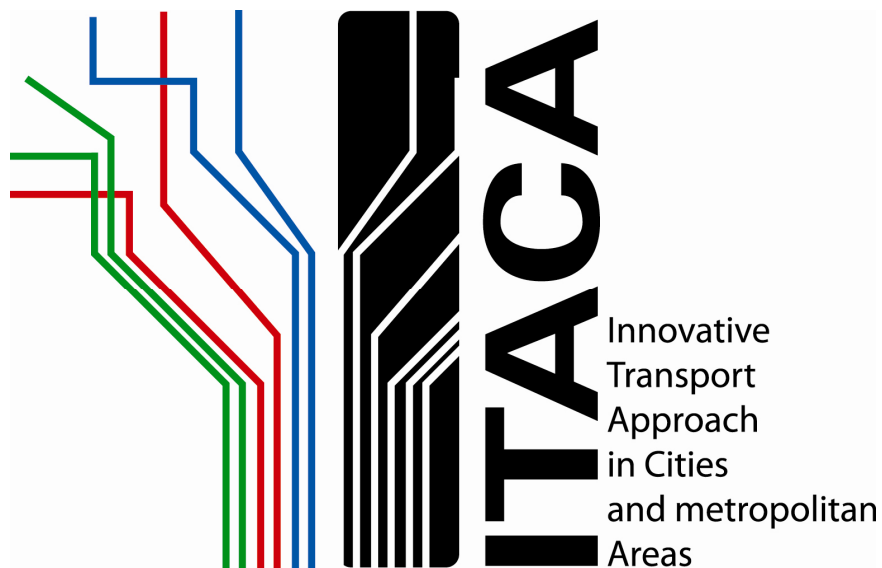


Innovative Transport Approach in Cities and metropolitan Areas

ITACA

E-brochure n° 1

**Innovative Technologies: new
propulsion systems**



Transport in Europe: Where we are and where we are going to?

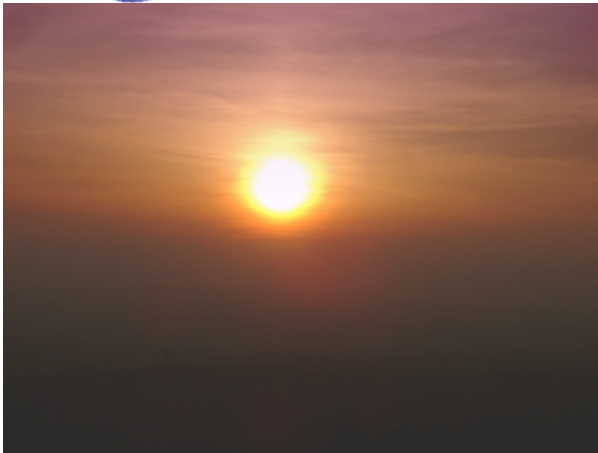
Some facts and figures about transport in Europe compiled in the EU White Paper Transport 2050 “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system”:

- The transport industry directly employs more than 10 million people, accounting for 4.5% of total employment, and represents 4.6% of Gross Domestic Product (GDP). Manufacture of transport equipment provides an additional 1.7% GDP and 1.5% employment.
- In the EU, transport depends on oil and oil products for more than 96% of its energy needs. Europe imports around 84% of its crude oil from abroad. In 2010, the EU’s oil import bill was around € 210 billion.



(Source: SXC)

- Transport greenhouse gas emissions, including from international aviation and maritime transport, increased by around 34% between 1990 and 2008. Over the same period, energy industries reduced their emissions by about 9%. Transport is responsible for about a quarter of the EU's greenhouse gas emissions. 71.3% of overall emissions are generated by road transport (2008).



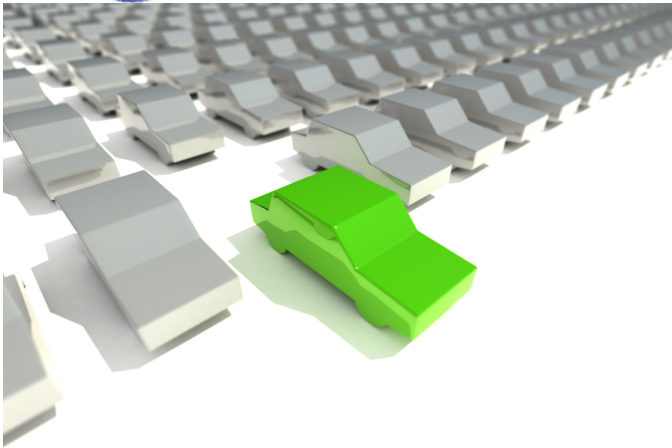
(Source: SXC)

- Green technology offers European companies a huge commercial opportunity. Cutting emissions means investing in technology, but Europe is lagging behind its competitors.



