ASSIST

Assessing the social and economic impacts of past and future sustainable transport policy in Europe

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Assessment of the Social and Economic Impacts of Transport Policy Measures

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ASSIST

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Abbreviations

FP7	7th RTD Framework Programme for Research and Technological Development
ADAS	Advanced Driver Assistance System
ANS	Air Navigation Services
ASSIST	Assessing the social and economic impacts of past and future sustainable transport policy in Europe
ASTRA	Assessment of transport strategies
ATM	Air Traffic Management
B2A	Business-to- Administration
B2B	Business-to-Business
BRIC	Brazil, Russia, India, China
CCS	Cargo Community Systems
EASA	European Aviation Safety Agency
EC	European Commission
ERA	European Railway Agency
ERSAP	European Road Safety Action Programme
ERTMS	European Rail Traffic Management System
ETA	Estimated Time of Arrival
ETCS	European Train Control System
ETP	European Transport Policy
FAB	Functional Airspace Blocks
FDI	Foreign Direct Investment
GHG	Greenhouse Gas
GSM-R	Global System for Mobile - Railway
ICT	Information and Communication Technology
ITS	Intelligent Transport System

ILO	International Labour Organisation
IWW	Inland waterways transport
LCV	Light Commercial Vehicle
LEZ	Low Emission Zone
MLC	Maritime Labour Convention
NCC	National Competitiveness Council
NSW	National Single Window
OPS	Onshore Power Supply
P&R	Park and Ride
PCS	Port Community Systems
PM	Particulate Matter
PSW	Port Single Window
RIS	River Information System
RSAP	Road Safety Action Programme
RTD	Research and Technological Development
RTTI	Real–Time Traffic Information
SDH	Synchronous Digital Hierarchy
SES	Single European Sky
SME	Small and Medium sized Enterprises
SPC	Single Point of Contact
SSN	SafeSeaNet
STCW	Standards for Training, Certification and Watchkeeping
TAF	Telematic Applications for Rail Freight
TEN-T	Trans European Network - Transport
TPM	Transport Policy Measure
WEF	World Economic Forum
WP	Work Package
V2I	Vehicle to Infrastructure

VTMIS	Vessel Traffic Management and Information Systems

Executive Summary

Introduction to the ASSIST project

The ASSIST project (Assessing the social and economic impacts of past and future sustainable transport policy in Europe) is funded by the European Commission (EC) as part of the 7th Framework Programme for Research and Technological Development (FP7). The European Union set up this framework programme to target its overall objectives in terms of increased growth and jobs. Under these premises, ASSIST aims to achieve the objectives of the FP7 transport themes by developing more integrated, greener and smarter transport systems, which will benefit society as a whole.

The project was launched in April 2011 and runs for 2 years. It aims to provide the European Commission with information and advice concerning the social, economic and environmental impacts of sustainable transport policies and measures applied in the EU Member States or other countries in the past, or likely to be applied in future. The results should reveal whether these policies are in line with the strategic objectives of the EU.

ASSIST aims to enhance one “product” and establish another:

- First, to enhance the **ASTRA-EC model,** a tool for assessing the social and economic impacts of transport policy. This tool is based on the ASTRA model[1] (ASTRA = Assessment of Transport Strategies), which has been applied successfully in different European policy studies.
- Second, the project findings about the impacts of transport policy measures (TPMs) will be communicated to a large community of policymakers and experts in the EU and its Member States in the **Handbook of Social and Economic Impacts of Sustainable Transport Policy**.

This report describes the potential social, economic and environmental impacts of transport policy measures (TPMs) in a qualitative, and if possible, quantitative manner. The report contains the following elements:

- Overview of the main social and economic impacts of European TPMs. This includes environmental impacts as well, if these have a social and economic dimension.

1 http://www.astra-model.eu/

- Assessment of the impacts of transport policies regarding their influence on the competitiveness of the European transport system and economy, showing their various spatial and sectoral implications.
- Provision of a basis for validating the ASTRA-EC model by quantifying TPM impacts as far as possible. This quantification helps to improve and enhance the ASTRA-EC model, which has been derived from the earlier and frequently applied ASTRA model. The assessment of the social and economic impacts needs to deliver valid and reliable values for the model to be robust.
- Input for the Handbook of Social and Economic Impacts of Sustainable Transport Policy to support the assessment of the social and economic impacts of sustainable transport policies. This handbook will include a TPM analysis of past effects and future developments to help policymakers, administrations and scientists conduct ex-ante assessments.

The report's objective is to provide the EU with sound policy advice on the potential social and economic impacts of sustainable transport policies. It is addressed to policymakers and the interested public and aims to indicate relevant transport policies and outline their impacts. Thus it should be used as a basis for further and more detailed research and not as a substitute for an individual policy assessment.

In general, the second work-package and the report D2.1 provide a chapter which concludes the impact findings of the most important transport European policy measures and their social, economic or ecological effects. The D2.1 does not provide general or even surveying conclusions at any part - in contrast, the work intends to support the handbook and its synthesis. Hence, the synthesis should be considered as the crucial outcome of the assessment of TPM's and its impacts.

TPM categories, allocation and selection

In order to align the ASSIST impact assessment with the White Paper on Transport, the structure and terminology of the White Paper Impact Assessment (EC (2011b)) has been largely adopted to allocate the relevant transport policy measures. Accordingly, and based on Maurer et al. 2012, eight categories are defined. These categories are further divided into 41 subcategories, which aim to depict the whole bandwidth of European, national and local transport policy areas.

The eight categories are:

1. Pricing
2. Taxation
3. Infrastructure
4. Internal market

5. Standards and flanking measures
6. Transport planning
7. Research and innovation
8. Others

Measures in the first two categories are designed to influence the demand for transport services and transport infrastructure. The subsequent categories 3 - 7 target the improvement of the supply side of the transport system. In comparison to the White Paper, the scope of the fifth category (efficiency standards) has been expanded slightly by omitting the term “efficiency” because of the diversity of TPMs.

‘Research and innovation’ is not directly comparable with the previous categories in the list as it stands for the fundamental development of transport measures. The final category (‘Others’) subsumes a few TPMs which are not assignable to any of the previous categories.

Selecting TPMs for the impact assessment was based on the requirement that each subcategory must be represented by at least one TPM with the potential to contribute to the main objectives as defined in the White Paper. However, as the work progressed, it became obvious that TPMs often relate to more than one subcategory and can be allocated to different subcategories or even to other categories.

In the end, a “long list” of approximately 180 individual TPMs was compiled from the extensive list of transport measures collected in the first work package. The final selection of TPMs was based on applying a set of criteria (e.g. present political relevance (“hot topic”), spatial level of application, future political relevance etc.) in close cooperation with the EC. These criteria were used to trim the list to the 61 most relevant European transport policy measures.

