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EXTR@Web Project

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Further information on EXTR@Web's editorial team for Thematic Research Summaries can be obtained from Annex III.

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Abbreviations and Acronyms Used

CO_2	Carbon Dioxide
EC	European Commission
EEA	European Environment Agency
ERA	European Research Area (EU, EFTA and CEECs)
EXTR@Web	Exploitation of Transport Research Results via the Web (DG TREN FP 5 Accompanying Measure project)
EU	European Union
GDP	Gross Domestic Product
JEGTE	Joint Expert Group on Transport and Environment
OECD	Organisation of Economic Co-operation and Development
RTD	Research and Technical Development
TENs	Trans-European Networks
TERM	Transport and Environment Reporting Mechanism
TRKC	Transport Research Knowledge Centre; TRKC website at ec.europa.eu/transport/extra

Table of Contents

1. Introduction

This paper provides a structured guide to the results of Research and Technical Development (RTD) projects relating to **Environmental Aspects**, carried out in transport research programmes throughout the European Research Area (ERA).
It is one of a series of 28 papers. Two further from an original set of 30 transport themes – i.e. Long-distance Transport and Financing Tools – have been discontinued as separate reports, though all related projects will eventually be covered elsewhere in Thematic Research Summaries.

	Paper no.	Transport theme
Dimension 1	1.1	Passenger Transport
	1.2	Freight Transport
	1.3	Urban Transport
	1.4	Rural Transport
	1.5	Regional Transport
	1.6	EU Accession Issues
Dimension 2	2.1	Air Transport
	2.2	Rail Transport
	2.3	Road Transport
	2.4	Waterborne Transport
	2.5	Other Modes
	2.6	Intermodal Transport
Dimension 3	3.1	Economic Aspects
	3.2	Efficiency
	3.3	Equity and Accessibility
	3.4	**Environmental Aspects**
	3.5	User Aspects (incl. ergonomics, quality, choice and rights)
	3.6	Safety and Security
Dimension 4	4.1	Decision-support Tools
	4.2	Information and Awareness
	4.3	Infrastructure Provision (incl. TENs)
	4.4	Integration
	4.5	Intelligent Transport Systems
	4.6	Regulation / Deregulation
	4.7	Land Use Planning
	4.8	Transport Management
	4.9	Pricing, Taxation and Financing Tools
	4.10	Vehicle Technology

Of the more than 5600 projects from research programmes the Transport Research Knowledge Centre (TRKC) ultimately has considered, a total of **357** projects deal partly or fully with the issues of **Environmental Aspects**.

1.1 How to use this paper

It is recommended that you use this paper to locate RTD (Research and Technical Development) results on sub-themes where you have a particular interest, rather than reading the paper from start to finish:

- Start in Section 2 to get an overview of the scope of the particular theme.
- Read Section 4 that summarises the findings for each sub-theme of interest to you.
- Consult Annex I to identify the individual projects, be they of European or national origin, relating to a particular sub-theme.
- If this is the first time you have used one of the series of thematic research summaries, it is strongly recommended that you read Annex II. This explains the background and purpose of the EXTR@Web project, and the basis upon which information in this document was selected and analysed.

The other sections of this paper can help you to gain an overall picture of the **Environmental Aspects** theme, associated policy issues and the background of project EXTR@Web.

The analysis in this paper is the responsibility of the EXTR@Web project team, and does not represent the official viewpoint of the European Commission.

1.2 The link to the Transport Research Knowledge Centre website

Further details on individual projects can be obtained from the Transport Research Knowledge Centre (TRKC) website at: **ec.europa.eu/transport/extra**

The TRKC website includes summaries and full final reports of individual projects, as well as a variety of analyses, and publications prepared by the EXTR@Web project.

How to best use the online resource:

- The 'Projects & Analysis' section allows the user to specify a project-wide search on 'Publication date', 'Origin', 'Document type', 'Mode', 'Sector', 'Geographic area', 'Policy objective' and 'Tool', or any combination of these criteria.
- This may be complemented, or superseded, by the flexible 'Free text search'.
- On the query result screen, free text search criteria may be refined, as appropriate. Further tick boxes here allow limiting query results according to 'Project status' (five levels).
- Query results are presented in a table, which allows for sorting by column (click on relevant column header for alphanumerical sorting).
- Project-specific summaries may include links to project websites, or provide contact details for the project, where available.

It should be noted that the online Transport Research Knowledge Centre will be updated frequently, though dependent on input from project co-ordinators.

Other parts of the TRKC website cover transport research at Programme level, and expand on transport related issues, e.g. in the 'Links', 'Events', 'Glossary' and 'FAQs' sections.

2. Scope of theme

2.1 Definition of theme

The **Environmental aspects** of transport are concerned with sustainability. Currently, negative impacts of transport have significant detrimental effects on the environment (both built and natural in some cases), and hence individuals' lives, making transport unsustainable in the long term without mitigation measures. Sustainable transport can be defined as a system, with associated travel patterns that can meet transport needs efficiently, whilst minimising avoidable or unnecessary adverse impacts, and their associated costs over relevant space, and time scales.

The environmental aspects of transport sustainability are concerned with atmospheric pollution (both global and local), noise pollution, land take, the effects of waste disposal (both scrapped vehicles and production waste) on the natural environment, recycling to mitigate waste disposal impacts, development of alternative fuels to reduce reliance on non-renewable resources, and reduce pollution from the burning of fossil fuels, and the effects of the above on flora and fauna. These environmental aspects of transport affect individuals' lives through health impacts, and nuisance.

The theme typically covers:
- The development of mitigation measures, such as the control of vehicle emissions;
- the introduction of new environment-friendly technologies and transport concepts to
  - reduce energy resource use for transport,
  - improve air quality,
  - reduce transport related noise,
  - avoid waste and recycle waste related to transport; and
- the acquisition of knowledge, and development of tools to support environmental impact assessment, and the formulation of integrated strategies for impact abatement.

2.2 Topics included in theme

The topics covered under this theme are:
- Environmental sustainability
  - energy resource use,
  - non-energy resource use,
  - global warming,
  - stratospheric ozone depletion,
  - bio-diversity/habitat destruction;
- local air quality
  - health,
  - material damage (corrosion and soiling);
- regional air quality (crops, forestry, aquatic and terrestrial ecosystem damage);
- nuisance
  - noise and vibration,

  - visual intrusion/landscape degradation,
  - severance;
- waste
  - land contamination, and
  - water pollution.

There are three types of measure that can be applied to reduce environmental impacts:
- **Operational measures** which reduce the impact per vehicle-km, or per unit of infrastructure;
- **strategic measures** that optimise the use of the vehicle, or the transport system, for instance affecting the number of vehicle-km driven for a given transport "output"; and
- **demand measures** which reduce the actual demand for travel.

Operational measures include:
- Technology improvements and optimum technology choice;
- good operating, and fuel management practices, including effective monitoring of fuel use, driver awareness, training and incentive schemes, and preventive maintenance; and
- traffic management schemes which smooth traffic flow.

Strategic measures include:
- Optimising travel routes e.g., using routing software, vehicle location and direction systems, and traffic information systems;
- improving load factors e.g., through better utilisation of freight vehicles and car sharing, fleet management and logistics integration; and
- mode switching for both freight and passenger transport.

Demand measures include:
- Land-use planning;
- travel substitution methods such as tele-working, video conferencing and home delivery; and
- influencing travel choice (mode, time, route) in order to reduce congestion.

The policy instruments, and levers which act on the operational, strategic and demand effects include:
- Fiscal measures, pricing and incentives;
- regulatory measures;
- infrastructure measures, including traffic management;
- information and public awareness initiatives; and
- voluntary agreements.

The above summary of topics describes the principal breakdown of technical, organisational and managerial aspects that come under the theme, whereas Chapter 4 of this document reflects sub-themes according to actual priorities in transport research policy.

2.3 Significance of theme

The external costs of environmental impacts of transport are enormous – air pollution and noise are estimated to cost the EU at least 0.6% of GDP every year, or some 40 billion euros [9]. Over 90% of these costs are due to road transport, and equate to 90 euros per person per year.

Air pollution problems (e.g., ozone) in summer are requiring that, on more and more occasions, citizens across Europe have to refrain from outdoor activities. It is estimated that thousands of European citizens die each year from just one form of air pollution (particulate matter).Transport causes over half the total emissions of carbon monoxide and nitrogen oxide, and represents a major source of ozone precursors. Thus, local pollution effects are significant, especially given the close proximity of the main receptors (people) to vehicle tailpipes in urban areas. It has also been calculated that 20% of Europe's citizens (around 80 million people) suffer from unacceptable levels of noise from road traffic.

Some forms of pollution are expected to go down in the near-term on the basis of current policies (e.g., tighter vehicle emission and fuel quality standards). However, in the longer-term, transport emissions may increase again as traffic growth outstrips technological improvements. And despite the technological progress, some urban areas anticipate problems in meeting air quality standards for nitrogen oxides and particulate matter over the next ten years.

Meanwhile, emissions of the main greenhouse gas carbon dioxide (CO_2) are set to increase substantially. In particular, on current trends, CO_2 from transport will be some 40% higher in 2010 compared to 1990, whereas the Kyoto agreement is targeting a real reduction in CO_2 emissions economy-wide. Transport already accounts for around 26% of carbon dioxide emissions in the EU, and EU CO_2 emissions from transport contribute around 3.5% of global CO_2 emissions. This means that the energy and climate change impacts of transport are moving high on the political agenda.

Road transport is generally perceived to be the greatest problem area for CO_2, partly due to traffic volumes, but also as a consequence of the high emissions per passenger-km/ tonne-km. Passenger cars account for around 50% of transport related CO_2, and road freight for approximately 35%.

For the transport sector as a whole, CO_2 emissions have been growing at a rate faster than GDP growth in Europe. In the period 1985 to 1995, economic growth in the EU-15 led to an increase in GDP of 26%, whereas CO_2 emissions from transport grew by 37%. In contrast, CO_2 emissions from the non-transport sectors seem to have been decoupled from general economic growth, with a 5% decline over the same period.

Approximately 7% of CO_2 growth from transport was due to a shift to less energy efficient modes, and 30% to transport growth in general. The modal share of road for EU-15 freight transport has increased from 54 to 61 to 72% over the period from 1975 to 1985 to 1995. Similarly, the share of passenger transport undertaken by private car has increased by 18% since 1970, while the relative use of buses, urban rail, walking and cycling have all declined.

Major impacts of transport sector emissions include:

- Health – respiratory diseases and heart attacks;
- damage to buildings and crops; and
- global warming.

Other impacts include the use of non-renewable fossil fuels, and primary aggregates, particularly for road construction and maintenance, and the burden of residues from vehicle disposal, which are expected to increase as the use of steel declines.

Further to this, the environmental impacts in terms of nuisance (noise and vibration, visual intrusion/landscape degradation, and severance) have considerable negative social impacts, resulting in socially unsustainable transport systems. Noise and vibration have been associated with stress, and ultimately, mental health problems, whilst severance is associated with social exclusion. Torode [10] notes that, “Increasingly, roads and traffic have come to dominate our cities. … roads have been squeezed into residential areas with a serious impact on the residential environment, and historic buildings are damaged by the pollution and constant vibration from heavy traffic. “Visual intrusion, noise, smells, dirt, fumes, the fear of accidents and severance caused by heavily-trafficked roads, all combine to give an overwhelming impression in the majority of cities of complete domination by vehicular traffic”. High traffic speeds, wide roads and widely spaced junctions restrict the places where pedestrians can safely cross the road. Parked vehicles … add to the danger.” Torode also goes on to note that, “Some communities become cut off by road infrastructure, or by high levels of traffic which can isolate people, especially the elderly and disabled, who feel unable to walk or cross the street. This limits their interpersonal networks of support [resulting in exclusion], which has been found to be associated with higher mortality and morbidity in the elderly [8]. The effect on children can also be severe.” These views are upheld by [3] who observes that, “Severance, … has important health effects. Access to a healthy diet, places for activity, employment and recreation can be restricted and feelings of insecurity, anxiety and stress increased, particularly among older people [11]. Traffic volume and speed influence the level of non-traffic activity on streets – for equivalent streets, the higher the volume of traffic the lower the pedestrian activity [2].”

3. Policy context

The European Transport White Paper, "European Transport Policy for 2010: time to decide" [4] states early on in its policy guidelines that, "a modern transport system must be sustainable from an economic and social as well as an environmental viewpoint," thus, giving environmental aspects equal importance along side economic and social aspects. Further to the overarching role of environmental aspects in the drive for sustainability, they are also important in many of the White Paper's more specific guidelines, one of which is concerned entirely with environmental aspects: "developing medium and long-term environmental objectives for a sustainable transport system" [4]. The overall package of proposals put forward in the White Paper are designed to re-direct the common transport policy towards sustainability, but specific attention is drawn to the need to tackle the following:

- "The risk of congestion on the major arteries and regional imbalance;
- the conditions for shifting the balance between modes;
- the priority to be given to clearing bottlenecks;
- the new place given to users, at the heart of transport policy; and
- the need to manage the effects of transport globalisation" [4].

It is noted that hard choices will need to be made between maintaining the status quo, and making changes that will result in a sustainable system. In particular, new forms of regulation will be needed to "channel future demand for mobility and to ensure that the whole of Europe's economy develops in a sustainable fashion" [4]. However, with regard to existing regulations, it is noted that international agreements are often focused on facilitating trade and commerce, rather than environmental protection. Thus, insufficient account is currently taken of environmental protection, and the associated security of supply concerns [4].

With this in mind, environmental considerations should be integrated into Community policies [4]. The Transport Council highlighted five areas where measures should be pursued in 1999: "(i) growth in CO_2 emissions from transport, (ii) pollutant emissions and their effects on health, (iii) anticipated growth in transport, in particular due to enlargement, (iv) modal distribution and its development, and (v) noise in transport" [4]. There appears to be a bias here in favour of environmental aspects concerned with atmospheric and noise pollution. Whilst growth in transport and modal split both lead to social effects arising from environmental impacts, these social aspects are not specifically referenced, thus potentially leaving readers with the view that growth and modal split are purely an issue in the pollution context.

Environmental aspects are also given prominence in transport fiscal policy in the White Paper; "budget and fiscal policy [should] achieve full internalisation of external – in particular environmental – costs" [4]. With regard to the Trans-European Network, the White Paper also states that, "the Community rules will be amended to open up the possibility of allocating part of the revenue from user charges to construction of the most environmentally-friendly infrastructure" [4]. The White Paper goes on to state that, "the integration of external costs must also encourage the use of modes of lesser environmental impact" [4].

