information on urban mobility legislation and funding** on its website. This should develop into a reference point for information on EU action and financial support in the field of urban mobility.

- Study to explore the opportunities for making public transport systems more **inter-operable**, including better information and smart ticketing.

- Study on '**green zones**'. The results of this study should help cities to identify solutions that suit their needs and strengthen environmental protection, while ensuring, at the same time, freedom of movement in a non-





discriminatory way for all citizens in the Union.

Policies for sustainable transport in Italy

In the past two decades, transport policy in Italian cities has consisted mainly in imposing standards and land use regulation measures, such as the definition of limited access or pedestrian areas, and in some sporadic cases, the construction of bicycle lanes (especially in Northern cities). Since the 1990s, and because of the increasing concern over environmental quality, urban governments have continued to rely on parking policies and traffic-free Saturdays or Sundays. As regards parking, parking charges are very common in almost all cities, both because of their effectiveness and because of their positive effect on municipal budgets. On the other hand, traffic-free weekends, although very common, even in small cities,

have recently been much criticized by environmentalists because of their supposed ineffectiveness. Besides specific parking plans, urban transport policy actions in Italian cities are largely considered in two types of urban plan:

- **PUT, Piano Urbano del Traffico** (*Urban Traffic Plan*);
- **PUM, Piano Urbano della Mobilità** (*Mobility Traffic Plan*).

The former type, **PUT**, is a classic urban transportation plan and is mainly devoted to **managing city transport demand and supply issues**, such as public transit, parking policies, and road safety measures. According to *Italian law* (Law Decree/D.Lgs. 285/92), only cities with more than 30,000 inhabitants must define and adopt a PUT, whilst for smaller ones, the approval of a PUT is optional.



The national “**Industria 2015**” program.

One of the most important research program in Italy is the so called “**Industria 2015**” proposed by the Italian Ministry of Economic Development. The program has established the strategic lines for the development and competitiveness of the future production systems in **Italy**. The aim of the program is to stimulate industrial innovation projects to create new cross-sector industries (which integrate

manufacturing, advanced services and new technologies) to encourage the development of specific types of products and services with a high content of innovation in strategic areas for the country: **energy efficiency** (200M€), **sustainable mobility** (180M€) and **new technologies** for the made in Italy (190M€). The actors involved, in addition to the production sectors, are national and local administrations, universities and research institutions.



Developing and experimentation Of electric powered vintage carriages in ROME

The main goal of the project is the development of an innovative electrically-powered vintage carriage (*Botticella*) and its experimentation in the touristic centre of **ROME**. For the realization of the project two different phases have been foreseen: the first phase have seen the designing and the construction of two prototypes of the electric vehicle and it will be concluded in 2010; the second phase will be carried out in 2011 and sees the integration of the first two prototypes in the municipal fleet. .

Actually **Rome Municipality** is already testing electric assisted rickshaws for freight and passenger transport in the inner zone of the city. Public charging stations have been already installed at selected sites in the city to charge private and public electric vehicles. Moreover in the city centre there are 44 traditional horse-drawn carriages that, according to the urban plans drawn up by the Municipality, will be confined to parks during the week and allowed in the centre only at weekends. The plans foresee also the replacement of the horse-drawn carriages on weekdays by a fleet of electrically-powered vintage cars. Results from the first phase have seen the complete design of the electric vehicle and the analysis of the related



Figure 1: *The design of the new electric powered Botticella*



regulations and standards.

Figure 1 shows the final design of the vehicle: particular attention has been given in using innovative and sustainable materials and technologies trying to respect and maintain the vintage style of the traditional roman *Botticella*.

Figure 2 illustrates the main components of the prototype. The vehicle has been designed to be multifunctional and thanks to its modularity it will be possible to use it for various applications. A list of guidelines and specific indicators has been individuated in order to monitor and evaluate the activities that will be carried out during the experimental phase. The indicators will allow to evaluate the success of the measures and services demonstrated within the Project, in terms of technical features, energy and environmental issues, user acceptance, impacts and financial issues. Assessment objectives, expected impacts, measures of performance,

reference cases and measurement methods have been also identified. This will allow to highlight the overall performances of the measures and services that will be demonstrated within the Project. Moreover, georeferential mobile units and safety and touristic information unit have been identified and will be installed on the prototypes (rickshaws and electrically-powered vintage cars) and will be integrated with a set of sensors used to monitor the territory and the service.