Impact assessment

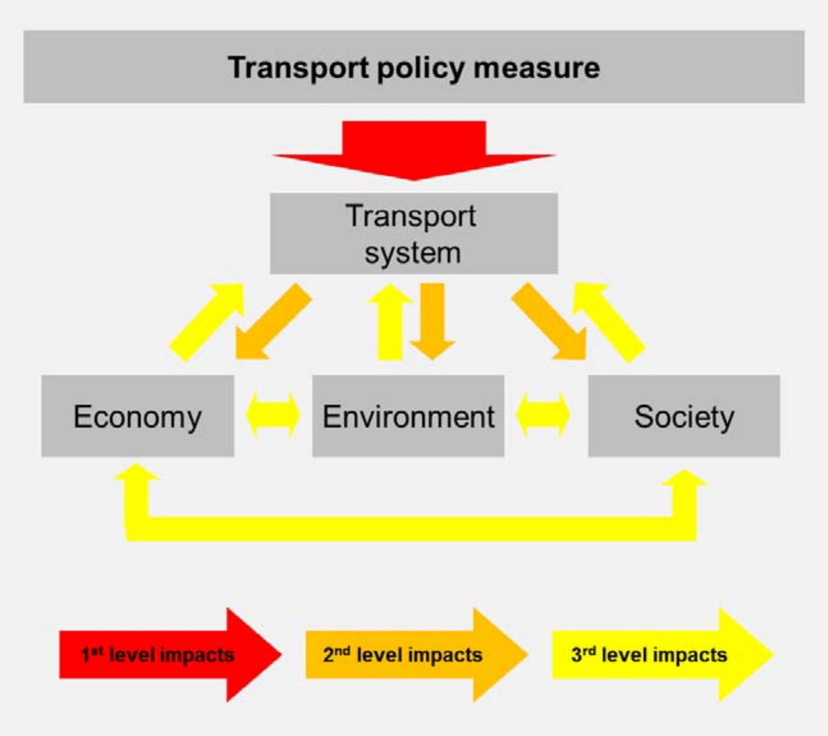
Impact assessment is used to identify and analyse the effects and consequences of policies (or projects or programmes) in order to ensure that such measures are:

- economically sound (viable),
- environmentally sustainable, and
- socially equitable.

The ASSIST team developed a “**fact sheet”** to structure and allocate the impacts of the different transport policy measures in a comparable and comprehensive way. The fact sheet summarises the assessment results (quantitatively / qualitatively and compliance with the European policy objectives) of the individual TPMs in a condensed and standardised format.

The subsequent figure illustrates the impact assessment approach within the ASSIST project:

Figure 0-1: Interdependencies of the transport system, the economy, the environment and society



Source: ProgTrans

Implementing a transport policy measure has multiple effects and consequences (impacts) for different "user" segments (passengers, operators, economy, society etc., cf. 3.3.2) and sections (transport system, economy, environment, society). However, it is expected that all the different types of measures (e.g. infrastructure developments, traffic regulations, fiscal regulations, new vehicles etc.) will first affect the **transport system**, e.g. by changing user travel times and costs, influencing trip origins / destinations, mode and route choice and finally the traffic conditions (1st level impacts).

At a subsequent stage (2nd level impacts), changes then mainly emanate from the transport system and (subsequent exemplary positive) influence the **economy** (e.g. due to less congestion, reduced travelling times for transport users and clients, changing transport costs for individuals and firms, improved accessibility for more advantageous location choice for production and commerce), the **environment** (e.g.

fewer accidents, reduced air pollution and noise) and **society** (e.g. due to better health conditions, more acceptable working conditions in transport, easier access to vehicles, better development potentialities of surrounding areas) with no straight or decisive sequence.

The next impact level (3rd level impacts) describes the impacts on all four sections (the transport system, the economy, the environment and society), irrespective of the direction or kind of action. Hence it is also possible for there to be repercussions on the transport system.

Competitiveness analysis

Greater attention has been paid to competitiveness over the past two decades due to the limitations and challenges posed by globalisation. The EC has also focused more on this issue and has implemented policies to increase competitiveness, both within Europe and between the EU and the rest of the world. A good transport system is essential to increase competitiveness. Competitiveness can be viewed on different levels. We chose the spatial and sectoral levels. The spatial level covers the main macro-economic aspects of competitiveness at a regional, national or international level. The sectoral level mainly concerns the micro level, addressing competition between firms or clusters of firms.

We refer to the definition of competitiveness given by the EC:

‘When identifying economic impacts, particular attention should be paid to factors that are widely considered as being important to productivity, and hence to the competitiveness of the EU. Competitiveness is a measure of an economy’s ability to provide its population with high and rising standards of living and high rates of employment on a sustainable basis. Vigorous competition in a supportive business environment is a key driver of productivity growth and competitiveness.’ [EC (2012a), p. 4].

This broad definition covers both **spatial** and **sectoral competitiveness**:

- **Spatial competitiveness** refers to competitiveness on a geographical level like a municipality, region or nation.
- **Sectoral competitiveness** relates to the competitiveness between firms in different sectors like agriculture or industry.

In both cases, competitiveness aims to increase productivity. Obviously, this analysis does not claim to present a comprehensive definition or measurement of competitiveness, but it does try to link the concept of spatial and sectoral competitiveness to the transport system, transport policy and the impacts of transport policy measures.

Spatial competitiveness concerns the improvement of employment and productivity on a certain geographical level, such as a region or a nation. The changes in employment and productivity are benchmarked against other regions or nations. Productivity is dependent upon different factors, such as research and development or foreign direct investments. For a region or nation, good accessibility is a precondition to stimulating employment or economic growth.

Concerning **spatial competitiveness**, we looked at the impact of categories of TPMs on an area's accessibility. In the transport system, we looked at key variables such as travelling time, distance or costs. A change in any of these variables will bring about a change in accessibility.

The most important TPMs influencing transport costs and hence the accessibility of certain regions are in the categories 'Pricing' and 'Taxation'. Consequently, these TPMs will be considered in the spatial competitiveness analysis. Supply measures such as infrastructure and internal market are also relevant as they usually have a positive effect on accessibility, thus increasing competitiveness in terms of economic growth, productivity and employment. However, some distributional effects may occur as well.

Research and innovation do not lead directly to improved accessibility. However, increasing research and innovation improves the employment situation of this sector. Also, top level research is able to increase the positive public image of a region or nation.

The TPM category 'Other' encompasses very diverse types of measures and their impacts on accessibility can be positive or negative.

Sectoral competitiveness is closely linked with productivity and its fundamental determinants include qualitative and quantitative changes of inputs and technological improvements as well as unit labour costs and price / quality competitiveness. Two different types of sectoral competitiveness have been defined.

'Intra-sectoral' changes of competitiveness deal with the structural (modal) shifts within the transportation sector which imply changes concerning the competitiveness of transport operations. If possible, the competitiveness changes influenced by the individual transport policy measure will be explained using the modifications to the variables in terms of cost, time and level of service (reliability, frequency etc.).

The ‘inter-sectoral’ level identifies direct and indirect impacts of measures on the competitive preconditions for clustered economic sectors (and services) on a broader scale.

In a holistic consideration of measures and their impacts on competitive aspects, it becomes obvious that positive effects prevail with respect to the general European policy objectives. Although negative intra- and inter-sectoral impacts and effects appear, they do not seriously influence the competitiveness of transport operators and economic sectors.

Secondly, generally it can be stated that transport policy measures affect “intra-sectoral” aspects much more than “inter-sectoral” competitiveness.

Furthermore, the analysis revealed that some intra-sectoral transport operators are much more affected by TPMs than others; mostly road and rail transport service suppliers. This is clearly caused by the type (recipient) of measures, which constitute the different categories and its areas of application.

It is evident that the competitiveness analysis is a first attempt to provide insights into the impacts of TPMs. It makes no claims to be complete; further, measure-specific assessments focussing on competitiveness are required, preferably supported by additional quantitative investigations or surveys.

Conclusions

This report identifies relevant transport policy measures and allocates them to categories and subcategories. The conducted impact assessments reveal that the impacts depend strongly on the type of measure involved.

This means that the impact extent of individual TPMs is inevitably related to the geographical area of implementation, the measure’s individual design (e.g. measures within the same category do not necessarily have the same design) and the scale/support of measure (financially, politically, spatially etc.). Hence, the assessment results and their use in the ASTRA–EC model as well as in the handbook are general in nature.

The TPM impact assessments yielded comprehensive, reliable and valuable results regarding impacts on the transport system as well as downstream economic, social and environmental impacts. Most impacts have been described qualitatively, some quantitatively. Only very few measures had effects on specific social groups, which do mostly different concern income groups.