Specific modes are also focused on in terms of environmental policy. Modal shift away from over dependence on motorised road transport, and revitalisation of the railways are both highlighted, as is achieving a balance between growth in air transport, and the environment [4]. With regard to air, the emphasis is on reducing the environmental impacts of engine noise, and emissions, including fuel consumption improvements. This is most likely to be achieved through the adoption of stricter standards [4]. However, the need to restrain air traffic growth through competition regulation is also acknowledged; "the growth in road

and air traffic must … be brought under control, and rail and other environmentally friendly modes given the means to become competitive alternatives" [4]. However, this does not mean that the White Paper is advising against growth in air traffic per se, it is merely advocating controlled growth. Indeed, the White Paper states that, "Europe will not be able to cope without new airport infrastructure" [4]. Nevertheless, new regulatory frameworks focused on the way in which slots are allocated will be needed to make more efficient use of airport capacity, including measures to avoid the development of hub airports, and the ground and sky congestion that is associated with such airports [4]. Further, airport charges should change to avoid bunching of flights, intermodality with rail should be encouraged to facilitate the development of high-speed rail links between cities to focus air links where rail is not feasible, yet at the same time, environmental rules should "encourage efforts to find alternative measures before restricting operators at an airport" [4]. The taxation of aviation kerosene issue also needs to be addressed.

As reflected here, there is considerable emphasis on air transport in the White Paper, and rightly so, given the rapid expansion air is currently experiencing. However, there is also considerable emphasis on water transport possibilities, especially with regard to freight, since the current capacity is underutilised. Shifting freight from road to rail is also advocated. Further, the development of alternative fuels, and environmentally friendly infrastructure, as well as modes are advocated.

The development of the policy summarised here, and set out in considerably more detail in the White Paper, goes back to the European Council Cardiff Summit in 1998. The Council stipulated that the Commission and transport ministers should focus their efforts on developing integrated transport and environment strategies [5]. A strategy towards this end was adopted by the Transport Council in 1999, and the report, "Recommendations for actions towards sustainable transport: A strategy review", was released by the JEGTE (established in 1998) in 2000. At the April 2001 meeting of the Transport Council resolution was passed to agree pursuit of: integration by the Commission, the development of long-term and intermediate environmental targets for transport, and further development of TERM, the transport and environment reporting mechanism. Within all of this, consideration of the impacts of *e*-commerce, as stipulated under the *e*Europe 2002 Action Plan (adopted by the Heads of state and Government at the Feira European Council in June 2000), was requested. The link here with other policy areas one that advocated throughout the white Paper where appropriate.

To bring the context up to date, the European Environment Agency (EEA) issued a briefing on "Transport and the Environment in Europe" in 2004 [6]. This briefing was based on the TERM 2004: indicators tracking transport and environment integration in the European Union report titled: "Ten Key Transport and Environment Issues for Policy-Makers" [7]. EEA's briefing summarised the situation as follows:

- "Growing transport volumes are leading to increased pressure on the environment especially in relation to climate change and biodiversity loss. Present efforts to counteract these trends are at best only slowing down the rate of increase. On the positive side, technological improvements are delivering reductions in air pollution from road transport despite the growth in traffic volumes. Even so, more is needed to solve the problem of urban air pollution" [6].

The following trends were identified from the early 1990's:

- Volumes of transport are still increasing;
- road and air are growing faster than other modes;
- emissions of harmful pollutants are falling;
- greenhouse gas emissions are increasing;
- alternative fuels policy is beginning to take effect;
- transport infrastructure is continuing to expand;
- accessibility is still largely car dependent;
- pressure on habitats is increasing; and
- price structures generally are not supporting EU transport policy [6][7].

The increasing volume of transport is challenging the central EU transport policy of de-coupling transport from economic growth. Similarly, increases in road and air travel, especially air, since technological advances in road transport vehicles are reducing emissions per vehicle from that source, are challenging policy regarding reductions in atmospheric pollution. Whilst technological developments relating to road transport vehicles has lead to emissions of harmful local pollutants decreasing, since the technology is currently keeping reductions ahead of increases in road traffic growth, this may not continue if there are not further improvements, or the rate of traffic growth increases. A further threat to this success is growth in air traffic, which also emits locally harmful pollutants, but which has not experienced any real technological advances in terms of fuel consumption efficiency, or emission reductions. Additionally, despite the decrease in local atmospheric pollutants, technological improvements in road transport technology have not reduced greenhouse gas emissions. Consequently, greenhouse gas emissions continued to grow as a result of the increases in volume of road and air traffic. With regard to development of alternative fuels however, development is promising. However, in environmental terms, we should not forget that alternative fuels can still emit atmospheric pollutants at the point of use, and during extraction and production processes.

With regard to transport infrastructure it is continuing to expand in the context of road and rail. Where rail infrastructure developments permit travel by rail instead of road or air, then the environmental benefits may be positive despite fragmentation of habitat. However, it is not clear that infrastructure expansion is balancing economic and environmental sustainability needs, since road building is still a common response to meet accessibility needs. This is resulting in fragmentation of habitat, without much potential for modal switch in favour of environmentally friendly modes. Accessibility that remains largely car dependent is also failing to meet equity policy that seeks to avoid disadvantaging those without a car. Severance impacts of infrastructure developments are also likely if relevant design mitigation measures are not taken.

With regard to pricing, the structure continues to favour individual transport. The cost of rail and bus passenger fares are increasing more rapidly than private transport costs, whilst the cost of road freight transport is falling. Thus, passengers and freight are encouraged to travel by road. This is challenging the rail revitalisation policy, as well as other environmental sustainability policies, especially those related to pollution. Nevertheless, positive progress is being made in terms of fair and efficient pricing that internalises all external costs with regard to road and rail. However, air and water are not included in this price restructuring, thus, the market remains distorted [7].

This summary of progress towards environmental transport objectives over the past decade suggests that transport policy with regard to environmental aspects is not likely to change significantly in the near future. In the slightly more medium term, it could be that policy shifts to favour environmentally friendly modes even more, and introduce harsher penalties for those who continue to drive and fly.

4. Synthesis of findings from completed projects

Research projects contributing to the theme of **Environmental Aspects** can be broken down to the following three political areas with sub-themes:

- Environmental impact assessment
  - assessment techniques,
  - evaluation tools,
  - evaluation of external costs;
- mitigation measures
  - preparation of regulations,
  - abatement strategies;
- development of environment-friendly forms of transport
  - new technologies and transport concepts,
  - non-motorised modes.

You may wish to further consult the following Thematic Research Summaries that present research findings which are complementary to those covered in this paper:

- D2.E-2.1 Air transport;
- D2.E-2.3 Road transport;
- D2.E-2.4 Waterborne transport;
- D2.E-4.1 Decision-support tools;
- D2.E-4.2 Information and awareness; and
- D2.E-4.10 Vehicle technology.

Results from the following **28** projects have been included in the current version of this Thematic Research Summary:

Research sub-theme	Contributing projects
Environmental impact assessment	AEROCERT; BEACON; EMARC; H-SENSE; METARAIL; MEET; POLMIT; PROPOLIS; Combination of a traffic simulation model with an air emission simulation model; Costs and benefits of nature and landscape conservation; Particle emissions; Sustainability assessment of projects and strategies
Mitigation measures	ARCOP; SCRAPPAGE; SPRITE; An integrated instrument to evaluate effects of local mobility plans on traffic viability and the environment; Interactions transport/land-use; Measures in transport to reduce CO_2 and tropospheric ozone; Recreational traffic – Analysis and strategies; Strategies for sustainable transport; Study of determining factors for traffic induced vibrations in buildings; Transport interchange

Research sub-theme	Contributing projects
Development of environment-friendly forms of transport	COMPOSIT; ECTOS; UTOPIA; Car-free households; Electric vehicles and new mobility concepts; Energetic and environmental assessment of Eurometro; Pedestrian and cycle traffic

Detailed findings and policy implications for individual projects can be found in Annex I. Please refer to acronyms and project titles, respectively, listed above.

4.1 Environmental impact assessment

4.1.1 Research objectives

Headline objectives under environmental impact assessment include, development of criteria and indicators for sustainable transportation. Sound ecological criteria and measurements in relation to air pollution, greenhouse gases, variety of species etc. need to be developed within. The contribution of the concept of true costing to sustainability is also needs to be investigated. A further objective contributing to the above is to identify the most cost effective strategy for reducing the amounts of harmful particulates emitted from diesel-engined vehicles, starting with the development of improved assessment and evaluation procedures.

4.1.2 Main findings

PROPOLIS demonstrated that decision making systems can impact on sustainability – economic and social as well as environmental. A good urban policy programme consists of co-ordinated elements that work together to produce cumulative long-term effects that attain a balanced set of environmental, social and economic goals. These elements may include:

- Pricing;
- public transport investment programmes; and
- land use planning.

Appropriate decision making tools utilising modelling and the full range of data sets as developed by PROPOLIS can support the achievement of sustainability by allowing the analysis of different potential scenarios.

BEACON has established that Strategic Environmental Assessment (SEA) is mandatory in most countries, and if it is not already, it will be in the future due to EU legislation, but currently, the approach taken is variable. The overall conclusions were that:

- The link with decision making is often weak in practice;
- there is no “homogeneous application of SEA methodologies”; and
- a perception of methodological uncertainty prevails.

A SEA manual was produced as a key output of the project.

In Switzerland, a “tool for defining, assessing and comparing the costs and benefits of measures for preserving nature and landscape” has been produced. It is noted that the tool does not, and cannot produce mathematically accurate results since the subject pre-

cludes precise scientific operationalisation, but assessment criteria leave scope for interpretation to account for this . A further Swiss project has been concerned with the "sustainability assessment of projects and strategies." Achieving sustainable strategies and plans depends on the effectiveness of assessment instruments and their co-ordination.

The AEROCERT consortium analysed the noise and emissions of a significant number of recorded flights for a number of representative aircraft. Comparison of these flights with each other and with for equivalent certification flights has shown marked variation in aircraft operations for a certain type or mission and, at the same time, has shown significant differences relative to certification flight test conditions.

- The observations and conclusions, drawn from the wealth of flight data in this project, are an excellent starting point for future research on tools, models and data required for improved impact assessment and certification. At the same time the certification data is put into perspective when it comes to impact assessment based on certification criteria.

EMARC assessed the effects of the MARPOL (the International Convention for the Prevention of Pollution from Ships) regulations on port environments to investigate systems for the management of ship waste. EMARC found that MARPOL appears to be having a positive impact, although data is described as scant and anecdotal. Nevertheless, EMARC reports that there are few spills, those that do occur are small, the penetration of on-board equipment is high, and the number of prosecutions is small. Regarding oil and noxious liquids, on-board systems are complementary to shore counterparts when used legally. Regarding garbage, there is a need for a garbage process record book, improved communications between ship and shore regarding facilities available in port and a ships needs, and staff training. Best practice is comprised of: waste minimisation, separation of remaining waste for disposal ashore, continuous training in waste management and environmental objectives.

H-SENSE developed predictive sedimentological models for the management of harbour activities regarding silting and the evaluation of associated environmental pollution in estuaries and costal settings with limited tidal influence. H-SENSE developed a harbour sediment database for monitoring purposes. It will allow modelling and statistical evaluations relating to sediment settlement, dredging, traffic management and release of pollutants. Understanding the harbour setting will allow more efficient use and dredging.

MEET developed a Europe wise methodology for calculating traffic emissions and energy consumption, and hence evaluating the impact of transport on air pollution. The procedure includes extensive coverage of modes and journey types.

In Belgium the Combination of a Traffic Simulation Model with an Air Emission Simulation Model project aimed to improve the evaluation and localisation of pollutants to reduce pollution. The combined model allows decision makers to assess impacts of proposed traffic changes in terms of traffic flows as well as pollution, since impacts on these two indicators may not always be in the same direction.

The Swiss Particle Emissions project aimed to quantify the contribution of road traffic to ambient air concentrations of PM_{10} and $PM_{2.5}$ at four sites representing important air pollution scenarios. This work was motivated by the health impacts of PMs and the need to develop effective reduction scenarios. The key results were:

- Urban and sub-urban models were successful; and
- differentiation between the contribution of light and heavy vehicles was possible.

POLMIT was concerned with the pollution of groundwater and soil by road traffic sources: dispersal mechanisms, pathways and mitigation measures. Groundwater and soil pollution

is usually in the form of metals from vehicles (which is affected by traffic volume), poly-cyclic aromatic hydrocarbons (PAHs) from vehicles and certain road surfaces, and chlorine from winter de-icing salts (which naturally varies with the severity of the winter). Dispersion is through run off and short distance aerial dispersion and deposition. In terms of soil pollution, lead exists at problematic levels, but deposition is probably historical dating back to use of leaded petrol. Copper and Zinc are sometimes problematic, but thought to derive from nearby crash barriers rather than roads or vehicles directly. It was not possible to reliably determine the quantity of total hydrocarbons (THCs) or PAHs. In terms of groundwater pollution, concentrations of heavy metals were low, even near to or downstream from roads. Metals are retained in the soil, and do not easily leach down through the soil profile. However, elevated concentrations are found when large amounts of de-icing salts are applied to the roads, as chlorine facilitates movement of absorbed metals. Again there were problems determining THCs and PAHs, with high variation between sites. In terms of control methods, treatments are available for run off, but not aerial dispersion. Significant quantities of zinc and chlorine are transported by aerial dispersion. Porous roads are the best reduction mechanism, but the only treatment available is source control.

MetaRail aimed to develop and improve methodologies and techniques for measurement of railway exterior noise for the purpose of type testing, monitoring and diagnostics. The key outputs were:

- An improved methodology for type testing, which can be adopted by the ISO/CEN standard for exterior noise test procedures for constant speed pass-by;
- new methods for separating track and vehicle noise were demonstrated;
- indirect roughness measurement techniques were also demonstrated; and
- many of the suggested improvements are suitable for incorporation into ISO 3095 standard for railway noise measurement.

4.2 Mitigation measures

4.2.1 Research objectives

A key objective under mitigation measures is to increase the knowledge required for improving highway performance with a view to minimising the leaching of contaminants from roads and traffic. Improvement of pavement performance will lead to less road closures, better use of the road network, longer service life and more effective transportation of goods and people. A further key objective is related to noise, including aircraft noise. Relevant research objectives being considered by current projects in this area include investigation of complex configurations which may reduce noise by at least 7EPNdB, and technological developments to double the lifetime of components by decreasing the vibration energy.