(Source: SXC)

- Electric cars could contribute to savings of 5 Mt CO₂/year if the national and regional objectives of putting 5 million electric vehicles on the market by 2020 are met. Greater efforts are needed to increase electro-mobility: today's electric car would need a battery pack weighing 2 500 kilos to provide the same energy as a diesel car with a 50-litre tank.



(Source: SXC)

- The European Commission's hydrogen bus project has demonstrated over three years in nine EU cities that hydrogen is a viable zero-emission alternative to diesel and gasoline – provided that the energy generating the hydrogen comes from non-fossil sources. The buses transported 8.5 million passengers over 2.6 million km, using 555 tonnes of hydrogen instead of 1 million litres of diesel. Of the people surveyed, 68% said they wanted to see more of these buses, and 44% were willing to pay more for them.

Among others goals, the Transport 2050 roadmap sets for urban transport a big shift to cleaner cars and cleaner fuels, halving the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050 with a shift to electric cars, hydrogen cars, hybrid cars, to public transport, and to walking or cycling in cities; achieve essentially CO₂-free city logistics in major urban centres by 2030.

These goals will be achieved, among other measures, by the development of an EU Strategic Transport Technology Plan (STTP) to cover the research and the effective deployment of new technologies. This Plan will be a major initiative to regroup/refocus transport research and development efforts in Europe, including key areas as alternative fuels, new materials, new propulsion systems, etc. as well as specific measures to incentivise and facilitate the introduction of clean vehicles.

Obviously, for technological solutions for clean cars, no city can act alone. Here, the EU will focus EU research efforts, introduce EU-wide deployment strategies and the right market conditions to facilitate the take-up of new cleaner vehicles in cities.



(Source: SXC)



(Source: Diputación de Huelva)



(Source: Diputación de Huelva)

ITACA objectives and methodology

Related to this global challenge, ITACA project aims to contribute to the EU priority to reduce CO₂ emissions associated to road transport in urban and metropolitan areas. ITACA is a POWER Interreg IV C Programme subproject which aims to reduce carbon emissions in metropolitan areas by identification, assessment and exchange of innovative technologies and management plans for public and private transport. This entails the development of public sector strategies for optimising the design and delivery of sustainable transport solutions, comprising several approaches like the identification of innovative and eco-friendly technologies suitable to be used in urban areas both in public and private transport, realistic assessment of impacts, benefits, costs and requirements for infrastructure and supply chains, barriers and gaps, R&D and Innovation priorities, etc.

ITACA partners are:

- Regione Emilia-Romagna (Emilia-Romagna, Italy)
- Instituto Nacional de Técnica Aeroespacial (INTA) (Andalucía, Spain)
- Provincia di Rimini (Emilia-Romagna, Italy)
- Comune di Ferrara (Emilia-Romagna, Italy)
- Stichting Brabantse Milieufederatie (Noord-Brabant, The Netherlands)
- Diputación Provincial de Huelva (Andalucía, Spain)
- City of Lidingö (Stockholm Region, Sweden)



(Source: Diputación de Huelva)

ITACA partners have identified, analyze and share information and experiences about these issues, not only at policy level, but also practical applications and showcases related with the scope of the project. ITACA project offers the opportunity to compare different visions and approaches for common mobility needs, adapted to the particular characteristics of each region.



In all these regional and local approaches, innovative technologies and eco-friendly fuels have been remarked as key issues, and their promotion and deployment becomes a priority for future transport policies and strategies. ITACA have joined experiences in this area, and the common conclusions can be used as a tool to help to policy and decision makers to choose the most suitable “best available technologies” in short-mid term for sustainable low-carbon transport.

From the point of view of use of new propulsion systems in vehicles, after a preliminary inventory of available technologies, the contribution of ITACA partners was focused on good practices and showcases regarding the promotion and deployment of hybrid vehicles, pure batteries electric vehicles and fuel cell vehicles. The status of development of these technologies in every region is different, but there are some common points:

- Hybrid vehicles are considered a mature technology with a great potential of growing in the market in the short term, not only in the particular user market but also in sectors like taxi companies and fleets. In this context, public grants to the acquisition of hybrid vehicles, associated to a simplified procedure to accede to this funding, have been demonstrate a high success in some regions like Andalucía. In the next future, plug-in hybrid vehicles are expected to pave the way to electric vehicles.
- Electric vehicles are expected to play a fundamental role in the urban mobility in the next years. After several unsuccessful attempts, it seems that, this time, the electric car is here to stay in our cities. The commonly named “electric vehicles” are also called pure batteries electric vehicle, because there are in fact different types of electric vehicles. All the ITACA regions have contributed with experiences and initiatives in this area, covering a wide field of applications: from cases focused on the urban use of the vehicle (electric taxis in Utrecht, electric car sharing in Seville, municipality vehicles in Lidingö as part of its Environmental Plan, regional and local administration fleets in Bologna, etc.) to touristic uses of this kind of vehicles (electric tourist shuttles in Huelva or the promotion of electric vehicles targeted to tourist industry in Rimini in the framework of the mobility scheme "Mi nuovo elettrico"). In some regions, the electric vehicles benefits on the local urban air and CO₂ emissions are increased when the electricity used is, totally or partially, produced from renewable energy sources. It is interesting to remark that good practices and showcases proposed by ITACA partners are focused not on particular drivers, but on public transport and fleets, that appears like the first users of this technology.



- Fuel cell vehicles are also electric vehicles, where the electricity to power the motor is produced from hydrogen in a fuel cell. The fuel cell is powered by filling the fuel tank with hydrogen. Hydrogen and electricity together represent one of the most promising ways to realise sustainable energy. Fuel cells, as an efficient conversion technology, and hydrogen, as a clean energy carrier, have a great potential to contribute to addressing energy challenges facing Europe. A number of demonstration projects have been carried out across Europe to demonstrate the feasibility and reliability of the technology under real world conditions, taking into account not only technical and economic issues, but also public acceptance, training and education; with the final goal that hydrogen and fuel cell road vehicles will meet challenging performance, durability, safety and cost targets by 2015, anticipating a expected mass-market rollout in 2020. ITACA regions have participated in some of these project focused on the research, development and demonstration of fuel cell vehicles for road transportation. Among these projects, there are of particular interest the project CUTE in Stockholm, focused on the testing and operation of fuel cell buses in daily public service and the Spanish project Hércules in Andalucía, focused on the design, construction and testing of a fuel cell vehicle based on a commercial light sport utility vehicle (SUV).



(Source: CUTE Project/ Fuel Cell Bus Club)

Good practices and showcases

Hybrid vehicles:

Use of hybrid vehicles in public transport sector, mainly taxis, is common and well adopted way to reduce CO₂ emissions in regions like Stockholm, but only in the last three years it has become a success in Andalucía. Why? The answer is a combination of public grants to the purchase of this kind of vehicles and a very simple procedure to accede to this financial support.

Particular users and companies located in Andalucía can buy a hybrid car using a simple procedure which requires no formalities with the administrative offices. People only need to visit one of the dealers participating in the program, where they can find the available hybrid models in the market. The dealer, through an electronic procedure, will submit on behalf of the final user the funding request to the Energy Development Program of the Agencia Andaluza de la Energía. The user will receive the equivalent discount on his invoice directly and no other step with the Administration is needed.

Thank to this program, the Regional Government, through the Agencia Andaluza de la Energía, has funded the acquisition of 1,694 vehicles with hybrid technology since 2008. The total budget of these grants has achieved 4.8 million Euros, with an impact in the economic activity of sector higher than 35 million Euros. One of the main target of this programme is the taxi sector. In Seville for example, the success of the programme has been important because in three years the number of hybrid taxis has been increased from a negligible percentage up to 8 %, with similar results in other Andalusian cities.

The low carbon contribution is clear: for a taxi driver, running 80,000 kilometres per year mostly in urban areas, it is possible to achieve with this technology a fuel savings of 1,808 litres per year, saving the emission to the atmosphere of more than 4.16 tonnes of CO₂ annually.



(Source: INTA)



More information:

http://www.agenciaandaluzadelaenergia.es/agenciadelaenergia/nav/com/contenido.jsp?pag=/contenidos/incentivos/incentivos_09&id=2

Electric vehicles:

GreenCab is a large scale experience with clean, electric mobility in the taxi sector. This experience has been launched in the city of Utrecht, region of Utrecht, by a private company, Prestige GreenCab, in close collaboration with a wide range of private and government partners. Apart from being a 'normal' taxi company using electric vehicles, the goal of GreenCab is to be a test site to promote practical application of sustainable mobility technologies. This real situation provides knowledge and insight on behavioural, technical, administrative and political effects. This reveals which innovations are promising for large-scale production. In addition, the test site aims to promote the supply of certain modes of transport, such as plug-in hybrid and battery-electric vehicles.