Considering the overall result of the impact assessments, it is obvious that positive effects prevail with respect to the European policy objectives.

The assessment showed overall positive impacts on the economic level. Most TPMs promote an efficient and sustainable transport system, which in turn leads to lower transport costs and thus increases productivity. Regarding their economic responsiveness (in the sense of being influenced), the most frequently affected segments are the transport operators, with distinctly positive impacts exerted by the majority of policy measures. Transport costs, sectoral competitiveness and revenues in the transport sector are the most frequently addressed economic impact fields.

In social terms, the impact assessment reveals that mostly infrastructure measures have positive effects, with regard to 'safety' and 'health'.

The impacts on the environment are even more beneficial and are positively related to society; almost 95% of impacts are environmentally beneficial and thus also benefit society in a broader sense. The impact fields most (positively) influenced by policy measures concern air pollutants and noise emissions, which are also directly positive for the societal environment.

1 Introduction

1.1 Background and objectives of the ASSIST Project

The mainstream policy strategy of the European Union (EU) targeting the years 2030 and 2050 considers its overriding objective to be the establishment of a sustainable but competitive social market economy. A greener and smarter economy is to be developed based on the key drivers of innovation, more efficient resource usage, knowledge-based value growth and last, but not least, the inclusion of all different social groups into society.

In this context the European Transport Policy (ETP) takes its direction from these general objectives. Therefore, in the new EU Transport White Paper 'Roadmap to a single European Transport Area – Towards a Competitive and Resource Efficient Transport System', the ETP describes its overall aim as establishing a transport system which meets society's economic, social and environmental needs in a way which is conducive to an inclusive society within a fully integrated and competitive Europe. To achieve this aim, a long list of initiatives is given which could be implemented in the next few decades.

In addition, EU climate policy has become increasingly important over the past few years and focuses on limiting climate change by setting CO_2 emission reduction targets. ETP also has to contribute to these goals, since climate policy is considered as an essential strategic objective of the European Union.

Due to these developments and the future challenges faced by the EU, a sustainable transport policy will have two goals: On the one hand, it should aim at improving the efficiency and competitiveness of the transport system. On the other hand, a sustainable policy has to foster the deployment of innovative and alternative technologies to promote de-carbonisation of the transport system.

The ASSIST (Assessing the social and economic impacts of past and future sustainable transport policy in Europe) project, funded by the European Commission (EC) as part of the 7th Framework Programme for Research and Technological Development, targets the EU objectives to develop integrated, greener and smarter transport systems.

The main objective of ASSIST is to provide the EU with sound policy advice on the potential social and economic impacts of future sustainable transport policies and measures (TPM), which have to be in line with and pursue the strategic objectives of the EU as described above.

This overall objective will be achieved by accomplishing the different aims and tasks described below:

- An assessment and analysis of the social and economic impacts of 'traditional' TPMs already applied in the EU, specific Member States or other developed countries. Based on empirical as well as desk research, this element forms a main component shaping the policy advice.
- The consideration of future challenges which constitute significant trend breaks and are expected to occur within the next 20 years. This involves analysing the impacts of the challenges (e.g. peak oil, e-mobility) and assessing these impacts compared with the "traditional" TPMs' social and economic impacts.
- Further development of the ASTRA (Assessment of transport strategies) model[2] to the ASTRA-EC model, a powerful tool for assessing the medium- and long-term social and economic impacts of transport policies. Upon completion of the project, the ASTRA–EC model will be handed over to the EC. It complements the existing inventory of models including the European network transport model TRANSTOOLS, and the TREMOVE model which handles fleet development, energy consumption and GHG emissions. ASTRA-EC will fill the gaps between these other two models and completes the whole range of tools for the impact assessment of transport measures.
- Establish communication with stakeholders from the EC about the findings of TPM assessments and use of the ASTRA-EC model.
- Compile and publish a handbook of the social and economic impacts of sustainable transport policies which should be available to a large user community of policymakers and experts from the EC and Member States.

In this way, ASSIST aims to achieve the objectives of the FP7 transport themes by developing more integrated, greener and smarter transport systems, from which, in turn, the whole of society stands to benefit.

2 http://www.astra-model.eu/

1.2 Background and objectives of Work Package 2 of the ASSIST project

Within ASSIST, **Work Package 2** (WP2) targets the identification of potential social, economic and environmental impacts of transport policy measures which are based on sustainability criteria. The work package is partly based on the analysis of TPMs in WP1 and should produce the following output:

- Overview of the main social and economic impacts of European TPMs. This also includes environmental impacts as long as these have a social dimension.
- Quantification of the impacts on different spatial levels.
- Assessment and evaluation of TPM impacts regarding their influences on the competitiveness of the European transport system.
- A first step towards compiling a handbook to support the assessment of the social and economic impacts of sustainable transport policies.

The second work-package results target the enhancement / establishment of two "products":

- On the one hand, the WP2 findings will be incorporated into the handbook on the social and economic impacts of transport policies. This handbook will include a TPM analysis of past effects and future developments to help policymakers, administrations and scientists conduct ex-ante assessments (Line A).
- On the other hand, WP2 will lay the ground for validating the ASTRA-EC model by quantifying TPM impacts as far as possible. This quantification aims at improving the ASTRA-EC model, which is derived from the previous and frequently applied ASTRA model. The assessment of the social and economic impacts needs to deliver valid and reliable values for the model to be durable (Line B).

This reports' objective to provide the EU with sound policy advice on the potential social and economic impacts of future sustainable transport policies. It is addressed to policymakers and the interested public to give first insights of impacts and indications of relevant transport policies. Thus it should be used as a basis for further and more detailed research and is not able to substitute an individual policy assessment.

This deliverable D 2.1 depicts the main outcome of the second work package and contains the classification of TPMs into categories and subcategories as described in **chapter 2.** The categorisations are in line with the 2011 EC White Paper on EU Transport Policy (referred to as the "White Paper") and its associated documents [EC(2011a, b, c]. Subsequently, the **third chapter** describes the methodology used for the impact assessment of transport policy measures by means of a standardised 'fact sheet'. This fact sheet was jointly compiled by the task leaders of WP 2 and approved by the EC. In addition, the fact sheet form was discussed with experts and stakeholders at a workshop in Utrecht (NL) on February 8th, 2012. The completed fact sheets constitute the basis for assessing the economic, social and environmental impacts of the individual TPMs. As previously mentioned, the impact assessment of transport policy measures is the main outcome of the second work package. Hence, all TPM assessments carried out by the consortium are annexed (ANNEX 4) to this deliverable. In addition, **Chapter 4** will discuss the sectoral and spatial dimensions of TPM impacts specifically related to competitiveness aspects. **Chapter 5** will conclude and summarise the main findings for each assessed transport policy measure.

2 Selection of measures for the impact assessment

The long list of TPMs builds on the work carried out in WP 1 (see ASSIST D1 (2011): Scoping of Transport Policy Measures (TPM)), which provides a screening of TPMs from selected policy documents and studies in order to compile a list of social, economic and environmental impacts by category. Furthermore, it defines the relevant terms in the project and the relevant social and economic impacts of TPMs. A classification of TPMs has been developed, which covers different dimensions such as transport modes and geographical level. The first ASSIST deliverable also describes the current policy framework in which the implementation of transport policy is embedded.

The methodology for assessing the impacts of TPMs builds on the **categorisation** of TPMs as documented in ASSIST D1. The categories are further divided into subcategories in line with the EU White Paper on Transport. ASSIST D1 not only contains an inventory of relevant TPMs on European, national, regional and local level, but also summarises the social, economic and environmental impacts which are associated with these TPM categories. The methodology in WP2 takes this approach a step further by focusing on the direction and level of impacts, which are documented in the individual TPM fact sheets.