4.2.2 Main findings

ARCOP which looked at shipping in the Artic sea area included a work package on environmental issues, which noted that there is no experience of large-scale shipping operations in Artic conditions, particularly regarding the movement of oil. Consequently, ARCOP simulated oil spill scenarios and the economics of such scenarios. The research found that experts agree on the potential spillage scenarios, and appropriate responses, but more

work is needed to develop these due to lack of experience. Overall, “readiness for accidents must be further developed”, and safety taken seriously. The ARCOP project and its work also became part of the EU-Russia energy dialogue, and will help when developing energy transportation policies from Arctic Russia to Europe.

SCRAPPAGE, a UK project designed to enhance the UK vehicle market model, looked at mitigation measures from the perspective of minimising waste from fleet turnover. Key outputs from the project were a derivation of ‘core survival rates’ for petrol cars (by engine size), diesel cars and HGVs (both by vintage), and a model, based on stated preference, giving survival rates for the above vehicles of different ages, varying by vehicle excise duty, new car prices, depreciation rates/second hand value, fuel prices, and scrappage schemes.

SPRITE, separating transport intensity and economic growth considered measures to achieve this objective, and one of the recommendations of Belgian research below. Whilst not proven at EU level, the measures with proven effects at lower levels are: combined measures to change mobility-related attitudes and traffic behaviour, car sharing as part of combined mobility, controlled Parking Zones, urban road pricing, hydrogen fuel cell vehicles, high speed rail, road pricing for freight traffic. It is also worth noting that an integrated approach that combines two or more measures is necessary to separate transport intensity from GDP, no one measure will work alone.

Swiss research concerned with strategies for sustainable transport aimed to present a coherent strategy for sustainable transport to be achieved by 2030/40. The key measures recommended by this research were: a CO_2 tax, temporary subsidies of renewable energy, equipping diesel vehicles with particle filters, taxation of noise emissions, equitable fiscal treatment of private and public transportation, enforcement of more restrictive prescriptions for economic land use by national, regional and local government.

Study of transport and land use interactions in Switzerland have identified a number of key challenges:

- Challenges for the Regional Planning Policy:
  - Improve co-ordination.
  - With regard to small areas, establish standards and criteria so that regional planning can base the development of utilisation of land on a more sustainable response to the growing demand for public transport.
  - The co-ordinating roles of federal/regional authorities, and regional authorities and communities, needs to be strengthened.
- Challenges for the Transport Policy:
  - With regard to large areas, the design and funding of measures for transport must be determined increasingly in accordance with efforts for more sustainable regional planning.
  - With regard to small areas, criteria and standards have to be developed for how the design and funding of public transport services can be made increasingly dependent on a more sustainable settlement structure.
  - With regard to the authorities: concepts and factual plans need to be re-evaluated; projects and programmes need to be evaluated earlier with regard to their regional feasibility.

Swiss research concerned with leisure traffic found that strategies targeting sustainable recreational traffic should focus on the essential requirements of people in their leisure activities.

Three levels of a sustainable policy for recreational traffic were identified:

- Firstly, all approaches allowing for more sustainable forms of mobility should be considered.
- Secondly, such a policy should make use of the political approaches that are already being implemented today.
- Thirdly, new foci should be sought for with reference to recreational activities and traffic.

A Belgium project concerned with developing an integrated instrument to evaluate effects of local mobility plans on traffic viability and the environment developed an instrument that assessed impacts on: accessibility, traffic viability, noise nuisance, air quality, mobility, crossability [ability to cross the road; severance], and road safety. Evaluation was possible at the district and street level using the tool, which made use of pollution dispersion models.

The UK transport interchange project looked at ways to improve interchanges and their role in promoting seamless travel. The project concluded that more “informal interchanges” should be encouraged. Places involving interchange need to be “warm, with adequate shelter”, and provide passengers with sufficient information regarding services, fares and whether buses [or trains, trams, trolley buses etc] are running to schedule.

A further Belgian project, this time solely concerned with atmospheric pollution developed measures to decrease CO_2 and tropospheric ozone. The study considered existing and potential policy measures that fell within the framework of sustainable mobility policy. Measures were investigated for their effect in terms of reducing CO_2 and tropospheric ozone, and their technological, economic and social feasibility. The policy advice that arose from this project included: use of travel demand management, separation of economic growth and travel demand – promotion of teleworking, prevention of induced traffic, use of technology – more environmentally friendly vehicles, inspection and maintenance programmes, behavioural measures to alter vehicle purchasing, driving style, and use of luxury accessories. The project concluded that policy must be co-ordinated to avoid sending contradictory messages, at all EU, national, regional and local levels. Environmental interests should also be more integrated into policy and decision making.

Work concerned with traffic induced vibrations in buildings has also been undertaken in Belgium. This aimed to obtain more insight into the relevant physical phenomena, and the relative importance of determining factors related to traffic induced vibrations. The initial concern was solely with road traffic, but transferability, or further development of the work into other areas, particularly rail was highlighted, including development of a model for rail. Results support the development of a sustainable mobility policy. Recommendations included, limitation of gross vehicle weight, speed limits, and alternative design of speed reduction infrastructure. The influence of the thickness of pavements was also investigated, and the work can be used to formulate guidelines regarding nuisance due to traffic induced vibrations.

4.3 Development of environment-friendly forms of transport

4.3.1 Research objectives

A key purpose of research projects seeking to develop environment-friendly forms of transport is to find new means to promote walking in cities by improving the conditions and quality of urban public spaces in this respect. The objective is to identify best practices as well as to develop new tools and generic solutions for that purpose. These concern problem identification, and problem solving for implementation of planned measures. The tools and solutions generated are aimed at designers, planners and decision makers to be used in the development of urban pedestrian environments.

4.3.2 Main findings

ECTOS demonstrates and evaluates a hydrogen based bus service, including the refuelling infrastructure. The project demonstrates the social, environmental and economic factors affecting viability of such a service. Throughout the project, hydrogen production, and bus operations were completely CO_2 free, re-fuelling infrastructure was integrated with conventional infrastructure, and the service proved to be socially and environmentally beneficial. Nevertheless, the costs of hydrogen infrastructure and bus operations are not yet commercially viable.

UTOPIA was concerned with urban transport options for propulsion systems, and instruments for analysis. There were four major outputs: assessment of the most promising applications for cleaner vehicles and supporting measures, from a city perspective, recommendations on policy actions at the EU and national levels to promote/facilitate market introductions and demonstrations, good practice guide to setting up and running pilot and demonstration projects, and software providing information and assessment methods to support local decision making.

Swiss research into electric vehicles and new mobility concepts advocates electric vehicles in urban areas in the context of demand responsive “capillary” public transport, a car-sharing fleet, and integration with existing public transport.

In Switzerland it has also been found that car-sharing should be developed in areas with weak infrastructures. This should be supported by perception and communication activities, new, integrated mobility services, mobility packages, supporting traffic planning, public transport provisions, price structures, fiscal actions, bicycle and pedestrian promotion, parking control, car free residential areas and settlement planning.

Swiss research into walking and cycling drew the following conclusions. Four factors argue for the promotion of pedestrian and cycle traffic:

- The promotion of pedestrian and cycle traffic offers significant opportunities;
- many efficient measures for the promotion of pedestrian and cycle traffic are available and awaiting implementation;
- land use and urban planning provide key instruments to secure or reintroduce settlement structures orientated at pedestrian and cycle traffic; and
- the promotion of pedestrian and cycle traffic would especially benefit a range of societal groups often characterised by low car ownership.

On the other hand, there are many reasons and obstacles preventing or hindering adequate promotion of pedestrian and cycle traffic:

- Biased recognition of everyday mobility and traffic problems;
- lack of funding mechanisms that are available to other traffic participants;
- insufficient institutionalisation of pedestrian and cyclist concerns in government bodies; and
- inadequate distribution of tasks and responsibilities between different political levels.

Intensive promotion of pedestrian and cycle traffic is crucial for a sustainable transport policy. A programme to be called „Pedestrian and Cycle Traffic 2000plus“ is suggested. Such a programme would involve – under the guidance of one main office for pedestrian and cycle traffic – several regional offices responsible for interest groups and other government levels, affecting a variety of political sectors and responsibilities. A further element of the programme is the creation of awareness of the issues of pedestrian and cycle traffic, in combination with specific proposals for action

Assessment of Eurometro (a high-speed transport system in a partial vacuum with magnetic driving forces) in Switzerland has shown that:

- The consumption of primary energy and the global warming potential of a Eurometro system is expected to be significantly lower per passenger kilometre than with other transport systems.
- As a Eurometro system would be operated mainly with electric power, the method used for generating electricity is a major impact factor regarding the climatic and environmental efficiency.
- Other relevant issues are the impacts of tunnel construction and other infrastructure.
- Further investigations with regard to the demand for such transport systems will have to be a main focus of future.
- Other accompanying control measures, besides internalising external costs within the field of transport, have to be developed and evaluated.
- Economic and financial aspects of constructing and operating a Eurometro system also influence the sustainability of a high-speed system very strongly.

A technological development that can contribute to more environmentally friendly transportation is the use of composites (e.g., fibreglass) in manufacturing, resulting in lighter vehicles, and thus, lower fuel consumption. However, it would be a mistake to assume that the substitution of metals with composites will be automatic. There is no doubt that the number of composite material applications within the automotive sector will increase, but, as has been demonstrated by the aerospace sector, they will never completely replace metals.

5. References

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Annex I: Contributing projects

Preface This Annex lists all the projects (European and national) which belong to the **Environmental Aspects** theme, in alphabetical order of project acronym (for projects with acronyms), followed by projects without acronyms in alphabetical order of the project's name in English. Where results have been made available to the EXTR@Web project, a summary of key findings and policy implications relevant to this theme are given.

In 'Origin' column, use ISO 3166-1 country designators as follows:

Austria – AT; Belgium – BE; Bulgaria – BG; Cyprus – CY; Czech Republic – CZ; Denmark – DK; Estonia – EE; European – EU; Finland – FI; France – FR; Germany – DE; Greece – GR; Hungary – HU; Iceland – IS; International – INT; Ireland – IE; Italy – IT; Latvia – LV; Lithuania – LT; Luxembourg – LU; Malta – MT; Netherlands – NL; Norway – NO; Poland – PL; Portugal – PT; Romania – RO; Slovakia – SK; Slovenia – SI; Spain – ES; Sweden – SE; Switzerland – CH; United Kingdom – UK; Other countries – Oth

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
3D-STRUCTURES	Lighter and Safer Automotive 3D-Structures at Low Investments through the Development of the Innovative Double Sheets Hydroforming Technology	EU	Environmental impact assessment
Project contact m.casali@crf.it			
AAA	Advanced Amphibious Aircraft	EU	Development of environment-friendly forms of transport
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=224			
AERO2K	Global aircraft emissions data project for climate impacts evaluation	EU	Mitigation measures
Project contact dslee@qinetiq.com			
AEROCERT	Aircraft Environmental Impacts and Certification Criteria	EU	Development of environment-friendly forms of transport

Key Findings

Many flight data recordings (FDR) and engine condition monitoring (ECM) data records, and a wealth of data has allowed comparison of the well-defined International Civil Aviation Organisation (ICAO) certification procedures with a diversity of aircraft operations as apparent from the recordings:

- Significant improvements regarding accuracy of impact assessment are possible if additional noise data could be made available to the public domain.
- Significant differences between the individual flight profiles in the recorded flights are apparent. This also implies significant differences between the profiles of certification and recorded flights.
- A better impact assessment can be made if the flight profiles used for impact assessment reflect the

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

day to day operations better.

- There is no recommendation to change the noise certification procedures, rather to secure certification noise map data that can be used for noise assessment purposes.
- Regarding emissions at and around airports, a better impact assessment can be made by having information available on more species, and obtaining certification data for additional thrust levels applied in actual operations.
- Regarding gaseous emissions impact on the global atmosphere and at higher altitudes, the current state of the art technology is not yet capable of providing well proven and well accepted methods for impact assessments.
- The evident in-service deterioration of engine components does not significantly change the noise performance. No justification exists to represent deterioration effects in the noise certification procedures.

Regarding emissions, the deterioration effects of engine deterioration are indeed noticeable. At maximum levels of deterioration, both fuel use and NO_X emissions increase significantly at all conditions. It is recommended that the consequences of deterioration of fuel and emissions need to be translated into impacts both at the local airport level and at the global level

Policy Implications

A number of AEROCERT findings have already been identified as relevant to ongoing analysis within the noise work programme of ICAO/CAEP and its working group 1 (noise technical) and WG3. Specifically comparisons between certificated and actual noise performance are of interest to the JET-10 group, which is looking at noise certification requirements.
At the workshop it has become evident that AEROCERT reporting could benefit developments on ICAO Annex 16, FAR 34 and the JAR 34. It has been strongly recommended to bring the AEROCERT findings forward drawing, as far as possible, on the available supporting data.