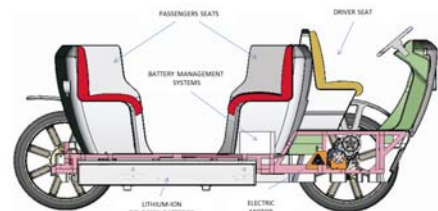


Figure 2: *Main components of the new electric powered Botticella*

This pilot service will be monitored in order to measure strengths and weaknesses of the scheme. This will involve measurement of energy use,



Sustainable mobility solutions for the island of Ventotene

23

The main purpose of this project is to study pathways that lead to **sustainable energy systems** for the small island of Ventotene in Italy. The project looks into several aspects such as renewable energy penetration, efficient energy use, clean transportation options, monitoring and fleet management. The project has been financed by the **Lazio regional government** with the participation of the Municipality of Ventotene and it has been developed by the **Pole for Sustainable Mobility (POMOS)** and various private partners. The project has a duration of six months split up in two periods of 3 months corresponding to the 2009 and 2010 summer seasons.



Figure 3: *The electric vehicles.*

The main goals of the project were to analyse sustainable mobility models on the island through the implementation of a local sustainable mobility programme and the introduction and development of the following systems:

Electric Vehicles fleet

The first activity was to add seven 100% electric vans to the Municipal fleet. These are commercial Porter Piaggios using a pure electric drive train which only consumes electric energy (see **Figure 3**). The vans will be mainly used during the touristic season for transportations from the port to the centre of the island with an estimated average of 15 daily kilometers traveled on the island for each vehicle.



The vans will be also used to test the on board systems. Moreover a selection of other commercial electric and hybrid vehicles and prototypes developed by POMOS will be also tested on the island as well as the use of different kind of batteries (see **Figure 4**).



Figure 4: *Some of the hybrid and electric prototypes experimented in the project.*

Experimental on board systems for the telemetry and the control of the vehicles

The fleet was equipped with on board telemetric device to locate the vehicles, and send that data over network. Direct connection of the device diagnostic bus can allows the automatic collection of vehicle performance data to support preventive maintenance.

The on board system also includes a PC with a touch screen that is used to show data and information. A multimedia software was developed to provide to the drivers and the travelers audio and video messages according to the position of the vehicle. The system calculates the real-time location of any vehicle, then data are transmitted to a central server situated in the City Hall building and can be used immediately for daily operations and archived for further analysis too. The system can be used to monitor on-time performance and can be used for service planning, safety and security, traveler information and entertainment, vehicle component monitoring, and data collection.

Environmental monitoring system

The use of a compact air pollution analyzer was planned for environmental monitoring. The analyzer has an air quality



sensors module for several kind of gaseous pollutants (CO, NO₂, SO₂, O₃). It can be easily installed either on outdoor fixed emplacements or onboard of any kind of mobile vehicle (car, van, scooter, bicycle, segway) and operated both as a kinematic and static units to create an air quality monitoring control network. The air pollution analyzer is made to operate under software control by an external controller unit dealing with satellite positioning and data transmission to a remote control centre. Data are sent to the server and displayed and analyzed using a software tool.

25

Wireless communication system

An outdoor Wireless Mesh Network (WMN) was designed and created to cover most of the territory of the island.



Figure 5: *The integrated photovoltaic charging station.*

Intelligent charging systems and integration with Renewable Energy Sources

Charging stations will be installed at selected sites on the island to create a small Intelligent Networked Charging Infrastructure for EVs. The charging stations keep track of charging times and other data to allow remote monitoring of their utilization and correct functioning. The project foresees the installation of a main charging station located in the night deposit of the vehicles and of a public network of three charging stations integrated with photovoltaic generators (PV) with the general objective to



study and promote the use of PV energy to charge EVs on the island territory. A first integrated PV station has been designed, built and installed for charging the electrical vehicles and other two stations will be installed in summer **2010** (see **Figure 3**). The charging stations will be used during the experimental phases of the project to charge the Municipal electric fleets and the experimental prototypes. In the future, citizens with plug-in electric vehicles will be also able to charge their cars or scooters at these stations, located at convenient places around the island. All the experimental results and data coming from the charging infrastructure will be used to **learn more** about what is needed to support electric vehicles as they become more common on the island. The increased use of electric vehicles will impact electric utilities and the infrastructure for providing electricity to customers. The installation and the utilization of the Charging Stations will help to understanding of things such as

how this infrastructure works, how consumers want to use it, driving and charging patterns, and interconnection with the electricity grid and with RES.