The categories, as already defined in WP1, are:

1. Pricing
2. Taxation
3. Infrastructure
4. Internal market
5. Standards and flanking measures
6. Transport planning
7. Research and innovation
8. Others

Measures in the first two categories aim at influencing the demand for transport services. The subsequent categories 3 - 7 target the improvement of the supply side of the transport system. In comparison to the White Paper, the framework of the fifth category (efficiency standards) has been slightly widened because of the diversity of assignable TPMs by omitting the term “efficiency”. ‘Research and innovation’ is not directly comparable with the previous categories as it stands for the preparation of transport measures. The last category (‘Others’) subsumes the TPMs which are not assignable to any of the previous categories.

2.1 Definition of subcategories

In order to align the ASSIST impact assessment with the White Paper on Transport, the structure and terminology of the White Paper Impact Assessment (EC (2011b)) has been largely adopted. Table 2-1 shows the categories as mentioned above and the corresponding **subcategories** as defined by the ASSIST team. The total of 41 subcategories depict the whole bandwidth of the European, national and local transport policy areas, based on and drawn from the EC Staff Working Document accompanying the White Paper (EC (2011c)).

Table 2-1: Categories and subcategories

	Category		Subcategory
1	Pricing	1.1	Infrastructure charging / Access management schemes
		1.2	Internalisation of external costs (or selected external costs categories and individual modes)
		1.3	Public funding of transport
		1.4	Other / new financing instruments
2	Taxation	2.1	Fuel taxation
		2.2	Transport taxation (vehicle taxation, company car taxation, transport service taxation)
3	Infrastructure		European TEN-T core network
		3.1	cross border missing links
		3.2	key bottlenecks (freight and passenger)
		3.3	multimodal freight corridor structures
		3.4	EU transport infrastructure in view of energy efficiency needs and climate change challenges
		3.5	Planning procedure (timing, communication framework, environmental issues)
		3.6	Capacity and quality of transport systems
		3.7	Intelligent Transport System (ITS)
4	Internal market		Internal Market (intramodal)
		4.1	road
		4.2	rail
		4.3	inland waterway transport
		4.4	maritime
		4.5	air
			Transport security
		4.6	cargo
		4.7	passenger
		4.8	land transport
		4.9	“end-to-end”
		4.10	Multimodal Transport

	Category		Subcategory
5	Standards & flanking measures		Standards
		5.1	transport safety
		5.2	passenger rights
		5.3	environment
			Flanking measures
		5.4	promotion, information, dialogue
		5.5	regulation
6	Transport planning	6.1	Mobility strategies and plans
			Urban mobility
		6.2	plans & audits
		6.3	certification
		6.4	management & monitoring
		6.5	urban logistics strategies
		6.6	"zero/low emission" strategies
7	Research and innovation		Technology
		7.1	vehicles
		7.2	transport infrastructure / system
		7.3	transport information systems, management & services
			Framework
		7.4	transport safety
		7.5	promotion & incentives
		7.6	technology and infrastructure
8	Other	8.1	Alternative commuting solutions

Source: ProgTrans based on European Commission (2011b)

2.2 Classification of Transport Policy Measures

Allocating TPMs to the different subcategories is based on information from several different sources. Fundamental work was conducted in the first work package of the ASSIST project. The White Paper accompanying document (EC (2011c)) was also once again used to cover the main future-oriented fields of policies. In addition, other studies related to EU transport policy and often financed under the EC provided relevant information regarding missing TPMs (e.g. BESTUFS II, OPTIC). Subsequently, the ASSIST consortium members filled any major gaps remaining based on their own work experience.

Selecting TPMs for the impact assessment is made on the basis that each **subcategory** must be covered by at least one TPM with the potential to contribute to the main objectives defined by the White Paper. However, as work progressed in WP2 it became obvious that TPMs often cover more than one subcategory and thus can be allocated to different subcategories or even to other categories.

In the end, a long list of approximately 180 individual TPMs was retained (cf. Annex 1: Classification of transport policy measures). The further selection of TPMs has been conducted by the ASSIST team in close cooperation with the EC. It was based on a set of selection criteria, which has been defined by the team. By means of these criteria and its allocation to the TPM's, the long list has been concentrated to the most relevant measures for further impact assessments.

2.3 Workshop on TPMs

The ASSIST team held a 1st ASSIST workshop on February 8th, 2012 in Utrecht (NL) to present the methodology and planned procedure of the ASSIST assessment to experts and stakeholders. This workshop was intended to set up a panel of experts and transport sector stakeholders working directly or indirectly in the fields of social, economic or environmental impact assessment.

Altogether, 15 'external' participants attended the workshop together with the 11 team members. The participants represented a broad mix of institutions, organisations, geographical areas and transport modes.[3] In addition, the project officer from the European Commission (DG MOVE) attended the workshop representing expertise on the client side.

The 1st ASSIST workshop objectives were to discuss the classification and selection of TPMs, the impact assessment approach and to discuss the initial assessment results. Furthermore the ASSIST team expected to receive additional input concerning in-depth information on the economic, social and environmental impacts of transport policies. The workshop was also intended to obtain feedback concerning the completeness, reliability and understanding of the previous work.

As one main outcome, it can be concluded that there was neither fundamental disagreement nor major concerns about the work approach, procedure and preliminary results. A few essential remarks and improvements suggested by the participants are shown below:

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3 List of participants shown in the workshop summary minutes in Annex 2.

- Impact assessment is about finding a **comprehensive and reasonable** description (cause and effect chains) of impacts (interaction) rather than primarily aiming at quantifying effects.
- The selection of transport policy measures must be based on reasonable "**criteria**" determined by the ASSIST team. An important selection criterion is the degree to which a TPM could help to achieve the main targets defined in the White Paper.
- Impact assessments will have to analyse not only first but also **2^{nd} and 3^{rd} level effects.**
- Where appropriate, impact assessments may include "**story-telling**" techniques (functional logical chains), especially in the case of social impact assessments, which are often difficult to determine.

A more precise description of the suggestions made and accepted can be found in the notes on the workshop, annexed to this deliverable (Annex 2: Notes on the 1st ASSIST Workshop). Overall, the workshop was very constructive regarding the improvement of the approach, its results and the projects progress. The team obtained valuable feedback and advice regarding previous and upcoming work.

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3 Methodology of the assessment of transport policy measures

3.1 Impact assessments and impact chains

An impact assessment is a process used to identify and analyse the effects and consequences of policies (or projects or programmes) in order to ensure that such measures are:

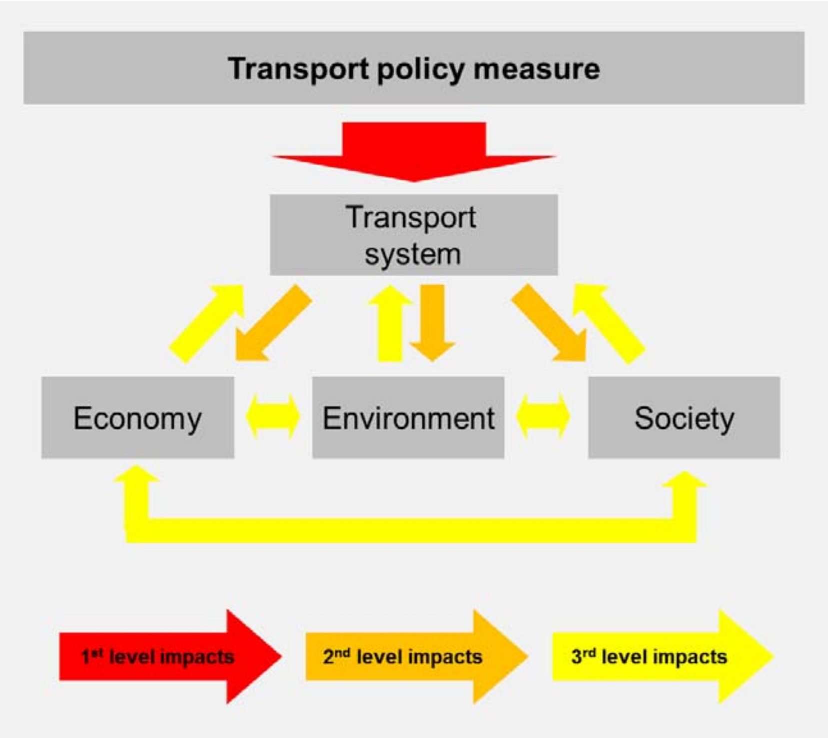
- economically sound (viable),
- environmentally sustainable, and
- socially equitable.