The service just started with 6 electric cabs, by the end of 2011 this will increase to 40. The project receives a government's grant from the 'test site' programme for electric and hybrid vehicles. Budget of this programme is € 10 millions.

Another experience with clean and electric mobility in urban areas is the COCHELE service. This initiative, promoted by a private company, is a electric car-sharing service, in which the user has at its disposal a network of vehicles, which can reserve and use as needed. Seville has been the first Spanish city to implement a car-sharing service with electric cars, complementing the various mobility options already exist in the city. COCHELE service members can book online 24 hours a day and thus use any of the cars located in the pickup and delivery points strategically located in commercial areas, residential and office of the city and its metropolitan area. An important benefit of the service is that electric cars are allowed to access to the historical center of Seville without time restriction, and there is free parking for this kind of vehicles. This service is targeted to people who occasionally need a vehicle for their urban trips. In fact, this particular user will benefit from considerable cost savings compared with private car ownership.



(Source: Diputación de Huelva)



(Source: Cochele)

More information:

GreenCab: <http://www.prestigegreencab.nl/home/waarom-greencab/>

COCHELE: <http://www.cochele.es/>

Fuel cell vehicles:

Spanish “Hercules” project is one of the most interesting projects developed in ITACA regions in the area of hydrogen technologies and fuel cells, because it has been structured around a dual purpose: to demonstrate the technical and economic feasibility of hydrogen production from renewable solar energy; and validate the use of hydrogen in fuel cells in the automotive sector. To achieve these goals the cooperation of different companies and research groups has been needed specialists in each of the technology areas that are addressed in the project. Project started in January 2006 and finished officially in 2010, but, due to their interest, some partners are working yet on the continuous improvement of the prototypes and deliverables of the project. Total budget of the project was around 7 million of Euros.

One of the “Hércules” subprojects was devoted to integrate new technologies in the automotive sector, improving energy efficiency and providing environmental benefits. The objective of this subproject was to use new and efficient environmental friendly technologies in the automotive sector, to advance in the development of automobiles more respectful with environment and able to operate with alternative fuels to those of fossil origin with greater power efficiency than the conventional vehicles.

To achieve these objectives, a non-pollutant vehicle, which replaces the conventional powertrain of a commercial vehicle with a new power system consisting of a fuel cell stack fed with pure hydrogen and an electric motor. The platform used for the project is a commercial, light-duty, 4x4 vehicle that uses compressed hydrogen as the fuel for a solid polymer fuel cell stack. The vehicle’s main characteristics are as follow:

- Light-duty 4x4 vehicle (Santana 350).
- Hybrid configuration fuel cell/batteries.
- Vehicle autonomy higher than 100 km.
- High efficiency electric powertrain, including regenerative braking to recover energy lost during braking.
- Reasonable cost together with economies of scale for future mass-produced components.
- Safe vehicle, able to fulfil all the existing safety standards and tests for this type of vehicle.

The most important lessons learnt have been that hydrogen can be used in a practical and safe way as a fuel for vehicles. Anyway, further technical and

economic improvements must be done to be competitive in terms of cost and performance with current technologies based on fossil fuels. Nevertheless, some partners are using the platforms developed in the project to test new products and design with an application in the hybrid vehicles or pure batteries electric vehicles market in the short and medium term.



(Source: INTA)

More information: <http://www.proyectohercules.es/>

About POWER and ITERREG IV C:

POWER is a €5.8m inter-regional programme aimed at driving Low Carbon Economies partly funded through INTERREG IVC in seven European regions:

- Andalusia (Spain)
- Emilia-Romagna (Italy)
- Malopolska (Poland)
- Noord-Brabant (The Netherlands)
- South East England (England)
- Stockholm (Sweden)
- Tallinn (Estonia)

The INTERREG IVC Programme is part of the European Territorial Cooperation objective of the Structural Fund policies for the period 2007-2013. It aims, by means of interregional cooperation, to improve the effectiveness of regional development policies and contribute to economic modernisation and increased competitiveness of Europe, by:



POWER
Low Carbon Economies



European Union
European Regional Development Fund



INTERREG IVC
INNOVATION & ENVIRONMENT
REGIONS OF EUROPE SHARING SOLUTIONS

- Enabling local and regional actors across the EU to exchange their experiences and knowledge;
- Matching regions less experienced in a certain policy field with more advanced regions;
- Ensuring the transfer of good practices into Structural Funds mainstream programmes.

More information about POWER PROGRAMME and INTERREG IV C:

<http://www.powerprogramme.eu/index.php>

www.interreg4c.eu

http://ec.europa.eu/regional_policy/index_en.htm

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