Project contact

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AEROFIL	New concept of high pressure hydraulic filter for aeronautics preserving environment	EU	Mitigation measures

Project contact

christophe.devillers@sofrance.com

AHEDAT	Advanced heavy duty engine aftertreatment technology	EU	Environmental impact assessment

Project contact

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AIRFORCE	Air Forecast in Europe	EU	Environmental impact assessment

Project website (or contact)

None

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ALICE	Advanced lightweight graphite based composite components for low emission combustion engines	EU	Environmental impact assessment
Project contact Dr. Joachim Metz; Schunk Kohlenstofftechnik GmbH, Fax: +49 641 6 08 12 23			
APOLISS	Applications of Lightweight Sandwich Sheets	EU	Environmental impact assessment
Project contact fmaaseid@ford.com			
ARCOP	Arctic Operational Platform	EU	Environmental impact assessment
Key Findings ARCOP which looked at shipping in the Artic sea area included a work package on environmental issues, which noted that there is no experience of large-scale shipping operations in Artic conditions, particularly regarding the movement of oil. Consequently, ARCOP simulated oil spill scenarios and the economics of such scenarios. The research found that experts agree on the potential spillage scenarios, and appropriate responses, but more work is needed to develop these due to lack of experience. Overall, "readiness for accidents must be further developed", and safety taken seriously. The ARCOP project and its work also became part of the EU-Russia energy dialogue, and will help when developing energy transportation policies from Arctic Russia to Europe. Policy implications The key policy implications of the ARCOP work are the promotion of joint working around the Arctic sea area, and development of risk management and accident remedial measures for oil spills, and promotion of dialogue of the transport of energy from Russia to Europe. Project website www.arcop.fi/reports.htm			
AROMA	Acoustic radiation of small turbomachines	EU	Mitigation measures
Project contact jean-louis.migeot@fft.be			
ART-DEXA	Advanced Regeneration Technologies for Diesel Exhaust Particulate After treatment	EU	Environmental impact assessment
Project contact m.debenedetti@crf.it			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ARTEMIS	Assessment of Road Transport Emission Models and Inventory Systems	EU	Environmental impact assessment
Project contact ahickman@trl.co.uk			
AURORA	Auxiliary climbing robot for underwear ship hull cleaning of the sea adherence and surveying	EU	Environmental impact assessment
Project contact armada@iai.csic.es			
AUTOTRACKER	Autonomous Inspection of Subsea Telecommunication Cables, Power Cables and Pipelines	EU	Environmental impact assessment
Project contact abj@maridan.dk			
BALTECOLOGICALSHIP	Environment Friendly Ships For Baltic Area	EU	Development of environment-friendly forms of transport
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2772			
BEACON	Building Environmental Assessment Consensus on the TEN-T		Environmental impact assessment

Key findings

BEACON has established that Strategic Environmental Assessment (SEA) is mandatory in most countries, and if it is not already, it will be in the future due to EU legislation, but currently, the approach taken is variable. The overall conclusions were that:

- The link with decision making is often weak in practice.
- There is no “homogeneous application of SEA methodologies.”
- A perception of methodological uncertainty prevails:
  - Results are often based on emissions inventories and rarely provide spatial indicators,
  - Social and health indicators are generally disregarded,
  - SEA is seen as a “new science” and there is a strong demand for support and guidance,
  - EU leadership and co-ordination is required.

A SEA manual was produced as a key output of the project.

Policy implications

The key policy implication is the promotion of more consistent strategic environmental assessment across Europe, which will have positive consequences for not only the environment, but also equity in all its forms (including social and economic).

Project website

www.transport-sea.net

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
CALM	Community noise research strategy plan	EU	Mitigation measures
Project website www.calm-network.com			
CARRE 1	Recycling Of Used Automotive Carpets	EU	Environmental impact assessment
Project website (or contact) None			
CLEANER-DRIVE	Use and integration of new-generation vehicles and radically improved propulsion systems in the transport system	EU	Environmental impact assessment
Project contact jonm@est.co.uk			
CLEANHULL	Protecting and ensuring water quality and increasing marine fuel efficiency with up to 30% by an innovative under water hull cleaning process	EU	Environmental impact assessment
Project contact Thor Olav Sperre; Sperre AS, Hydro Naeringspark, Bygg 90, 3671 Notodden, Norway			
COMET	Coated Sintered Metal Trap	EU	Environmental impact assessment
Project contact rainer.aust@daimlerchrysler.com			
COMPOSITE	The Composites Thematic Network	EU	Development of environment-friendly forms of transport
Key findings Another technological development that can contribute to more environmentally friendly transportation is the use of composites (e.g., fibreglass) in manufacturing. For example, a car with a body formed from composites will be lighter, and therefore use less fuel. However, it would be a strategic mistake to assume that the substitution of metals with composites will be automatic. There is no doubt that the number of composite material applications within the automotive sector will increase, but, as has been demonstrated by the aerospace sector, they will never completely replace metals. Composite materials have enormous potential, but the composite industry will need to demonstrate their advantages. Ideally, designers should seek to work with both materials without prejudice. If this approach is to be adopted, special attention will be required when considering the joining of composite and metal parts. Another essential requirement is the development of tools for product design, simulation, manufacturing and regulation using composite) Policy implications Composite materials have enormous potential, but the composite industry will need to demonstrate their advantages, and encouragement to do so through regulations and supportive guidelines would be bene-			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ficial. Ideally, designers should seek to work with conventional and composite materials without prejudice. If this approach is to be adopted, special attention will be required when considering the joining of composite and metal parts. Another essential requirement is the development of tools for product design, simulation, manufacturing and regulation of the use of composites. Stimulating the market use of composites, including the market for vehicles manufactured with composites, through taxation or price incentives would support product development. Project website www.compositn.net			
COST 341	Habitat fragmentation due to transport infrastructure	EU	Environmental impact assessment
Project website www.cordis.lu/cost-transport/src/cost-341.htm			
COST 346	Emissions and fuel consumption for heavy duty vehicles	EU	Environmental impact assessment
Project website www.cordis.lu/cost-transport/src/cost-346.htm			
COST 350	Integrated assessment of environmental impact of traffic and transport infrastructure	EU	Environmental impact assessment
Project website (or contact) None			
CRICE	Common rail based improved combustion for low emissions	EU	Environmental impact assessment
Project contact e.volpi@crf.it			
CYPRESS	Future engine cycle prediction and emissions study	EU	Mitigation measures
Project contact jrtilston@qinetiq.com			
DARTS	Durable and Reliable Tunnel Structures	EU	Development of environment-friendly forms of transport
Project website www.dartsproject.net			
D-CYCLE	Advanced Diesel cycle development for mid size engines with high pressure piezo common rail	EU	Environmental impact assessment
Project contact patrick.mattes@de.bosch.com			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
DIEXFIL	Development of diesel exhaust gases filtration technology with application of fuel additives enabling continuous regeneration of filters to minimize the particulate emission of city buses	EU	Environmental impact assessment
Project contact Ewa Ziabka; Spolnota, Berka Joselewicza 21, 31031 Krakow, Poland			
D-ISELE	Diesel Injection for Small Engines and Low Emissions	EU	Environmental impact assessment
Project contact Prof. Gert Siegle; Robert Bosch GmbH, Tel: +49 512 1494500			
D-LEVEL	Diesel-Low Emission Levels by Engine Modelling	EU	Environmental impact assessment
Project contact ingemar@vtd.volvo.se			
D-ULEV	Low CO_2 ULEV Diesel Passenger Car	EU	Environmental impact assessment
Project contact volkmar.webersinke-matejka@daimlerchrysler.com			
E.R.S.	Euro rolling silently	EU	Environmental impact assessment
Project contact jacques.raison@sncf.fr			
ECOPAINT	Environmentally friendly and efficient coatings for ships	EU	Environmental impact assessment
Project contact zerrahn@meyerwerft.de			
ECOPORTS	Information exchange and impact assessment for enhanced environmental-conscious operations in European ports and terminals	EU	Environmental impact assessment
Project contact herman.journee@amsterdamports.nl			
ECOTRANS	Direct charge of electric vehicles from hydro-electric power plants using fast charging equipment	EU	Environmental impact assessment
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2521			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ECTOS	Ecological City Transport	EU	Mitigation measures
Key findings ECTOS demonstrates and evaluates a hydrogen based bus service, including the refuelling infrastructure. The project demonstrates the social, environmental and economic factors affecting viability of such a service. Throughout the project, hydrogen production, and bus operations were completely CO2 free, refuelling infrastructure was integrated with conventional infrastructure, and the service proved to be socially and environmentally beneficial. Nevertheless, the costs of hydrogen infrastructure and bus operations are not yet commercially viable. Policy implications ECTOS has demonstrated what is currently possible with regard to providing CO2 free public transport services utilising hydrogen fuelled buses, and will thus be able to inform the development of policy in this area. It will be possible to develop policy that is feasible in practical terms both immediately, and in the long run. Project website www.ectos.is			
EDICT	Evaluation and demonstration of innovative city transport	EU	Development of environment-friendly forms of transport
Project website www.cardiff.gov.uk/edict/			
EEFAE	Efficient and environmentally friendly aircraft engine	EU	Mitigation measures
Project contact neil.pickard@rolls-royce.com			
EFTCOR	Environmental Friendly and Cost-effective Technology for Coating Removal	EU	Environmental impact assessment
Project contact jpmolina@izar.es			
ELEGT	Electric Exhaust Gas Turbo-charger	EU	Environmental impact assessment
Project contact Elena Barbero; Iveco Fiat SpA, Lgo Stura Lazio 49, Casella Postale 1371, I-10156 Torino, Italy			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
EMARC	MARPOL Rules and Ship Generated Waste	EU	Environmental impact assessment

Key findings

Evidence collated by EMARC indicates that the MARPOL regulations are having a positive effect on the marine environment, although data are sparse. For example, oil pollution decreased by 60% in the 1980s. However, beach litter may have worsened subsequent to MARPOL.
Current environmental data are well intentioned but too fragmented for firm conclusions to be drawn. National statistics from ports are needed in a comprehensive and standardised form. In addition, the accurate reporting of annual totals for each MARPOL Annex would be a major step forward. This standardisation of recording and reporting on a long-term common basis, both afloat and ashore, is essential if the full impact of MARPOL and its degree of enforcement are to be assessed.
An extensive survey of shipping companies and ports highlighted the need for communications between the various parties in the waste management chain to be improved, if the regulations are to work cost-effectively and efficiently. This can be achieved relatively simply by ensuring that the ship reports its requirements, this is acknowledged by the port and the information is passed on to the waste contractor. Measures such as the implementation of 'port waste management plans' would set the framework for such a communications system.
A conceptual model of the working of the MARPOL regulations has been developed. This is designed to help legislators assess the potential implications of a new rule or constraint in the shipping/port operational system.

Policy implications

EMARC concluded that improving and evaluating the implementation of MARPOL requires actions at a European level to: establish criteria for assessing the environmental impact of the regulations, and to provide common standards and databases for reporting quantities of waste; require all ports to prepare waste management plans; set up a system of independent audits of port reception facilities; establish common standards and procedures for beach monitoring campaigns and definition of beach litter sources.
In this respect, the Commission has already presented a proposal for a Council Directive on Port Reception Facilities for Ship-generated Waste and Cargo Residues, (COM(98)452).

Project contact

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EPISTLE	European project for improvement of supersonic transport low speed efficiency	EU	Mitigation measures

Project contact

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EREBIO	Emission reduction from engines and Transmissions substituting harmful additives in biolubricants by triboreactive materials	EU	Environmental impact assessment

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Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
ERRVIN	Managing the dynamic interaction between the vehicle and the infrastructure	EU	Environmental impact assessment
Project contact p.m.e.lewis@reading.ac.uk			
FCSHIP	Fuel Cell Technology in Ships	EU	Environmental impact assessment
Project contact nils.telle@rederi.no			
FUNIT	Future unit injector technologies	EU	Environmental impact assessment
Project contact daniel@vtd.volvo.se			
GET-CO2	Gasoline Engine Turbo-charging - Advanced Gasoline Powertrain for reduced Fuel Consumption and CO_2 Emissions	EU	Environmental impact assessment
Project contact pierre.beuzit@renault.com			
GLEVEL	Gasoline Direct injection-Low Emission Levels by Engine Modelling	EU	Development of environment-friendly forms of transport
Project contact eberhard.kraus@daimlerchrysler.com			
GREEN-NSD	Green North Sea Docks: Development of the Best Environmental Practice for Decontaminating Tributyltin (TBT) Containing Waters in the North Sea Region Based on Life Cycle Assessment	EU	Environmental impact assessment
Project website www.greendocks.de			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

H-SENSE | Harbours – Silting and Environmental Sedimentology | EU | Environmental impact assessment

Key findings

Through experimental work in the harbours of Göteborg (Sweden), Bergen (Norway) and Ventspils (Latvia), H-SENSE has made recommendations on routine and specialist techniques for surveying sediment - including methodological developments resulting from this project.
Geochemical databases were established for the three test harbours. These included the vertical distribution of sediment as well as spatial variations, since dredging and ship turbulence can affect sediment at considerable depth and thereby re-mobilise old contaminants. A new system for comparing contaminated sediments with different composition was proposed, since current classifications used by most harbour authorities are not sensitive to the mobility and toxicity of elements in different phases.
Three modelling approaches were developed and compared for the spatial prediction of clay distribution, harbour bed conditions, zinc pollution and sediment thickness. Further work will be needed to take these tools into general application. GIS modelling may reduce the cost of monitoring schemes currently used by harbour authorities.

Policy implications

Hydrographic surveying and the application of sediment data are important for improved dredging management and environmental protection. Many harbour sediments contain industrial and domestic pollutants, which could be released as a result of harbour operations or expansion. H-SENSE has provided methods permitting the most cost-effective sampling techniques and the most appropriate sediment management strategies to be applied.
The uncertainties in the distribution of sediment contamination, and in the significance of the various chemicals in given concentrations, favour the application of a risk-based approach to environmental protection. The generic modelling developed by H-SENSE provides a basis for the audit trail that is critical to such risk-based management.
One of the main barriers to sediment modelling is the lack of suitable input data. H-SENSE recommended that harbours review their procedures and strive to construct archives containing the type of data shown to be valuable for modelling. Routine monitoring in connection with maintenance dredging, as well as specific construction and remediation projects, will, if planned appropriately, provide the basic requirements. This would substantially reduce the costs of modelling.