The transport system is a complex one with multi-layer causal relationships. Furthermore, it is an integral part of the economic, environmental and social setting, where multiple cause and effect chains are formed, triggered by single TPMs or bundles of combined TPMs. There are purely local effects at the place where the transport activity takes place, but generally, impacts are identified at the regional and national levels and, because EU TPMs relate to all Member States, at the level of the European Union as well. The assessment not only looks at direct impacts, but at all sorts of indirect effects, both short-term and long-term. Figure 3-1 indicates that feedback and repercussions can also play a significant role.

Indirect impacts on different social groups (e.g. by age, gender, income level, physical status etc.) are also relevant for ASSIST.

Figure 3-1 depicts the structural interdependencies of the specific impact assessment approach applied in the ASSIST project. Each policy measure is assessed according to four impact fields: the transport system, the economy, society and the environment. In addition, the diagram shows three levels of impacts, which affect each section at a different stage, i.e. it is likely that each transport policy has direct (1st level) and indirect (2nd level) effects, but deferred (3rd level) impacts can also occur.

Figure 3-1: Interdependencies of the transport system, the economy, the environment and society



Source: ProgTrans

Implementing a transport policy measure has multiple effects and consequences (impacts) for different “user” segments (passengers, operators, economy, society etc.) and sections (transport system, economy, environment, society). Here, it should be remarked, that the term “economy” is employed in the meaning of a directly and indirectly affected broad reservoir of user such as companies, employees, markets etc. (also cf. 3.3.2). However, it is expected that all the different types of measures (e.g. infrastructure developments, traffic regulations, fiscal regulations, new vehicles etc.) will first affect the **transport system**, e.g. by changing user travel times and costs, influencing trip origins / destinations, mode and route choice and finally the traffic conditions (1st level impacts).

At a subsequent stage (2nd level impacts), changes then mainly emanate from the transport system and influence the **economy** (e.g. due to less congestion, reduced travelling times for transport users and clients, changing transport costs for individuals and firms, improved accessibility for more advantageous location choice for production and commerce), the **environment** (e.g. fewer accidents, reduced air pollution and noise) and **society** (e.g. due to better health conditions, more acceptable working conditions in transport, easier access to vehicles, better development potentialities of surrounding areas) with no straight or decisive sequence.

The next impact level (3rd level impacts) describes the impacts on all four sections (the transport system, the economy, the environment and society), irrespective of the direction or kind of action. Hence it is also possible for there to be repercussions on the transport system.

General explanation of impact chains for the Evaluation of Transport Policy Measures (Monigl 2001)

In connection with transport policy measures, the changes the measures cause in the transport system, the environment and the socio-economic setting have to be modelled. In spite of the fact that social impacts play a significant role in the ASSIST project, it is useful to consider the whole range of impacts, because transport, environmental, social and economic impacts are all interrelated.

In the ASSIST project, an **impact** is understood to be a change caused by a transport policy (measure) (TPM), which affects a difference between two stages (before/after; without/with) and which can be measured or modelled.

TPMs, whether geographical or global, have different impacts throughout the transport network or in general. A measure triggers changes to a "**chain**" of primary, secondary and tertiary impacts and affects different actors in and around the fields of passenger and freight transport including social groups which differ by age, gender, physical status, income level, etc.

The **impact chains** can be described according to their main types as follows (see Figure 3-2):

- **Direct network impacts** on transport users. Measures alter transport patterns (e.g. destination, mode, route choice) which result in changed traffic volumes and conditions (e.g. time spent in traffic (including congestion), fuel consumption, accidents etc.).

  There are further impacts on ***exposed non-transport user groups*** which also depend on traffic volume "outputs", e.g. pollutants and noise. These have adverse effects on health or the environment, and include accidents involving non-transport users, inhabitants etc.

- Indirect **network impacts** of transport measures on different ***socio-economic groups.*** These arise from varying the accessibility of infrastructure, service levels or transport charges between areas and thus influencing the location choices for residents and firms. All these affect income, the employment rate, welfare, education, safety, etc. Changing land-use, or production and commerce in an area also has repercussions on transport patterns and volumes.

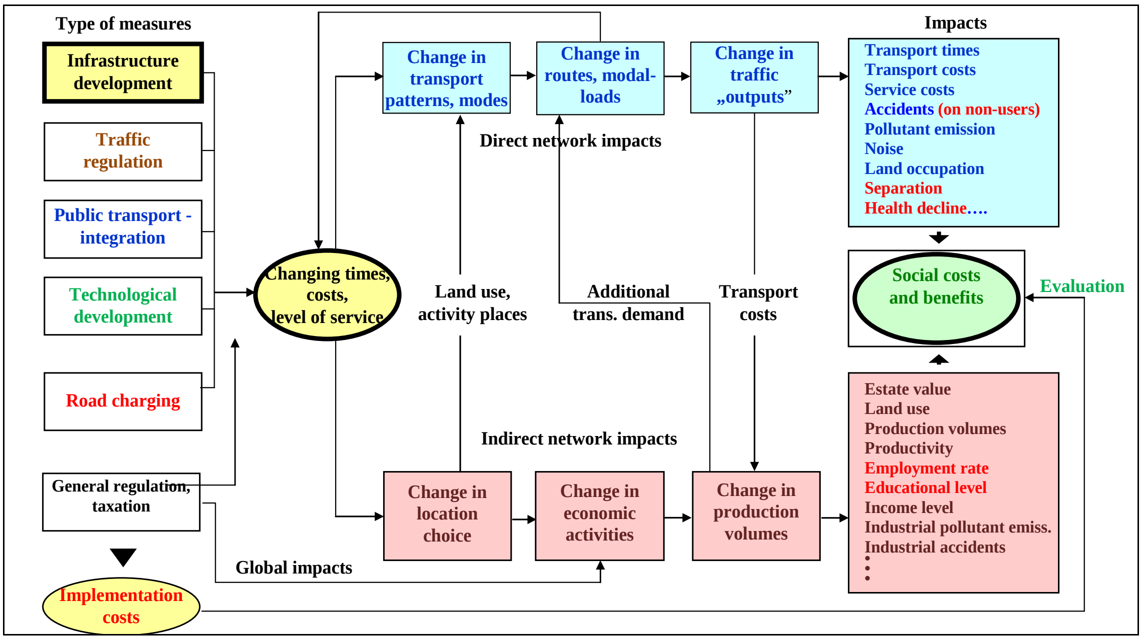
- **Global impacts** result from comprehensive measures such as fuel taxes, speed limits, bans of non-standard vehicles, etc., which influence transport intensity and accessibility.

Transport measures cause internal changes by effecting possible (immediate) changes to the "main regulators" (e.g. time, costs and other travel conditions) influencing transport patterns. These changes lead to a shift in trip destinations, transport modes and changes in traffic volumes, conditions and “outputs” as “semi-direct” consequences.