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CONCLUSIONS: key outcomes from the two projects

Cars and the automotive sector in general, consume almost half of the world petroleum production and are one of the main direct causes of the urban pollution. Various options are being used around the world to reduce this problem: **reduction of the use of private vehicles** in urban areas, **increasing efficiency** to reduce consumption, use of **new energy systems** such as Fuel Cells or Electric Vehicles and their integration with RES. In this Thematic Analysis Fiche general concepts and policies related to Urban Sustainable Mobility have been illustrated focusing on mobility solutions for touristic areas. Two examples of projects developed in *Italy* has been presented as pilot case studies. Considerations and policy recommendations and measures are given in this paragraph.



RESULTS

Two projects aiming at using clean vehicles in touristic have been presented in the previous paragraphs. The two projects represent a concrete example of **how the concept of sustainable mobility can be applied in touristic centers**. The projects have significant effects in social terms: the electric Botticella in Rome and the electric fleet in Ventotene represent strong and effective examples to make citizens and tourists aware of the concrete possibility of use clean transport systems in their holidays. The projects have significant effects as well as in terms of air pollution and noise. The results so far have proved that the two proposed solutions can offer **high benefits** to the environment. However, the successful implementation is only possible with the help of public funding in the beginning, especially in the field of Electric Vehicles (EV) promotion. Today

the use of EVs can contribute significantly to the reduction of the environmental pollution and despite the history of EVs being as old as the internal combustion engines, the recent technological evolution can make the electric transport competitive with respect to conventional transport. Nevertheless, an effort should be made by the industry and governments to protect the environment, through economical incentives to develop and acquire EVs. From the analysis of the two projects emerges that to implement electric fleets in urban or touristic areas it is absolutely essential the creation of an electric infrastructure to park and charge the vehicles. In fact electric and plug-in hybrid vehicles must be charged while parked and to successfully implement projects like the ones presented in this paper, the parking/charging infrastructure need to be considered and created. It can be useful to identify three main categories: Residential, Private and Public.



- **Residential** includes single and multi-family housing, as well as apartment complexes. Charging should be accessible for all forms of parking: garage, driveway or parking lot.
- **Private Sector** charging includes parking at workplaces, shopping centers or other locations where neither the vehicle owner nor the municipality owns the parking space.
- **Public charging** includes on-street parking and any public lot or parking deck.

technologies need to be minimized. Along with infrastructure, support will also be needed for **maintaining** and **servicing** the vehicles. While these vehicles are projected to have lower maintenance costs, a trained workforce must be available to service them and to enable maintenance-providers with the tools and training necessary to support these new vehicles.

A number of issues need to be considered in response to these needs. Though there may be variation in cost for the vehicle or parking space owner, the infrastructure for the charging stations is consistent. To ensure proper installation and safeguard consumers, training and certification need to be provided. The upfront costs that can sometimes slow adoption of new



EUROPEAN POLICY IMPLICATIONS

What next?

30

To fulfill the market of EVs will require a commitment to public education, helping consumers understand the vehicles' benefits and overcome concerns that hinder their use. The media must be engaged to report on infrastructure development, and public support from influential leaders in the state and nation is critical. Also, it is vital for initial adopters to have a positive consumer experience that will contribute to widespread acceptance. It must be easy for consumers to purchase vehicles and access charging stations, be aware of relevant tax credits, get charging stations installed and become educated on the location of charging stations outside the home. Measuring the impact of these new technologies on

consumers, businesses, economic prosperity and our environment is a key component in their sustainability. It is also anticipated that an influx of new technology, as well as the products and services associated with it, will encourage job growth.