Project website

hjs.geol.uib.no/hsense

HELINOVI | Helicopter noise and vibration reduction | EU | Development of environment-friendly forms of transport

Project contact

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HORTIA | Heat and oxidization resistant titanium alloys applications | EU | Development of environment-friendly forms of transport

Project contact

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Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
I-LEVEL	Injector flows – Low Emission Levels by Engine Modelling	EU	Environmental impact assessment
Project contact eberhard.w.wagner@daimlerchrysler.com			
IMPECC	Infrared microsystem for polluting emission control on cars	EU	Environmental impact assessment
Project contact jean.botti@delphiauto.com			
JEAN	Jet exhaust aerodynamics and noise	EU	Mitigation measures
Project contact john.fitzpatrick@tcd.ie			
KNOWNOX	Development of continuous catalytic NO_X reduction for lean burn cars	EU	Environmental impact assessment
Project contact lennart.cider@vtd.volvo.se			
LEADING EDGE	Prediction of leading edge and tip flow for the design of quiet and efficient screw propellers	EU	Environmental impact assessment
Project contact g.kuiper@marin.nl			
LIRECAR	Light and recyclable car	EU	Environmental impact assessment
Project contact pierre.beuzit@renault.com			
LOGCHAIN FOOTPRINT	Relating the environmental footprint of a vehicle to the lifetime cost of maintaining the infrastructure	EU	Development of environment-friendly forms of transport
Project website www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=2486			
LOPOCOTEP	Low pollutants combustor technology programme	EU	Mitigation measures
Project contact olivier.penanhoat@snecma.fr			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
LOTUS	Low temperature active urea based selective catalytic reduction of NO_X	EU	Environmental impact assessment
Project contact pernilla@vtd.volvo.se			
MAGMOVE	Magnetic movement valve for miller cycle operation of engines – reducing NO_X, CO_2 and particulate emission	EU	Environmental impact assessment
Project contact pepbacon@aol.com			
MARTOB	Onboard treatment of ballast water (Technologies development and applications) and application of low-sulphur marine fuel	EU	Environmental impact assessment
Project contact alan.tuck@ncl.ac.uk			
MEET	Methodology for Calculating Transport Emissions and Energy Consumption	EU	Environmental impact assessment

Key findings

MEET has compiled a comprehensive catalogue of methods, emissions factors and functions, for use in estimating pollutant emissions and energy consumption from transport. It covers all current vehicle technologies for all different types or classes of road vehicles, as well as rail, shipping and air transport. For road transport, cold start extra emissions, evaporative losses, road gradient and vehicle load effects are addressed. In addition, guidance is given concerning the emissions behaviour of future vehicles and fuels. Data are also provided on the pollutant emissions associated with energy production. Examples of the use of the methodologies are given for: road and rail transport, (a set of aggregated emissions factors have been calculated for use in simple strategic-level assessments); comparisons of passenger and freight journeys using different modes of transport.

Policy implications

The results from MEET are being incorporated in the COPERT3 methodology and the EMEP/CORINAIR Atmospheric Emission Inventory Guidebook. These tools are provided by the European Environment Agency to help Member States in reporting emissions according to their obligations under the UNECE Convention on Long Range Trans-boundary Pollution, the UN Framework Convention on Climate Change and the EC Monitoring Mechanism of Community CO2 and other Greenhouse Gas Emissions.
The interim results have also been incorporated in the TREMOVE model of the EU transport sector, developed under the Auto-Oil II Programme. This is being used to assess the most appropriate vehicle and fuel standards in order to meet EU air quality objectives in a cost-effective way.
In a third policy arena, MEET is contributing to the pilot study of the traffic and emissions levels on the Trans-European Transport Network. This study is a building block to establish a Strategic Environmental Assessment methodology for taking into account high-level environmental policy objectives when decisions are made on individual infrastructure projects that will enhance the European transport system.

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

Project website

www.inrets.fr/infos/cost319/M22.pdf

METARAIL | Methodologies and Actions for Rail Noise and Vibration Control | EU | Environmental impact assessment

Key findings

Thirteen techniques were studied in the project, including the testing of four new ones. Hardware and/or software were developed for six techniques.
Some of the techniques have been put forward as potential improvements to the ISO 3095 standard for railway exterior noise type testing. The changes are intended to give greater accuracy and reproducibility, especially when comparing measured data between different sites.
These methods were applied in a series of tests with a special test train at sites in four countries. Due to the improved procedures, measurement results were reproducible within a range of +/- 2 dB(A), which is a substantial improvement on the previous range of +/- 5 dB(A) or more. This was only possible due to accurate assessment of rail roughness, accurate speed control and careful monitoring of site-specific characteristics.
New methods for separating vehicle and track noise were demonstrated, such as a low-noise reference vehicle method and improved acoustic antenna techniques. The procedures were shown to be capable of quantifying the noise reductions due to low noise solutions such as improved braking systems and bogie shrouds. For example, it was possible to show which part of the noise reduction was due to lower roughness and which was due to shrouds.
In the tests, cast-iron block-braked wagons were the noisiest, followed by sintered metal block-braked wagons (about 6-8 dB(A) quieter) and then disc-braked and shrouded wagons (a further 4 dB(A) quieter). The largest reduction was due to lower wheel roughness, which was comparable to the rail roughness levels at most of the test sites. The bogie shrouds reduced vehicle noise by 4-7 dB(A), but the effect was limited by the remaining track noise contribution.

Policy implications

The METARAIL project maintained an interaction with the European Rail Research Institute's Advisory Group on Noise and Vibration, the Union International de Chemin de Fer's Task Force on Noise, the CEN standards body and other stakeholders. The project results have already in part been fed into a new draft of the ISO standard, prEN ISO 3095 (exterior noise type testing of rail vehicles), increasing its reproducibility and enabling better assessment of noise control measures for rail vehicles and tracks. The results of METARAIL are also serving as input to an EU working group on railway noise, which is advising on impending noise legislation (via Interoperability Directives) on high speed and conventional rail systems.
In the longer term, the project results will assist national authorities in determining measures needed for compliance with future Community legislation on noise.

Project website

www.alpnap.org/METARAIL_Final_Report.pdf

MICROCAT | A microwave catalytic system for land transport vehicles | EU | Environmental impact assessment

Project contact

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Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
MOBILS	Optimisation of Transport Systems for a Sustainable Citizen Mobility in Metropolitan Areas	EU	Environmental impact assessment
Project contact atm@bcn.servicom.es			
NANOSTRAP	Nanostructured sulphur traps for the protection of high performance NO_X storage/reduction catalysts in low emission engine applications	EU	Environmental impact assessment
Project contact centi@unime.it			
NEDENEF	New diesel engines and new diesel fuels – Influence of future fuel formulations on emissions and performance of new DI diesel technology	EU	Environmental impact assessment
Project contact pierre.forbes@ifp.fr			
NORMA	Noise reduction for marine applications	EU	Environmental impact assessment
Project website Peter Davies; Rolls-Royce Power Engineering plc., Raynesway, Derby DE21 7XX, UK			
PARTICULATES	Characterisation of Exhaust Particulate Emissions from Road Vehicles	EU	Environmental impact assessment
Project contact zizis@vergina.eng.auth.gr			
PICE	Pln-based improved combustion for low emission	EU	Environmental impact assessment
Project contact herbert.lohwasser@daimlerchrysler.com			
POA	Power optimised aircraft	EU	Mitigation measures
Project contact lester.faleiro@lli.liebherr.com			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
POLMIT	Pollution of groundwater and soil by road and traffic sources: dispersal mechanisms, pathways and mitigation measures	EU	Environmental impact assessment

Key findings

Metal emission rates have been primarily dependent on traffic volume, PAH (Policyclic Aromatic Hydrocarbons) emission rates primarily on traffic volume and road type, chloride emission rates mainly on the severity of the winter during the monitoring period and hence on the application of de-icing salts. Comparison with reported atmospheric emission in the UK has indicated that road transport contributes little Cd or Cr, very small amounts of Cu (2%) but significant amount of Pb (59%) and Zn (23%).
A mass balance approach has been used to determine what proportion of the calculated pollutant emissions entered the local terrestrial roadside, through highway runoff or aerial dispersion. The transfer rates of PAHs have been generally 10% of the emissions; within the metals, Zn was transported in the greatest quantity, followed by Cu and Pb and finally by Cr and Cd. Recovery rates for Cu and Pb have been relatively low (less than 10% and 5% respectively) while the rate has been just below 50% for Zn.
To determine the significance of roads and vehicles to soil and groundwater pollution, concentrations of road/vehicle-derived substances have been compared with recognised threshold levels, namely the intervention and target levels as set in the Dutch legislation. Soil intervention levels have been exceeded only for Pb, because of the large use of leaded fuel in the past. Most of the metal concentration have resulted well below the Dutch intervention levels for groundwater.

Policy implications

When an assessment indicates the need for treatment of road and vehicle pollution, the selection of the most appropriate type of treatment will have to take account of the type of pollutant, the transport mechanism by which this pollutant enters the roadside environment, the availability of land, the physical characteristics and the qualities of the receiving environment. Mitigation actions can be grouped into source-based and effect-based measures. Only source-based measures can tackle pollution that is transported by aerial dispersion.
The POLMIT project has developed the first draft of a Best Practice Handbook for the assessment of potential pollution problems and identification of the most appropriate treatment strategies. Further work would be needed to develop this handbook into a practical guide for engineers and consultants, to address some of the inconsistencies found in the experimental data and to identify clear thresholds within the decision making process.

Project website

www.trl.co.uk/polmit/index.htm

PROMETHEUS	Programme For A European Traffic System With Highest Efficiency And Unprecedented Safety	EU	Development of environment-friendly forms of transport

Project website

www.eureka.be/ifs/files/ifs/jsp-bin/eureka/ifs/jsps/projectForm.jsp?enumber=45

PROMPT	New Means to Promote Pedestrian Traffic in Cities	EU	Development of environment-friendly forms of transport

Project website

www.vtt.fi/virtual/prompt

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
PROPOLIS	Planning and Research for Land Use and Transport for Increasing Urban Sustainability	EU	Development of environment-friendly forms of transport

Key Findings

PROPOLIS has maintained and further developed the general comprehensive approach and the methodologies, originally developed in the SPARTACUS project, for studying sustainable urban policies. Most of the conclusions previously made can now be confirmed, specified in more detail and supported by more case cities and new types of models used.
The PROPOLIS system produces large amounts of information, but it also makes possible a drastic stepwise aggregation of the data – down to three sustainability index values per policy based on the preferences of the user or client of the system. In this way also the transparency of the system is maintained.
The results demonstrate the types of policies, which are likely to give positive results and therefore merit further study. However, theoretical, methodological and data limitations mean that some care is required in their interpretation. Despite these reservations many of the results in different types of cities, in different cultures and achieved using different types of models point in the same direction, are understandable and confirm the underlying theoretical considerations.
The main concept for further research builds on the premises that urban transport and land use form one integrated environmental, social and economic system that interacts with the surrounding region without a clear border. Thus the urban system and the effects of alternative policies should be assessed by simultaneously studying the land use and transport systems and their interaction with the environmental, social and economic systems and with the surrounding region on which the urban system is dependent. Both short- and long-term effects have to be taken into account. Many of the methods developed in PROPOLIS merit further research. However, the PROPOLIS system even in its current state could be used for more detailed policy identification in the seven case cities for producing comparable and harmonised data from different types of European cities.
The results show that the environmental sustainability deteriorates in all case cities compared with the current situation if no actions are taken and even if city specific reference scenarios, including local investment programmes, are adopted. Also socially the majority of cities tend to deteriorate.

Policy Implications

The PROPOLIS research has demonstrated that it is insufficient to merely evaluate policies on a one by one basis. Instead a complete urban policy programme should be evaluated both policy by policy and as a whole. DG Research 11. A good urban policy programme consists of co-ordinated elements that work together to produce cumulative long-term effects that attain a balanced set of environmental, social and economic goals. These elements may include:

- Combination of pricing policies directed at car users, with differentiation between peak and off-peak hours, as well as congested and non-congested areas, with appropriate level of pricing of public transport fares; and
- investment programmes supporting the changes in demand caused by the above policies and especially responding to the increased demand for better public transport speed and service.

A land use plan supporting the new need for people to live near central areas, in satellite cities or along well served public transport corridors and the people's increased need and opportunity to use public transport This policy line is likely, as demonstrated by the PROPOLIS case cities, to improve all dimensions of urban sustainability in typical European cities compared with their reference scenarios or continuation of existing policies and, in best cases, increase the current level of sustainability - improve our cities of tomorrow. This can only be achieved through coordinated intervention of both local and national decision-making levels.

Project website

www.wspgroup.fi/lt/propolis/

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
RATIN	Road and tyre interaction noise	EU	Environmental impact assessment
Project contact wk@ta.chalmers.se			
REVEAL	Remote Measurement of Vehicle Emissions at Low Cost	EU	Environmental impact assessment
Project contact richard.brook@sira.co.uk			
ROSAS	Research on silent aircraft concepts	EU	Mitigation measures
Project contact eric.maury@airbus.fr			
ROTRANOMO	Development of a microscopic road traffic noise model for the assess-ment of noise reduction measures	EU	Environmental impact assessment
Project contact henning.volkmar@volkswagen.de			
SAMARIS	Sustainable and Advanced Materials for Road Infrastructure	EU	Development of environment-friendly forms of transport
Project contact samaris.zag.si			
Save the North Sea (SNS)	A project targeting change of attitudes and behaviour towards marine litter in the North Sea	EU	Environmental impact assessment
Project website www.savethenorthsea.com			
SCATTER	Sprawling Cities And Transport: from Evaluation to Recommendations	EU	Development of environment-friendly forms of transport
Project website www.casa.ucl.ac.uk/scatter/			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

SCRAPPAGE — UK — Mitigation measures

Key findings

The key results of the project are as follows: derivation of 'core survival rates' for petrol cars (by engine size), diesel cars and Heavy Goods Vehicles (HGVs) (rigids and artics) all disaggregated by vintage; development of a model, based on the results of a stated preference survey, which shows how survival rates for petrol cars, diesel cars and HGVs of different ages vary in line with: vehicle excise duty; new car prices; depreciation rates/second hand car prices; fuel prices; scrappage scheme.

Policy implications

This project has determined the main factors that influence owners' decisions when they scrap cars and Heavy Goods Vehicles and will improve the existing method of predicting scrappage rates within the Vehicle Market Model (VMM). The results of the stated preference survey aimed at eliciting preferences from owners, insurers and dealers will help identify how an individual's decisions regarding car replacement may be influenced by Government policies such as the introduction of scrappage incentive schemes or graduated Vehicle Excise Duty. The project's outcomes will also improve modelling of the car fleet as well as allow more accurate modelling of various policy measures such as an accelerated scrappage scheme.

Project contact

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SCRAPTREAT — Thermal Treatment Of Scrap Tyres To Produce Re-Usable Carbon Black — EU — Environmental impact assessment

Project contact

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SILENCE(R) — Significantly lower community exposure to aircraft noise — EU — Mitigation measures

Project contact

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SILVIA — Sustainable Road Surfaces for Traffic Noise Control — EU — Environmental impact assessment

Project contact

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SMILE — Simulation methods of interior noise levels aerodynamically excited — EU — Environmental impact assessment

Project contact

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Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
SMOKERMEN	Smoke emissions reduction in marine engines	EU	Environmental impact assessment
Project contact gracimac@naval.ntua.gr			
SOURDINE II	Study of Optimisation Procedures for Decreasing the Impact of Noise around Airports II	EU	Environmental impact assessment
Project contact rgboer@nlr.nl			
SPACE-LIGHT	Whole space combustion for diesel light duty vehicles	EU	Environmental impact assessment
Project contact gerth@ifp.fr			
SPRITE	Separating the intensity of transport from economic growth	EU	Mitigation measures

Key findings

Seven illustrative measures stand out from the results as having proven potential (albeit not necessarily at a European scale) to influence transport intensity and/or unit environmental load whilst not having large detrimental effects on GDP. These are (in no particular order):

- Combined measures to change mobility-related attitudes and traffic behaviour;
- car sharing as part of combined mobility;
- controlled parking zones;
- urban road pricing;
- hydrogen fuel cell vehicles;
- high speed rail; and
- road pricing for freight traffic.