Policy measures also impact inter-area accessibility, which influences (in the longer term) location choice and ultimately land-use and the socio-economic framework of an area. In the wider frame, socio-economic parameters will also be affected such as, e.g. economic prosperity, life quality, education level, real estate values, welfare, cohesion, regeneration, tax revenues and attracted investments, etc.

To illustrate the impact chain approach, the flow chart in Figure 3-2 shows possible measures, their impacts and functional chains based on the example of “Infrastructure development”.

Figure 3-2: Impact chain approach – examples of social impacts (in red) from “Infrastructure development”



Source: Monigl J. (2001)

Figure 3-2 illustrates the example of “**infrastructure development**”, which also affects “society” e.g. by the ***separation of areas*** and ***health decline***; while the ***employment rate*** and the ***educational level*** are examples of indirect network impacts.

It should be mentioned that social impacts with exclusion or inclusion issues and equality relevance tend to be felt at the local level of the transport system, even if the TPM is considered to have international, national or regional validity. This makes it difficult to estimate, measure and model these kinds of impacts in an EU perspective.

In principle, this kind of “impact pathway” should provide a basic orientation when filling out the fact sheets for the different transport policy measures on the impact intensity in different fields, affected segments and actor groups.

Examples of direct and indirect impacts for different transport policy measures are given in Table 3-1 and Table 3-2.

Table 3-1 shows the main **direct** effects of transport measures and policies on the affected transport supply and the decisions of transport users regarding destination and route choice. This leads to changes in volumes and traffic “outputs” (travel time, costs, emissions, accidents etc.), which then impact social life (the last column of Table 3-1 represents mainly “external social cost elements”, which are not always covered in conventional transport cost-benefit analyses).

The “global measures” cause generic and not local effects.

Table 3-1: Direct transport effects of projects and policies on social life

Transport projects and policies	**Changes in**			
	Transport supply	**Transport patterns and volumes**	**Transport outputs**	**Social life**
Conventional infrastructure development (e.g. motorway construction)	▪ shorter transport times ▪ lower transport costs ▪ greater convenience	▪ new destinations ▪ new routes ▪ reassigned traffic loads	▪ lower time consumption ▪ lower operating costs ▪ fewer emissions ▪ fewer accidents	▪ more free time ▪ area separation ▪ better health conditions
New technology infrastructure development (e.g. Maglev lines)	▪ shorter transport times ▪ higher fares ▪ more comfort	▪ new loads ▪ new destinations ▪ modal shift ▪ reassigned traffic loads	▪ lower time consumption ▪ lower operating costs ▪ fewer emissions ▪ fewer accidents	▪ more free time ▪ area separation ▪ increasing inflation ▪ better health conditions
Route pricing (e.g. on motorways)	▪ higher transport costs, ▪ less congestion	▪ lower trip frequency ▪ modal shift ▪ alternative routes ▪ diverted routes	▪ more congestion on other roads ▪ more emissions ▪ more toll revenues	▪ worsening health conditions on parallel roads ▪ better budget prospects
Speed limits (e.g. on motorways)	▪ longer transport times	▪ alternative routes	▪ higher time consumption ▪ less serious accidents	▪ some negative effects on personal perception of freedom
Global taxation (e.g. on fuel)	▪ higher fuel prices	▪ lower trip frequency ▪ less traffic	▪ higher operating costs ▪ fewer emissions	▪ better health conditions ▪ better budget prospects
Vehicle standards (e.g. environmentally-friendly vehicles)	▪ higher transport investment costs ▪ lower operating costs	▪ lower trip frequency ▪ reduced loads	▪ higher operating costs ▪ fewer emissions	▪ better health conditions

Source: Fömterv, Monigl J. (2001)

Table 3-2 shows the main **indirect** impacts of transport projects and policies as changes in the relational accessibilities (may be represented by generalised costs), the location choices of economic and social actors, changes in land-use and production, which, in turn, affect transport volumes and loads and lead to changes in economic activities, volumes and costs. The last column of Table 3-2 again shows possible social impacts (e.g. on employment, living standards, health etc.).

Table 3-2: Indirect transport effects of projects and policies on social life

Transport projects and policies	Changes in			
	Relational accessibilities	**Land-use and industry technology**	**Production volumes**	**Social life**
Conventional infrastructure development (e.g. motorway construction)	▪ faster / cheaper connections	▪ new production sites at advantageous locations	▪ increasing production volume	▪ increasing employment ▪ higher standard of living ▪ detrimental to health ▪ detrimental to nature
New technology infrastructure development (e.g. Maglev lines)	▪ faster connections	▪ new technology-related industries at advantageous locations ▪ new production locations	▪ more production ▪ more industrial emissions	▪ increasing employment ▪ higher level skills ▪ detrimental to health
Route pricing (e.g. on motorways)	▪ faster / more expensive connections	▪ reallocation of production facilities to advantageous locations	▪ higher production costs ▪ more tax revenues	▪ increasing inflation ▪ better social services
Speed limits (e.g. on motorways)	▪ slower connections	▪ no specific changes, generally fewer benefits	▪ more storage capacity needed	▪ increased safety
Global taxation (e.g. on fuel)	▪ costly connections	▪ no specific changes, generally fewer benefits	▪ higher production costs ▪ more tax revenues	▪ better social services
Vehicle standards (e.g. environmentally-friendly vehicles)	▪ neutral	▪ new standard-related technologies	▪ special production	▪ higher level skills

Source: Fömterv, Monigl J. (2001)

The above explained “impact chain approach” also influences the modelling of these processes. In this context it is important that detailed transport networks (and their effects) are incorporated into models as this determines the sensitivity and dynamics of the results.

However, given the complexity of impact chains in the real world, any impact assessment will have to simplify things in order to produce meaningful statements, whether in quantitative or qualitative terms.

The ASSIST impact assessment must be understood as a screening to identify the impact areas which are relevant for further analysis. All other impact areas are considered to be less relevant, at least in the ASSIST project, and have therefore not been included.

A **fact sheet** (cf. chapter 3.2) was developed to present the impacts of individual transport policy measures in a comprehensive and formalised way. This fact sheet summarises the assessment results of the individual TPMs in a condensed and standardised format.

For clarification: the ASSIST impact assessment methodology is different from that used to prepare the White Paper, in which policies were assessed in order to quantify and qualify the effects with regard to one of four alternative scenarios.

3.2 Structure and description of the fact sheet

The fact sheet consists of **three main parts**:

Part A - General Information

The first part identifies the selected TPM by title, policy category and subcategory. The TPM is described in a summarised text form. The policy background and objectives are mentioned, complemented by implementation examples if applicable, such as the national implementation of EU legislation or specific implementation projects. This part also provides an overview, in qualitative terms, of the intended key changes regarding traffic and transport.

Part: B - Impacts

The second part is the main part of the fact sheet. In five sections, the various impacts triggered by the TPM are documented in a formally structured way with supporting verbal summaries. To start with there is a summary of impacts, listing the main impacts on traffic demand as well as economic, social and environmental aspects. In addition, impacts on the different social groups are summarised. This overview primarily addresses readers interested in the main findings of the impact assessment. The impacts are labelled in compliance with the terminology used in the impact assessment guidelines published by the European Commission [EC (2009k)]. Methodologically, five categories of impacts are distinguished:

- **B 1: Overview of impacts**
  Section 1 provides a general overview of how the segments are affected by the relevant TPM. The following segments are considered: passengers using various transport modes, the operators of different means of transport, employees in transport, residents, the economy, public bodies and society as a whole. Additionally this section provides summarised information about the extent to which different

social groups are affected by the various impacts. It highlights the main impacts by five types of social group: we distinguish by income, age, disabled persons, gender and ethnic minorities.