Integration of policies

The establishment of *synergies with other local initiatives and policies* directly or indirectly related to mobility can justify the start up of a Sustainable Mobility project and help its implementation, as well as ensure its long-term viability. In this context it is essential to show a concrete link between Mobility and other issues of concern like the use of Renewable Energies. The two presented projects were not stand-alone projects but were well integrated into a wider strategy of the city or the municipality. These projects demonstrated that objectives of Sustainable Mobility are more



achievable if they fit into a wider strategy with respect to issues such as sustainable urban development, tourism or environmental issues.

Towards a European common charger for electric vehicles

It is important that the European Standardisation Organisations bodies (**CEN-CENELEC** and **ETSI**) continue in developing a common charging system for electric cars, scooters and bicycles. **European standards** are developed by the European Standardisation organisations through voluntary cooperation among industry, consumers, public authorities and other interested parties for the development of technical specifications based on consensus. Standardisation tackles the interoperability of complementary products/services, requirements for safety, health or environmental performance. The standard has to ensure that all types of electric vehicles and their

batteries are charged both safely and easily in all EU Member States.

Thanks to this mandate plugs and connectors will use the same standard all across Europe, providing a true European solution independently of brands or countries. The Commission expects that the standard will be ready by mid-2011.

On a recent Communication of 29 April 2010 the European Commission established a **roadmap** for a coherent framework encouraging the market launch of electrically chargeable vehicles.

In this strategy, the mandate that the Commission addresses now to CENELEC, CEN and ETSI to develop a European common solution for the charging of electric vehicles is crucial. This mandate has three objectives:

- ***to ensure that electric vehicles can be safely***



charged by their drivers.

- *to ensure that electric vehicle chargers (including their removable batteries) interoperate with the electricity supply points and all types of electric vehicles. This would allow users to recharge their electric vehicles anywhere in the EU by using the same charger.*
- *the mandate requests the standardization bodies to consider the so-called smart-charging issues. Smart-charging will allow users to charge vehicles at off-peak times to get the lowest price and most efficient use of energy.*

The design of the European standard will take into account

ongoing activities in international standardisation. The European Commission will continue to work closely with the standardisation bodies and industry to ensure the timely development of the standard.

Regional and local level

It can be observed that many measures can be taken at regional and local levels, close to the citizen. Action on sustainable mobility will only produce all its potential gains if operations to be undertaken at Community and national levels are reflected locally and vice versa. The EU has already taken numerous initiatives in this area. As seen in Paragraph 3 an example is the **CIVITAS programme**, launched in 2000, which has helped 59 European cities with urban mobility projects. Support programmes have also been put in place to encourage public and private investment in rational transport use (pilot actions, creation of local agency networks, etc.). Furthermore, the specific activities that are



integrated into the operational development programmes for the EU cohesion policy, notably in those regions lagging behind in development, give the regions strong instruments which could be used for a wide range of different projects. Support and investments in clean urban transport, support to small and medium sized enterprises as well as related research and development are options to be mentioned. When this potential for transport efficiency is mobilised, one has, however, to respect the specific provisions of cohesion policy programming, partnership and management. It should also be further discussed how to find solutions for the growing problems caused by city centre congestion.

City transport is above all a matter for local and national authorities, the EU should contribute to find solutions in the face of the deterioration in the quality of life which this problem causes, and which goes hand-in-hand with a truly enormous

waste of energy. Local authorities have then an important role to play by providing and promoting sustainable solutions in their cities. Then again, there is the eternal problem of financing. Regulatory measures are certainly needed, but we must also be able to back them up with **investments**. Currently available financing products as developed by banks are not always suitable for the scale of many small projects, whereas the aggregate benefit such smaller projects can provide as a whole is substantial. There is a **huge potential** for investments in small-scale sustainable mobility projects throughout Europe. They will often be highly feasible, especially when including the aspects of Intelligent Transport Systems and environmental benefits. But financing of such projects, especially in the less developed regions of Europe, needs 'facilitation' to happen. Given the small scale and



dispersed nature of the projects to be funded, it would seem that action is in any event best initiated at local or regional level. Funds to support the projects for the improvement of transport efficiency have been very successful in many Member States, and it should be considered how best practices can be repeated and improved.

34

More on:

CENELEC

<http://www.cenelec.eu/Cenelec/Homepage.htm>



<http://www.etsi.org/website/homepage.aspx>

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