These are the areas where we believe the EU could currently most usefully focus its efforts in terms of decoupling. We have provided an estimate (albeit based on case study information which is not always as complete as we would like) of the scale of possible changes which might be realised given the implementation of a particular measure.

The EU needs to consider whether the measures suggested here are ones which could successfully be implemented as part of a policy to influence decoupling and whether there are issues of acceptability. Clearly it will be easier to implement measures such as green transport plans which are based around encouragement of people to change their behaviour, compared to measures which will force a change in behaviour through pricing or other means of control. Of course, ease of implementation does not imply effectiveness.

It is noticeable that many of the most promising measures in terms of their decoupling potential are likely to be the most difficult to implement as a result of high public discontent and resultant political wavering. It is worth noting that some of the measures considered which are not in the most promising list, for example tradable permits, appear to have potential to influence transport use, but there is a distinct lack of research to back this up. Such measures certainly have the potential to change the costs of driving and to influence vehicle kilometres.

The individual measures identified by the SPRITE consortium are illustrative measures, that is they are examples of different kinds of measures, but in most cases are by no means the only example of each

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

type. Each individual measure has some potential for reducing transport intensity, even in isolation. However, for their full impact to be recognised, they have to be incorporated into strategies of measures, which are both mutually supporting in the field for which they were designed and have beneficial, rather than adverse knock-on effects in the wider world.
There is a clear message which comes out of all of the aspects of the SPRITE project (review, questionnaires and panel sessions) that no one measure alone will make a significant difference, rather there is a need for an integrated approach. It is naturally more difficult to predict what the gross effects of different packages of measures may be and it is essential to consider the behavioural response to measures and packages of measures when planning their implementation.
It is important to recognise that some measures may need to be formed into packages to be fully effective, for example pricing may need to be supported by enhanced provision of alternatives in order to have the desired effect on mode choice, emissions and sustainability. Clearly there is potentially some additive benefit to be gained from packages of complementary measures or measures which affect different aspects of the transport system. Thus, a combination of pricing measures and measures to improve high speed rail systems is likely to have a greater impact than either one measure alone. Also the addition of Green Transport Plans (although of limited benefit alone) or other measures designed to influence attitudes, may be expected to further enhance the decoupling impact.

Policy implications

The seven areas listed above are the areas where we believe the EU could currently most usefully focus its efforts in terms of decoupling. We have provided an estimate (albeit based on case study information which is not always as complete as we would like) of the scale of possible changes which might be realised given the implementation of a particular measure.

Project website

www.its.leeds.ac.uk/projects/sprite/

STAIRRS	Strategies and Tools to Assess and Implement noise Reducing measures for Railway Systems	EU	Environmental impact assessment

Project contact

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STELLA	Sustainable Transport in Europe, and Links and Liaisons with America	EU	Environmental impact assessment

Project contact

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SYLOC-DEXA	System Level Optimisation and Control Tools for Diesel Exhaust After treatment	EU	Environmental impact assessment

Project contact

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Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
TRANSPLUS	Transport Planning, Land Use and Sustainability	EU	Development of environment-friendly forms of transport
Project website www.transplus.net			
TREBAWA	Treatment of ballast water	EU	Environmental impact assessment
Project website www.trebawa.de			
TURBONOISE CFD	Turbomachinery noise source CFD models for low noise aircraft engine designs	EU	Mitigation measures
Project contact brian.tester@rolls-royce.com			
ULEVEHD	Ultra Low Emission Hybrid Vehicle Development	EU	Environmental impact assessment
Project contact jens-peter.altendorf@volkswagen.de			
ULEV-TAP II	Ultra low emission vehicle - transport advanced propulsion II	EU	Environmental impact assessment
Project website www.ulev-tap.org			
UTOPIA	Urban Transport: Options for Propulsion Systems and Instruments for Analysis	EU	Development of environment-friendly forms of transport

Key findings

- An assessment of the most promising applications for cleaner vehicles and supporting measures, from a city perspective. This report assesses fuel options and applications for cleaner vehicles, and describes how best to introduce clean vehicles into cities using well-targeted demonstration projects backed by policy actions. It is illustrated by examples drawn from across Europe.
- Recommendations on policy actions at the European and national levels to promote or facilitate market introduction and demonstration. This report examines the potential benefits of cleaner vehicles, including the results of European-level modelling. It looks at government activities across Europe: programmes of pilot and demonstration projects, and supporting measures such as tax incentives, emissions standards and green procurement. Finally, it presents recommendations for: best practice in the design of programmes of pilot and demonstration projects; key supporting policies, which can make a major impact on the introduction of cleaner vehicles in European cities.
- A good practice guide to setting up and running pilot and demonstration projects, aimed at potential project champions. These guidelines cover the decision points and evaluation phases through the entire lifecycle of a demonstration project. Guidance is given on what to do and consider at each stage. This is supported by examples and good practice recommendations derived from a wide variety of European project experiences. The guidelines focus on urban applications of two-wheelers, cars, buses, vans and trucks.

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

- A software framework ('NAVIGATE UTOPIA') which provides information and assessment methodologies covering clean transport solutions. This is primarily to support people at the local level (such as city transport planners) in pre-screening options and building the arguments in favour of a local initiative. It is a user-friendly web-based tool. Within its structured framework, it provides a wide range of information, case studies and decision aids generated within the wider UTOPIA project. It also incorporates a multi-criteria tool for assessing the promising transport options for a specific city situation according to local policy objectives.

Policy implications

UTOPIA concluded that there is a need for alternative and renewable transport fuels. However, their current costs and other limitations in vehicle applications mean that market entry will typically be via particular niches such as urban buses. Supporting policies were evaluated: the most important policy measures are fiscal incentives. A distinction is needed between incentives to kick-start the market for individual fuels, and efficient incentives in the longer term that are not technology-specific (e.g. differential rates of fuel taxation based on relative environmental damage); demonstration projects have an important role in testing technologies, stimulating the market and raising consumer awareness; eco-labelling and green fleet certification schemes are important, especially where the label remains on the vehicle in everyday use; green procurement by Governments, whether voluntary or mandatory, can be significant in creating an initial market for new fuels and providing a signal to private consumers that these fuels are serious; standards for vehicles and fuels are important in creating a unified market and ensuring consumer confidence; low emission zones that allow city centre access only for clean vehicles, and Quality Contracts and Partnerships between local authorities and fleet operators, are new powerful tools for encouraging cleaner vehicles at a local level. Governments may need to provide the regulatory framework for their implementation and enforcement.

Project website

www.utopia-eu.com

VCR	Variable compression ratio for CO_2 reduction of gasoline engine	EU	Environmental impact assessment

Project contact

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VISPER	Vehicle integral simulation for pass-by noise reduction (an innovative step towards low noise traffic emissions)	EU	Environmental impact assessment

Project contact

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WINDY	Flow Induced Noise And Vibration Modelling In The Transportation Industry	EU	Environmental impact assessment

Project website (or contact)

none

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
–	Car-Free Households	CH	Development of environmental-friendly forms of transport

Key findings

Optimised development of public transport services and local services are the backbone of car-free mobility. At this time, the further development of Car-sharing is considered to be the most promising action. This action is highly efficient through concentrated competence, spreading coverage, improvements to the image of a car-free lifestyle, and high acceptability. It guarantees car-free households the ability to remain car-free and it will be a major incentive for car owners to give up their car. The establishment of associations would be an interesting action, but fraught with numerous uncertainties. Most indirect actions contribute to improved awareness about the existence of car-free households. With the exception of Car-sharing, which has been improving the general conditions for the spread of car-free households through its success in the market, no individual action on its own can provide satisfying results. Only a combination of actions will be successful. Every individual action contributes to the spreading of car-free households by a fraction of one per cent or, at best, by a few percent, and only if implemented over large areas and in a co-ordinated way. Indirect actions, in particular actions to improve the awareness about car-free households, develop their impact only in combination with each other. Successful implementation of such a cluster of actions should achieve significant success. Improved awareness is the key to creating acceptability for further action.

Policy implications

These considerations lead to the strategic approach illustrated in table S-8 below. Two parallel strands emerge from the mandatory preconditions of optimal public transport developments and optimal local services. On the one hand, all actions concerning technical traffic planning and mobility packages, which have already been integrated into the repertoire of traffic planning, are beginning to take effect. Promotion of slow traffic (bicycles and pedestrians), deceleration and reduction of motorised traffic, and improvements to residential areas, are well-established instruments and vital for the existence of car-free households. Further intensive development of Car-sharing is an ideal complement to these efforts – efforts that require consistent continuing application. On the other hand, awareness about the existence of car-free households needs to be improved significantly. Since competence for certain action areas is concentrated in large organisations or federal government authorities, they are suitable as stepping stones for a multitude of further individual actions, each of which, on its own, would have very little impact and could only prove successful if supported by improved and widespread awareness.

Project website

www.nfp41.ch

–	Combination of a traffic simulation model with an air emission simulation model	BE	Environmental impact assessment

Key findings

This project aimed to improve the evaluation and localisation of pollutants to reduce pollution. The combined model allows decision makers to assess impacts of proposed traffic changes in terms of traffic flows as well as pollution, since impacts on these two indicators may not always be in the same direction.

Policy implications

This project will enhance decision making as well as inform the development of more practical policy that can easily be implemented to successfully reduce the negative environmental impacts of air pollution.

Project website

193.191.208.76/belspo/home/publ/rappmobil_en.stm

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
–	Costs and benefits of nature and landscape conservation	CH	Environmental impact assessment

Key findings

A "tool for defining, assessing and comparing the costs and benefits of measures for preserving nature and landscape" has been produced. It is noted that the tool does not, and cannot produce mathematically accurate results since the subject precludes precise scientific operationalisation, but assessment criteria leave scope for interpretation to account for this.

Policy implications

It is likely that work such as this will lead to improved decision making, and ultimately improve the implementation of environmental policies.

Project website

www.nfp41.ch

–	Eco-friendly anti-fouling paints	EU	Environmental impact assessment

Project contact

Antonio Carlini; Orazio Brignola SpA, Via Giovanni XXIII 16, I-16018 Mignanego, Italy

–	Electric vehicles and new mobility concepts	CH	Development of environment-friendly forms of transport

Key findings

This project advocates electric vehicles in urban areas in the context of demand responsive "capillary" public transport, a car-sharing fleet, and integration with existing public transport.

Policy implications

Among the conclusions that may be drawn at the end of this research, it should be pointed out that the user must be able to count on continuity in the transit chain thanks to interchanges with the 'heavy' networks that constitute the true structure of public transport networks or with stations of vehicles available for free service. These vehicles available for free service should benefit from special measures aimed at ensuring their competitive use in relation to automobiles, such as: complementarity with the various public transport and road networks (according to the basic principle applied with Mobility); possibility of use for urban and suburban travel; preferential access in certain areas closed to automobile traffic; favourable parking conditions in the urban environment, in particular as far as rates and duration of authorised parking are concerned; any preferential tax/tariff measures (purchase of the vehicle, participation in maintenance expenses, taxes, vehicle tax).

Project website (or contact)

None

–	Emission reduction with improved transport efficiency	EU	Environmental impact assessment

Project contact

Christopher Cernes; Cernes and Associates Ltd., Randilow Farm, Checkley Lane, Wrinehill CW3 9DB, UK

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
–	Energetic and Environmental Assessment of Eurometro	CH	Development of environment-friendly forms of transport

Key findings

In the future, the rank of the issues energy demand, greenhouse gas emissions and their associated impact on climatic change caused by high-speed transport systems will increase. Therefore the optimisation of energy consumption and the corresponding power generation will be of growing importance.
The consumption of primary energy and the global warming potential of a Eurometro system, i.e. a high-speed transport system in a partial vacuum with magnetic driving forces, is expected to be significantly lower per passenger kilometre than with other transport systems operating in the distance range of about 300 to 1,000 kilometres (200 to 600 miles).
As a Eurometro system would be operated mainly with electric power, the method or the technology used for generating electricity is a major impact factor regarding the climatic and environmental efficiency. Therefore it should be considered accordingly for further optimisation of the overall system.
Other relevant issues are energy demand, potential impact on the climate and the general burden on the environment caused by tunnel construction and other infrastructure. Greenhouse gas emissions caused by the construction of infrastructure, for example, can reach a similar scale as those for the system's exploitation, assuming an operational life cycle of 100 years. Therefore, the issues of construction technology and the type of power generation and supply for the construction process should be investigated more extensively in future research studies.
The specific proportion of grey energy and of indirect burdens on the environment per passenger kilometre, depends strongly on the passenger demand and its development over the system's intended life cycle. Further investigations with regard to the demand for such transport systems will have to be a main focus of future research studies in this area.
Demand forecasts need to take into account not only general transport growth rates, but also other important factors such as migration effects from other high-speed transport systems and from slower transport systems (road, traditional rail transport), induced new traffic volumes, and potential special effects. Important factors in the development of the demand of HST-systems are travel fares and speed as well as integration into the existing network. Connected to the latter are the travelling times from door to door, the level of comfort and other factors such as environmental planning and social trends.
Other accompanying control measures, besides internalising external costs within the field of transport, have to be developed and evaluated. This is necessary in order to achieve the desired migration to a more energy-efficient and environment-friendly transport system as well as to limit induced new travel to an ecologically justifiable level.
Economic and financial aspects of constructing and operating a Eurometro system also influence the sustainability of a high-speed system very strongly. The present study only touched upon these aspects, which will therefore have to be the focus of future research work.

Policy implications

The step-by-step development of a Eurometro network between the major European population centres could become a kind of "backbone" of an energy-efficient and environment-friendly European high-speed transport system, having therefore the potential to last well into the future. In the foreseeable future, it could provide a transport system with state-of-the-art technology and speeds and travelling times comparable with air travel. Because of its high efficiency, safety and reliability it would provide noticeable progress with regard to ecological efficiency as well as short travelling times over distances up to 1,000 kilometres. It could close a "technological gap" between national and international ground-level railway systems with their limitations regarding speed and track design due to various factors on the one hand, and intra- and intercontinental air transport on the other hand.