- **B 2 - Traffic impacts**
  As TPMs are essentially intended to influence the transport sector, the impacts on all parties in this sector are reported first. The main impact fields are travelling time, risk of congestion, vehicle mileage and service and comfort.
- **B 3 - Economic impacts**
  Economic impacts are regarded as primarily relevant at the micro-economic level such as transport costs, revenues for transport operators and public authorities or changes in the value of real estate (triggered by improved accessibility or negative environmental impacts like noise). It considers the competitiveness of the transport industry sectoral and spatial competitiveness, too.
- **B 4 - Social impacts**
  When looking at the social side of TPMs, the analysis focuses on impacts on safety, health, employment and accessibility to transport systems. Social impacts describe the extent to which TPMs influence the societal structure – do they help to reduce differences or do they aggravate social disparities? The fourth section provides an overview of which social groups are (positively or negatively) affected.
- **B 5 - Environmental impacts**
  The fact sheet is not intended to replace a full environmental impact assessment, but it does emphasise the main environmental impacts with social relevance affected by the respective TPM.

All the impacts are presented in a standardised grid distinguishing the various groups affected and the relevant geographical levels. If impacts are judged to be relevant, the position of an arrow shows the change caused by the TPM in a simplified quantitative way. The underlying colour of the box indicates whether this change is positive or negative referring to the policy aims of the White Paper. Impacts varying significantly between implementation and operation are reported in two separate lines.

Part: C - References

The most relevant and recent sources of scientific evidence are listed in the third part. Where impacts are verifiable, reference is made to the underlying source. The list of references enables for the interested reader to obtain more details. It also provides the evidence that the impact assessment is based on science and is in line with the most recent assessments.

3.3 Detailed description of the fact sheet structure

Figure 3-3: Fact sheet template – General information (Part A)

FACT SHEET NO.: Cat -No. / Subcat No. **PERFORMED BY:**

A	**GENERAL INFORMATION**	
A 1	**Category**	
A 2	**Subcategory**	
A 3	**Transport policy measure (TPM)**	
A 4	**Description of TPM**	
A 5	**Implementation examples**	
A 6	**Objectives of TPM**	
A 7	**Key changes concerning:**	
A 7.1	- Choice of transport mode / Multimodality:	
A 7.2	- Origin and/or destination of trip:	
A 7.3	- Trip frequency:	
A 7.4	- Choice of route:	
A 7.5	- Timing (day, hour):	
A 7.6	- Occupancy rate / Loading factor:	
A 7.7	- Energy efficiency / Energy usage:	
A 8	**Main source**	

Source: ProgTrans -

3.3.1 A - General information

A 1 - A 6 Descriptive issues

The overview indicates the **category**, **subcategory** and **transport policy measure (TPM)** (cf. chapter 2), followed by a summary **description** of the TPM.

Implementation examples already applied and/or assessed in practice are listed as headlines. The **main objectives of a TPM** refer to the wider content of the TPM and the overall relevant transport policy context (cf. Figure 3-3).

A 7 Key changes

Transport policy measures might affect several fundamental travel and transport characteristics. These **key changes concern** different transport indicators. They are listed and explained in Table 3-3.

Table 3-3: Key changes in travel or transport behaviour

	Key changes	Description
A 7.1	Choice of transport mode / multimodality	Covers the aspect of whether the TPM modifies the options for choosing between various modes of transport. Multimodality stands for offering different means of transport (like car, public transport) and a changed behaviour of transport system users.
A 7.2	Origin and / or destination of trip	Indicates whether the TPM influences the choice of the origin and/or destination of a trip or a transport. Example: Higher air fares reduce travelling by plane (in favour of other modes and destinations).
A 7.3	Trip frequency	Expresses the number of trips made by a person per day, irrespective of the distance travelled.
A 7.4	Choice of route	The influence of the TPM on the usage of certain routes (e.g. triggered by physical barriers or prices) while origin and destination remain unchanged.
A 7.5	Timing (day, hour)	Stands for affecting the time when trips or transportations are made. This issue relates to peak and off-peak traffic distribution.
A 7.6	Occupancy rate / Load factor	A higher factor means that a higher number of passengers or a greater volume of goods are loaded into the same vehicle, which increases transport efficiency.
A 7.7	Energy efficiency / energy usage	Higher energy efficiency can be induced by a technological improvement or a behavioural change.

Source: ProgTrans

A 8 Main source Provides the main reference of the TPM under consideration.

3.3.2 B – Impacts

Columns

The **columns** in the fact sheet mainly comprise the groups of persons / companies, which are directly and indirectly affected by one or more impacts of the specific TPM.

Affected segments

Overall, there are **16 different** segments possibly affected by the implementation of a TPM, main segments allocated to two major groups: **passenger (transport users)** and **transport operators (service providers).** The latter represent the companies supplying transport services including both passenger and freight transport. Subsequently, Table 3-4 further divides these main groups according to the relevant modes of transport concerned.

Table 3-4: Differentiation of affected groups by mode of transport

Mode	Passengers	Transport operators
Road	Car drivers, motorcyclists; car and motorcycle passengers	Road hauliers (freight)
Rail	Train passengers	Train companies (for passenger and freight)
IWW (inland waterways)	negligible	Barge operators, inland port authorities (freight)
Air	Airline passengers	Air carriers, airport authorities (passengers and freight)
Maritime	Not covered	Ship-owners, seaport authorities (freight)
Public transport	Bus, coach and light rail passengers	Public transport operators (passengers)
Slow modes	Pedestrians, cyclists and other non-motorised forms of transport	negligible

Source: ProgTrans

In addition to passengers and transport operators, other “user” segments considered are:

- **Employees in the transport sector**
  Employees are those persons working in the transport sector and potentially affected by a TPM.

- **Residents**
  Residents are directly affected by TPM impacts like noise, emissions or changes in the value of real estate caused by transport systems.
- **Economy**
  "Economy" is regarded as a directly and indirectly affected broad reservoir of users such as companies, employees, markets etc. Economy covers businesses and branches not belonging to the transport sector. These benefit from a better (or worse) accessibility, higher or lower turnovers or changes in the value of their real estate.
- **Public bodies**
  Public bodies are, depending on the geographical level of the TPM, either local, regional, national or European authorities or agencies. The impacts are primarily linked to taxes, revenues or impacts on long-term financial obligations for infrastructure investments and operation.
- **Society**
  Society mostly encompasses environmental and economic impacts which are not directly assignable to a specific group. Additionally, in some cases there may be opposing impacts on different groups depending on whether society as a whole profits from the transport policy measure.

Geographical level

The spatial scope of impacts is differentiated into four **geographical levels**. The most important geographical level affected by a TPM is shown in the field **1st level**, the second most important level in the field **2nd level**. The spatial levels are abbreviated as shown:

- L: Local
- R: Regional
- N: National
- I: International

Source of information

The column **source** indicates the source on which the **assessment is based**. There are two types of sources:

- S: Study or report with impact assessment, or
- E: Evaluation by the project team and own judgement

The final column describes the **spatial level**, if any, on which the source is focused. For simplification, the same geographical abbreviations are applied as shown above.

B 1 Overview of impacts

Figure 3-4: Fact sheet template – overview of impacts and traffic impacts (Part B1/B2)

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				
B 1.2	**Summary: Income groups**																				
B 1.3	**Summary: Age groups**																				
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

		AFFECTED SEGMENTS																Geographical level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				
B 2.I	**Overall impacts on social groups**																				
B 2.II	**Implementation phase**																				
B 2.III	**Operation phase**																				
B 2.IV	**Summary / comments concerning the main impacts**																				
B 2.V	**Quantification of impacts**																				

Source: ProgTrans

Section B1 is designed to provide an overview of the main impacts of the TPM. It shows in a standardised form (B 1.1) the groups being affected (coloured boxes) and describes the impacts on five typical types of social groups.