Project website

www.nfp41.ch

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
–	Fuel-cell – Flywheel hybrid vehicle	EU	Environmental impact assessment
Project contact Colin Robinson; Pullman Transportation Projects Ltd., Carriage and Wagon Works Maindy Road, Cardiff CF24 4HQ, UK			
–	Hybrid Bus Powered by Fuel Cell and Flywheel	EU	Environmental impact assessment
Project contact John Parry; Parry People Movers Ltd., Overend Road, B64 7DD Cardley Heath, UK			
–	An Integrated Instrument to Evaluate Effects of Local Mobility Plans on Traffic Viability and The Environment	BE	Mitigation measures
Key findings A Belgium project concerned with developing an integrated instrument to evaluate effects of local mobility plans on traffic viability and the environment developed an instrument that assessed impacts on: • Accessibility, • Traffic viability, • Noise nuisance, • Air quality, • Mobility, • Crossability [ability to cross the road; severance], and • Road safety. Evaluation was possible at the district and street level using the tool, which made use of pollution dispersion models Policy implications This project is likely to improve decision making, and thus policy implementation at the district and local level with particular regard to social and equity of impacts related policy. Project website www.belspo.be			
–	Interactions Transport/Land-Use	CH	Mitigations measures
Key findings Regional planning and transport policies are very close linked. Both use space to a large degree, and both influence the type, the volume, and the location of usage. An analysis of constitutional principles already allows for conclusions about the importance and the opportunities of a co-ordinated regional planning and transport policy. As regional planning, in accordance with the Constitution of Switzerland, is the responsibility of the cantons, the Federal Government has very limited instruments for regional planning and for controlling transport. Therefore, transport-related regional planning takes place mainly on a small intra-regional level. Transport, on the other hand, plays a much more important role at the federal level. Here the conditions are favourable for a region-orientated transport policy, in particular with regard to the larger picture. These different scenarios call for a co-ordinating effort, or common objectives, for the Federal Govern-			

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

ment and the cantons. A first initiative for a common countrywide concept was undertaken within the framework of the 'General Transport Concept for Switzerland (GVK-CH) based on the modified regional planning guideline CK73. The failure of the first Regional Planning Act resulted in the lack of direct obligations for regional planning at a federal level, or these obligations were transferred to the cantonal planning authorities: the Federal Government limited itself to the preparation of concepts and factual plans. During the first generation of planning guidelines the linking of regional planning and transport policies was only moderately successful. Co-ordination was shifted closer to large projects such as NHT or Rail 2000 and therefore to the regional planning level. Within the framework of the second generation of guidelines, currently being prepared by the cantons, these two policy areas are to be linked more closely. Today the Federal Government, as well as the cantons, is better prepared for this as appropriate foundations have been worked on over the years. A critical evaluation indicated that neither the regional planning policy, nor the transport policy, have exhausted their common opportunities. The transport policy could only be employed with limited use for regional planning objectives. The transport system is understood as a 'necessary infrastructure'. One exception is its deployment as a balancing policy between areas. However, the transport policy also does not fully exploit the instruments of regional planning in order to strengthen its objectives. A review of the relevant EU documents reveals that this is not a situation applicable to Switzerland alone. Here, the promotion of infrastructure development for strengthening the cohesion between member states also receives high priority. The 'Principles of Regional Planning for Switzerland' meet, in all major points, the requirements of sustainable regional planning – with the exception of just one point it would seem: the issue of 'strengthening the countryside' requires a very differentiated perspective. However, practical implementation of these 'Principles of Regional Planning' is still in its infancy. A lot depends on the practical implementation. Meanwhile, there is much talk about 'strengthening the rural areas' and of 'improved networking with urban areas'. With attempts to be more precise, such phrases now seem to be questionable, as they have been understood up to now as descriptions of a rather haphazard settlement and job creation policy.

Policy implications

If one examined the challenges provided by a more sustainable transport system for the Regional Planning Policy, and by more sustainable regional planning for the Transport Policy, then the following can be stated from the perspective of this study and the results of NFP41: a) Challenges for the Regional Planning Policy: It must improve co-ordination to guide development initiatives to suitable areas, and develop criteria based on sustainability objectives for the design and funding of transport measures relevant for large areas. With regard to small areas, the Regional Planning Policy must establish standards and criteria so that regional planning can base the development of utilisation of soil on a more sustainable response to the growing demand for public transport (e.g. the dependence of new zones on public transport supply standards); the future deployment of telematics in particular must be based on clear criteria. The co-ordinating roles of federal/cantonal authorities, and cantonal authorities and communities, needs to be strengthened. b) Challenges for the Transport Policy: With regard to large areas, the design and funding of measures for transport must be determined increasingly in accordance with efforts for more sustainable regional planning (e.g. funding contributions for new public transport services to be based on a policy for more sustainable regional planning). With regard to small areas, criteria and standards have to be developed for how the design and funding of public transport services can be made increasingly dependent on a more sustainable settlement structure (funding contributions in relation to area usage). With regard to the authorities: concepts and factual plans need to be re-evaluated; projects and programmes need to be evaluated earlier with regard to their regional feasibility, and this also requires the development of a suitable instrument from the perspective of sustainable regional planning.

Project website

www.nfp41.ch

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			
–	Measures in transport to reduce CO_2 and tropospheric ozone	BE	Mitigation measures

Key findings

This project - solely concerned with atmospheric pollution - developed measures to decrease CO_2 and tropospheric ozone. The study considered existing and potential policy measures that fell within the framework of sustainable mobility policy. Measures were investigated for their effect in terms of reducing CO_2 and tropospheric ozone, and their technological, economic and social feasibility. The policy advice that arose from this project included:

- Use of travel demand management;
- separation of economic growth and travel demand – promotion of teleworking;
- prevention of induced traffic;
- use of technology – more environmentally friendly vehicles, inspection and maintenance programmes;
- behavioural measures to alter vehicle purchasing, driving style, and use of luxury accessories.

Policy implications

The project concluded that policy must be co-ordinated to avoid sending contradictory messages, at all EU, national, regional and local levels. Environmental interests should also be more integrated into policy and decision making.

Project website

193.191.208.76/belspo/home/publ/rappmobil_en.stm

–	Moteur Thermique Hybride Suralimenté	EU	Environmental impact assessment

Project contact

Fabien Rylko; Mecanique de Precision du Barrois, Rue des Prairies, F-55500 Ligny en Barrois, France

–	Optimised Recycling of End-of-Life Vehicles	EU	Environmental impact assessment

Project contact

Paul Fox; Automotive Recycling Ltd., Grovehill Road - Riverside House, Beverley HU17 0HJ, UK

–	Particle emissions	CH	Environmental impact assessment

Key findings

The Particle Emissions project aimed to quantify the contribution of road traffic to ambient air concentrations of PM10 and PM2.5 at four sites representing important air pollution scenarios. This work was motivated by the health impacts of PMs and the need to develop effective reduction scenarios. The key results were: urban and sub-urban models were successful, but at rural sites the receptor model used could not quantify traffic contributions to ambient air concentrations of PM10 and PM2.5 with sufficient reliability; differentiation between the contribution of light and heavy vehicles was possible; a new project looking at abrasion and re-suspension processes have evolved from the work; it was not possible to separate out the contribution of off road pollution, but the sites chosen were far enough away from sources (other than road sources) to give validity to the results.

Policy implications

Understanding of traffic contributions to ambient air concentrations of PMs will enable more accurate environmental impact assessments, and thus identification of areas in need to remedial or mitigation meas-

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

ures. Such knowledge will also contribute to the development of more appropriate policy and requirements in this area.

Project website

www.nfp41.ch/download/modulc/c4-kf-e.doc

–	Pedestrian and Cycle Traffic	CH	Development of environmentally friendly forms of transport

Key findings

Four factors argue for the promotion of pedestrian and cycle traffic: the promotion of pedestrian and cycle traffic offers significant opportunities: alternative transport, energy savings, protection of the environment, economic and health benefits; many efficient measures for the promotion of pedestrian and cycle traffic are available and awaiting implementation; land use and urban planning provide key instruments to secure or reintroduce settlement structures orientated at pedestrian and cycle traffic, the promotion of pedestrian and cycle traffic would especially benefit children, women, and elderly people.
On the other hand, there are many reasons and obstacles preventing or hindering adequate promotion of pedestrian and cycle traffic: biased recognition of everyday mobility and traffic problems; lack of funding mechanisms that are available to other traffic participants; insufficient institutionalisation of pedestrian and cyclist concerns in government bodies; inadequate distribution of tasks and responsibilities between different political levels.

Policy implications

Research in the area of pedestrian and cycle traffic can only become institutionalised if sufficient resources are made available to close the many research gaps in basic data, possible action, and strategy options.

Project website

www.nfp41.ch

–	Promotion of Pollution Control and Energy Saving by Use of Hybrid Power Systems	EU	Environmental impact assessment

Project contact

Nils Jaenig; Transport Technologie-Consult Karlsruhe GmbH (TTK), Gerwigstrasse 53, D-76131 Karlsruhe, Germany

–	Recreational Traffic – Analysis and Strategies	CH	Mitigation measures

Key findings

Strategies targeting sustainable recreational traffic should focus on the essential requirements of people in their leisure activities One can distinguish three levels of a sustainable policy for recreational traffic: Firstly, all approaches allowing for more sustainable forms of mobility should be considered, even those that in principle do not target recreational traffic but could make an effective contribution to it. These include the promotion of no-car families, the implementation of fair and effective pricing, more parking premises and the promotion of energy-efficient vehicles. Secondly, such a policy should make use of the political approaches that are already being implemented today, but account more stringently for the specific requirements of recreational traffic. These include strategic planning, spatial planning, infrastructure and transport policies as well as environmental and energy policy. Thirdly, new foci should be sought for with reference to recreational activities and traffic, for example by conducting specific analyses of recrea-

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

tional traffic or providing additional services and offers.

Policy implications

A sustainable strategy for recreational traffic requires that existing approaches be continuously developed and completed, and new approaches defined. When evaluating the impact of the individual elements one should keep in mind that what is most important is how individual measures work together. Generally one can say that a comprehensive implementation of the strategic elements presented here could well generate a qualitative leap that might launch recreational traffic on the path to sustainability.

Project website

www.nfp41.ch

–	Small hybrid city-car operated with biofuels or LPG	EU	Environmental impact assessment

Project contact

Dr. Lino Pasquali; Pasquali Macchine Agricole S.r.l., Fax: +39 055 8877746

–	Strain-, Age-, And Fatigue Resistant Environmental Coating – Options And Tests	EU	Environmental impact assessment

Project contact

Tommy Thoern; Composite Technology HB, c/o Färg i Väst, Klangfärgsgatan 8, 426 52 Vaestra Froelunda

–	Strategies for Sustainable Transport	CH	Mitigation measures

Key findings

This project aimed to present a coherent strategy for sustainable transport to be achieved by 2030/40. The key measures recommended by this research were: a CO_2 tax, temporary subsidies of renewable energy, equipping diesel vehicles with particle filters, taxation of noise emissions, equitable fiscal treatment of private and public transportation, enforcement of more restrictive prescriptions for economic land use by national, regional and local government.

Policy implications

This project will inform the development of policy concerned with overall sustainable transport strategies.

Project website

www.nfp41.ch

–	Study of determining factors for traffic induced vibrations in buildings	BE	Mitigation measures

Key findings

This work aimed to obtain more insight into the relevant physical phenomena, and the relative importance of determining factors related to traffic induced vibrations. The initial concern was solely with road traffic, but transferability, or further development of the work into other areas, particularly rail was highlighted, including development of a model for rail. Results support the development of a sustainable mobility policy. Recommendations included, limitation of gross vehicle weight, speed limits, and alternative design of

Theme: **Environmental Aspects**			Last update: **27 July 2006**
Acronym	Project title (in English)	Origin	Research sub-theme
Key findings / Policy implications / Project website or contact			

speed reduction infrastructure. The influence of the thickness of pavements was also investigated, and the work can be used to formulate guidelines regarding nuisance due to traffic induced vibrations.

Policy implications

The knowledge gained from this project will inform the development of policy designed to minimise and mitigate the negative impacts of traffic induced vibrations for road, rail and other transport contexts as the research is extended.

Project website

193.191.208.76/belspo/fedra/proj.asp?l=en&COD=MD/DD/19

–	Sustainability Assessment of Projects and Strategies	CH	Environmental impact assessment

Key findings

Achieving sustainable strategies and plans depends on the effectiveness of assessment instruments and their co-ordination. To this end, the following are needed: a co-ordination agency; synthesis and systematic structuring of criteria, plus on-going development of criteria; development of criteria in other policy areas, and co-ordination with transport criteria; equal consideration of economic and social criteria along side environmental criteria; greater awareness and understanding amongst all stakeholders including the general public to raise acceptability; appropriate revisions to legislation, regional and local strategy documents (guidance), feasibility studies and environmental impact assessment.

Policy implications

This project will inform both decision making and thus policy development for sustainable transport strategies and projects.

Project website

www.nfp41.ch/reports/projects/kf-c06.html

–	Transport Interchange	UK	Mitigation measures

Key findings

This project looked at ways to improve interchanges and their role in promoting seamless travel. The project concluded that more “informal interchanges” should be encouraged. Places involving interchange need to be “warm, with adequate shelter”, and provide passengers with sufficient information regarding services, fares and whether buses [or trains, trams, trolley buses etc] are running to schedule.

Policy implications

This project will inform the development of policy relating to integrated transport and seamless travel.

Project website

www.rmd.dft.gov.uk/project.asp?intProjectID=10561

–	Aircraft emissions and reduction technologies	EU	Mitigation measures

Project website (or contact)

None

Annex II: General information on the Transport Research Knowledge Centre and analysis process used

The Knowledge Centre's background

The EXTR@Web project – Exploitation of Transport Research Results via the Web – attempts to collect, structure, analyse and disseminate transport research results, covering not only EU supported but also nationally financed research in the European Research Area (ERA), as well as selected global transport RTD programmes and projects.

The EXTR@Web consortium has brought together eight main contractors to combine strong and in-depth technical knowledge of transport technology and of EU and national transport RTD programmes with solid communication and dissemination experience.

The current project's direct predecessor, EXTRA (a Fourth Framework Programme Transport RTD project), co-ordinated dissemination activities on the European level for the first time. While FP4 addressed transport research on a mode-by-mode basis, the current Fifth Framework Programme (FP5) focuses on generic themes that consequently reflect transport policy objectives.

The EXTR@Web project will provide support to research at European and national levels by building up and promoting an electronic hub. The key objectives are:

- To establish a comprehensive web-based Knowledge Centre, providing structured and timely access to both detailed and user-oriented summary information on transport research programmes and their results across Europe;
- to provide an electronic hub for inter-connecting European and national programmes and individual networks concerned with transport research into an easily navigable European network;
- to establish a common best practice scheme for the structure and content of the reporting of transport research results;
- to provide high-quality analytical outputs that are structured and tailored according to the type of stakeholder and medium; and
- to raise awareness of the new service, the implications of emerging results, and the wider opportunities under national research programmes across Europe as a whole.

EXTR@Web will provide a comprehensive pool of programme, project and results related information to users, principally in electronic format via the Internet. The approach is based on three main strokes of work covering:

- Monitoring, analysis and information preparation;
- website and electronic news service, the principal dissemination channels; and
- management of knowledge transfer, including dissemination by non-electronic means, and also the maintenance of a contact database and e-mail enquiry service and evaluation of the performance of EXTR@Web.

Definition of transport research

For inclusion into the Transport Research Knowledge Centre, Transport research programmes and projects have to be within the definition of research and transport simultaneously. This will define the eligibility of projects.

Definition of research

General OECD definition:
"Creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of humanity, culture and society, and the use of this stock of knowledge to devise new applications."

Additional transport research criteria:

- Targeted – in line with transport policy aims, strategies and processes to solve the inherent problems for society.
- Accessible – a public activity, open to scrutiny by peers.
- Transferable – useful beyond the specific research project, applicable in principle to other researchers and research contexts as well as decision-makers in policy, industry and science.

Definition of transport

In order to clarify expectations from the Transport Research Knowledge Centre, and to ensure a common understanding of important terms, the Programme Analysis Group of EXTR@Web has come up with the following definition of transport.

- Transport is the means by which a person or material of any kind is passed from its origin to its destination.
- Transport comprises:
  - the transport users: passenger, business, freight;
  - the transport vehicles (full life cycle issues);
  - the transport infrastructure (full life cycle issues);
  - the transport system: the interaction of users, vehicles and infrastructure;
  - the impacts of transport: contribution to objectives, and hence to overall sustainability; and
  - the transport tools: methods and instruments to help ensure an effective contribution to the objectives.

Three levels of analysis

Project level analysis

For European, national and international projects the following harmonized process was agreed:

- For each eligible project, the project co-ordinator will be requested to draft a Project Profile;
- the EXTR@Web consortium identifies, for each project all relevant themes (typically up to five), and provides the project linkage;
- for each eligible project, the project co-ordinator will be requested to draft the other elements of the reporting scheme – Progress Summary and Result Summary – due to the project progress and provides the final report;
- projects with highest relevance and best available final results will be selected for analysis;
- for every such relevant theme within each project a short and concise paragraph – structured with bullet points as appropriate – will be written to present the key findings of the project in relation to the objectives of the theme; and
- this information will be searchable on the Knowledge Centre website.

Thematic analysis

The thematic analysis has been exploiting existing project level analysis. The consolidated project wise findings have been structured and analysed along 30 themes, which are fixed for the project life time and fed into annual Thematic Research Summaries and Annual Compendia. However, for reporting purposes Thematic Research Summaries have been limited to 28 volumes (cf. Chapter 1).
The sequence of outputs has been comprising an explanation of the overall structure, and regular reports treating national, European and international research in a comprehensive way.

Deliverable number	Title	Release date (final version)
D2.A	"Thematic structure and definitions – all themes"	August 2006
D2.B	"European, national and international project database"	July 2006
D2.C	"First annual thematic research summary"; 30 vol.	December 2004
D2.D	"Second annual thematic research summary"; 10 vol.	March 2006
D2.E	**"Third annual thematic research summary"; 28 vol.**	**August 2006**

Table: The sequence of deliverables

Policy level analysis

Whilst the 30 themes are fixed, this type of analysis should give the flexibility to provide information on ad hoc policy priorities. Hence, policy level analysis will synthesize key findings of projects across combinations of themes. As an output, policy brochures shall be prepared depending on ad hoc requirements by DG TREN or by the high-level Advisory Group (AG).

Annex III: Editorial team for Thematic Research Summaries

Please note that – in principle – all EXTR@Web partners and sub-contractors will be contributing to a particular Thematic Research Summary because all project level findings that are of some relevance to one of the 28 (30) individual themes are presented in the comprehensive format of these papers.
The following summary of authors and peer reviewers is presented in alphabetical order while the main author of this paper is given on page i of the document.

Fabien Dreveton, ISIS; France
Mr Dreveton has an electrical engineering post-MSc degree, an MBA and over 8 years experience in Intelligent Transport Systems for road transport. He has been a senior engineer with ISIS since 2001, specialising in traffic control, motorway management, ITS standards development process and system architecture.
Co-author: Road Transport

Prof J Augusto Felício, Neptune – CEGE/ISEG; Portugal
Professor Felício, holding a PhD in management, is teaching graduate and post-graduate courses such as 'Maritime transport and port management' and 'Land transport and logistic management' at ISEG, School of Economics and Management (Technical University of Lisbon). His activities include participation in transport research where he has published several related articles and books.
Main author: Waterborne Transport, Intelligent Transport Systems
Peer review: Efficiency, Vehicle Technology

Dr Paul E Firmin, Institute for Transport Studies, University of Leeds (ITS); UK
Dr Firmin has 30 years of experience in transport planning and engineering, including local authority, consultancy and academia. His research specialities are: traffic management, transport survey design & analysis, traveller information systems; driver route choice behaviour and transport telematics. He is currently the MSc(Eng) degree programme leader and international student adviser at ITS, University of Leeds. He teaches computing skills and traffic management, and supervises student dissertation projects.
Main author: Information and Awareness
Peer review: Safety and Security

Dr Nils Gendner, Neptune – University of Bremen, ISL; Germany
Dr Gendner has been working for more than four years at the University of Bremen, Institute of Shipping Economics and Logistics. His main topics include the analysis of processes, functions and data flows in shipping and within the rail sector. He contributes to ongoing efforts in intermodality by participating in several projects dealing with intermodal concepts and developments.
Main author: Intermodal Transport, Integration
Peer review: Financing Tools, Pricing and Taxation

Wolfgang Helmreich, Industrieanlagen-Betriebsgesellschaft mbH (IABG); Germany
Mr Helmreich is a civil engineer from the Technical University of Munich. He has more than 15 years experience with transport planning and infrastructure design in the rail, road and air sector, and sound knowledge of vehicle technologies. His expertise also includes project management, web publishing and dissemination skills. He joined IABG in 1999 as a senior transport consultant after working as project manager at several German engineering companies. He is principal editor of all Thematic Research Summaries.

Main author: Air Transport, User Aspects, Safety and Security
Peer review: Regional Transport, Rail Transport, Waterborne Transport, Environmental Aspects, Land Use Planning

Cristina I Ivan, Group of Independent Experts Ltd (GIE); Romania
Ms Ivan has a law degree and has graduated a Master course in project management. Ever since 1998 she has participated in various projects financed by international donors in Romania. The main areas of her expertise cover: project management, legal approximation of the EU acquis & drafting of environmental legislation, as well as the carrying out of awareness raising and dissemination activities, including those for the transport sector.

Main author: EU Accession Issues
Peer review: Economic Aspects, User Aspects, Transport Management

Dr Ann Jopson, Institute for Transport Studies, University of Leeds (ITS); UK
Dr Jopson is a Research Fellow whose main interests and expertise lie in the areas of travel behaviour psychology, transport marketing and urban transport planning and policy, with particular emphasis on travel demand management through attitudinal and behavioural measures. Her PhD thesis was based on the role of psychology in reducing car use.

Main author: Environmental Aspects
Peer review: Rural Transport

Dimitris Koryzis, Systema; Greece
Mr Koryzis is a production & management engineer from the Technical University of Crete and holds an MSc in Decision Sciences from Athens University of Economics & Business. He has more than 8 years experience as technical and managerial consultant for 30 European programmes in the transport sector (road, maritime and intermodal) as well as in research and innovation technology EC projects.

Co-author: Pricing, Taxation and Financing Tools
Peer review: Integration

Ulrich Leiss, Industrieanlagen-Betriebsgesellschaft mbH (IABG); Germany
Mr Leiss is an aerospace engineer from the Technical University of Munich. His professional career includes 24 years experience with research, technical analyses, monitoring and managing national and European projects and programmes. These activities cover the areas aerospace, transport, energy and new technologies.

Main author: Other Modes, Vehicle Technology

Bryan Matthews, Institute for Transport Studies, University of Leeds (ITS); UK
Mr Matthews has 9 years experience of transport research and project management in both consultancy and university settings. His research expertise is in transport policy analysis and transport economics. He has worked on a number of EU, UK DfT and Research Council projects. He also contributes to teaching activities, lecturing on Air Transport Systems and supervising student projects.

Main author: Rail Transport
Peer review: Air Transport

Prof Anthony D May, Institute for Transport Studies, University of Leeds (ITS); UK
Professor May has over 35 years' experience in transport planning and traffic engineering. He has been a professor at Leeds since 1977, and has served as Head of the Department of Civil Engineering, Dean of the Faculty of Engineering, Pro-Vice Chancellor for Research and Director of the Institute for Transport Studies. He also has practical experience with the MVA consultancy and the GLC in London. His research specialities include: land use planning, traffic management, road pricing, sustainable urban transport, integrated transport and environmental impacts of transport.

Supervision of entire process of thematic reviews

Batool Menaz, Institute for Transport Studies, University of Leeds (ITS); UK
Ms Menaz is a transport economist from the University of Leeds. She has been involved in a number of various projects including research into transport pricing reform issues in air, road and rail for the IMPRINT-Europe thematic network project, and research for the UK Rail Research Centre looking at the alternative visions for the future of the British rail system.

Main author: *Regulation/Deregulation*
Co-author: *Passenger Transport, Equity and Accessibility, Land Use Planning*
Peer review: *Road Transport*

Christina Paschalidou, Systema; Greece
Ms Paschalidou is a transportation engineer from Aristotle University (Thessaloniki), with a MSc in Urban and Regional Transport from Laboratory of Transport Economics in Lyon. Her field of interest is transport planning and engineering, EU and national transport policies, sustainability issues and research. She joined Systema in 2005, while her previous experience includes an internship in ISIS, traffic studies elaborated individually and research activities in the Aristotle University.

Main author: *Transport Management*
Peer review: *Information and Awareness*

Ignacio Rada Cotera, Neptune – IkerConsulting; Spain
Mr Rada Cotera is a lawyer from Deusto University in Bilbao, holding a diploma and certificate of European studies from Deusto and Saarland Universities, respectively. He has been working on EU projects since 2000. His main expertise is European commercial and regional policy, maritime transport and port affairs, legal aspects of international economic relations, urban planning, regional benchmarking and development.

Main author: *Regional Transport*

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Mr Salucci holds a degree in mechanical engineering from the University of Rome “La Sapienza”. His past research experience has focused on computer modelling of the operations of freight terminals and automatic passenger transport systems, the latter being carried out within EC funded research projects. His current research for a doctorate is in the area of transhipment and information and communication technologies for intermodal freight transport.

Co-author: *Freight Transport, Urban Transport, Rural Transport, Efficiency, Decision-support Tools*
Peer review: *Intermodal Transport*

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Dr Seidel has graduated as economist and holds a PhD from the University of Bremen. He has been working on EU projects since 1988. His main expertise is in European industrial and regional policy, telecommunication research projects, maritime transport and port affairs, evaluation of technical aid, urban planning, regional benchmarking development.

Co-author: *Regional Transport*

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Co-author: *Freight Transport, Urban Transport, Rural Transport, Economic Aspects, Infrastructure Provision, Pricing, Taxation and Financing Tools*
Peer review: *EU Accession Issues, Intelligent Transport Systems, Regulation/ Deregulation*

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Mr Stantchev holds a degree in Economics and Trade from Varna University of Economics in Bulgaria and an MA in Political Science from the Central European University in Hungary. His early research experience was in the area of small business development in transitional economies of Central and Eastern Europe. Damian has also contributed to an extensive report on the role of the logistics and transportation sector in society for the Logistics & Transportation Corporate Citizenship Initiative of the World Economic Forum. His research for a doctorate examines the role of logistics in enhancing the competitiveness of the regional economy and encompasses all aspects of original research and data collection including the design, conduct and analyses of large scale surveys as well as the collection of commercial data and development of case studies.

Main author: *Passenger Transport, Land Use Planning, Equity and Accessibility*
Peer review: *Freight Transport*

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Mr Winder is a transport planner with a BSc in transport management (Aston University, England) and over 15 years experience in consultancies and public transport authorities covering transport planning and policy, particularly at UK, French and Europe-wide levels. Since 1998 he has been a senior engineer at ISIS, responsible for a wide range of European projects focusing primarily on Trans-European Networks, ITS for road traffic management, urban and regional public transport and EU enlargement aspects.

Main author: *Road Transport*
Peer review: *Passenger Transport, Urban Transport, Other Modes, Equity and Accessibility, Infrastructure Provision*

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Ard Wolthuis graduated in Science & Innovation Management, in the field of Transport and Mobility, from the University of Utrecht. He has been involved in transport projects and analysed socio-economic, environmental, political and legal aspects, such as the Phileas project, the Fokker bankruptcy, and innovation policy of companies in the Netherlands. Has participated in a European project on innovation in urban public transport systems. Since spring 2005 has joined DITS as a research fellow. His main areas of activities are policy analysis and dissemination of research results.
Co-author: Efficiency, Decision-support Tools

Dr Zhaomin Zhang, ANAST – University of Liege, Neptune; Belgium
Dr Zhang has got the university degrees of Civil Engineering, Mechanical and Marine Engineering; Master of Transportation Sciences and Doctor of Philosophy. He is a senior engineer and led the important projects related to the "Establishment of a mathematical traffic model on the Belgian waterway network" (Belgian national research program "Transport and mobility"), the project called "On computerisation and management in real-time of operations relating to the exploitation of fluvial traffic to organise the waterway transport", Belgian Regional Ministry of Public Works) and the Project related to the development of a transport cost model in the inland navigation sector. He has also been involved in numerous simulation and operation research activities.
Peer review: Decision-support Tools