B 1.1 Summary

A coloured box (cf. 3.4.2) indicates that a certain group (summarising the column) is affected by the analysed measure. There is no indication of the extent of the impact.

The lines subsume the impacts of the specific TPM for different type of social group being affected. The five social groups are:

B 1.2 Income groups

Cover the different (partly clustered) levels of income (low income, high income)

B 1.3 Age groups

Are typically clustered in age groups (e.g. young persons: <15 years, adults: 15 – 65 years, senior persons >65 years)

B 1.4 Disabled people

Require specific facilities and assistance to use transport systems

B 1.5 Gender groups

Are relevant if men and women are affected in a significantly different way

B 1.6 Ethnic groups

Are differentiated where required or suitable, for race, colour, religion, cultural background.

B 2 Traffic Impacts

Traffic impacts are limited to the main technical characteristics of a trip or transportation. Economic, environmental and social aspects are dealt with separately.

Table 3-5: Impact fields B2.1 – B2.4: Traffic impacts

B 2	TRAFFIC IMPACTS	
B 2.1	Travel or transport time	Travel or transport time indicates the time spent for trips with a certain transport mode; this time is either reduced due to a faster (or different) connection, less traffic or a reduced use of the respective mode etc.
B 2.2	Risk of congestion	The risk of congestion is reduced by a TPM which reduces traffic or reduces / removes bottlenecks.
B 2.3	Vehicle mileage	Vehicle mileage measures the distance travelled with a certain transport mode. This can be reduced due to a different shorter connection, a change in destination or origin of the trip or a reduced use of the respective mode.
B 2.4	Service and comfort	Ideally, the transport system is comfortable and easy to operate and thus user-friendly. Service and comfort are also affected by e.g. a toll system and its implementation as well as the services provided.

Source: ProgTrans

Overall aspects of impacts

The same structure is used to show the overall impacts for each impact group in the order described. The impact groups subsume economic impacts (B 3), social impacts (B 4) and environmental impacts (B 5). The terminology is explained above.

The overall aspects of traffic impacts are documented underneath the traffic impact grid:

B 2.I Overall impacts on social groups

Provides (in-depth) information about the type of social groups concerned

B 2.II Implementation phase

Describes impacts which occur during the implementation of a TPM such as those arising during construction, preparatory or research activities for new technologies etc.

B 2.III Operation phase

Affiliates at the period of implementing the policy measure. It describes impacts of the relevant TPM when the measure is fully implemented, respectively in operation.

B 2.IV Summary / comments concerning the main impacts

Explains and amends the most important impacts. In addition, it mentions other effects resulting from the TPM adaptation, which cannot be determined in the spreadsheet.

B 2.V Quantification of impacts

Provides quantifiable data as figures, elasticities or ranges of values. However, it has to be emphasised that the figures cited usually refer to a specific example or a model calculation and are therefore often not comparable.

B 3 Economic Impacts

Figure 3-5: Fact sheet template – Economic and social impacts (Part - B3/B4)

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 3.1	Transport costs																				
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				
B 3.I	**Overall impacts on social groups**																				
B 3.II	**Implementation phase**																				
B 3.III	**Operation phase**																				
B 3.IV	**Summary / comments concerning the main impacts**																				
B 3.V	**Quantification of impacts**																				

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				
B 4.I	**Overall impacts on social groups**																				
B 4.II	**Implementation phase**																				
B 4.III	**Operation phase**																				
B 4.IV	**Summary / comments concerning the main impacts**																				
B 4.V	**Quantification of impacts**																				

Source: ProgTrans

Section B 3 assesses the economic effects which emerge as a result of implementing the TPM. Such effects mainly appear in the course of structural changes regarding the costs and revenues relevant for users, operators and indirectly affected groups of the transport systems. The impacts are detailed in Table 3-6 below.

Table 3-6: Impact fields B 3.1 – B 3.11: Economic impacts

B 3	ECONOMIC IMPACTS	
B 3.1	Transport costs	Transport costs are caused by using or operating a transport system, e.g. tolls, fares, fuel prices and overall costs of operation.
B 3.2	Private income / commercial turnover	Income / revenue changes that arise for persons / businesses due to economic changes caused by a TPM. For businesses, this also includes a change in transport costs because they are part of the supply chain.
B 3.3	Revenues for transport operators / service providers	Revenue changes for transport operators / service providers are affected by the costs of operating the transport service. These are affected by transport costs, costs of employment, insurance costs etc.
B 3.4	Sectoral competitiveness	Change in competitiveness between transport companies (and industries closely connected to them) due to a change in productivity.
B 3.5	Spatial competitiveness	Change in local, regional, national or international competitiveness of transport companies due to different framework conditions, i.e. transportation costs, regulations / legislation etc...
B 3.6	Housing expenditures	Change of costs for rent/floor space for residents/businesses due to the changed economic situation in the areas affected by the TPM.
B 3.7	Insurance costs	Change of insurance costs caused by the transport policy measure.
B 3.8	Health service costs	Costs for services regarding the diagnosis and treatment of disease and for the maintenance of good health.
B 3.9	Public authorities & administrative burdens on businesses	Indicates the administrative effort for public authorities and businesses caused by the TPM.
B 3.10	Public income (e.g.: taxes, charges)	Change of state revenues or other types of administrative units obtained by taxes and other charges.
B 3.11	Third countries and international relations	Change in the relations between the EU and third countries concerning trade, investment flows and services which have an effect on foreign and domestic businesses and consumers.

Source: ProgTrans

B 4 Social Impacts

This section determines the direct and indirect impacts measures have as social influences on different groups. The most important impact fields are health, safety and employment. Additional impact fields are security, accessibility and social inclusion. The impacts are detailed in Table 3-7 below.

Table 3-7: Impact fields B 4.1 – B 4.8: Social impacts

B 4	SOCIAL IMPACTS	
B 4.1	Health (incl. well-being)	Impact on the physical and psychological well-being of an individual. This is influenced by pollution, noise and other factors affecting the individual and his/her environment.
B 4.2	Safety	The safety of a transport system is measured in the number of accidents (fatalities) as well as the general feeling of safety.
B 4.3	Crime, terrorism and security	The security of a transport system is affected by e.g. crime and terrorism. This impact field includes the current security measures and the feeling of security they imbue.
B 4.4	Accessibility of transport systems	Improvements to the transport system regarding availability (time), accessibility (distance), simplicity of access (physical, technical barriers) and usage.
B 4.5	Social inclusion, equality treatment and opportunities	Indicates discriminatory effects, i.e. how the measure influences the gap between certain social groups.
B 4.6	Standards and rights (related to job quality)	Depicts the situation of workers in the transport system, considering e.g. working hours regulation, training etc.
B 4.7	Employment and labour markets	General situation of the labour market and change in the employment rate due to new job creation or loss of jobs, possibly for particular professions or groups of workers.
B 4.8	Cultural heritage / culture	Impact on buildings of architectural or historical significance or archaeological sites, which influences the quality of living of the affected society.

Source: ProgTrans

B 5 Environmental Impacts

Figure 3-6 Fact sheet template – Environmental impacts and references (Part B5/C)

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS															Geographi-cal level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																				
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				
B 5.I	**Overall impacts on social groups**																				
B 5.II	**Implementation phase**																				
B 5.III	**Operation phase**																				
B 5.IV	**Summary / comments concerning the main impacts**																				
B 5.V	**Quantification of impacts**																				

C	REFERENCES	
C 1	**Other TPMs of this subcategory**	
C 2	**References**	**International** [1] **National** **Regional / Local**

Source: ProgTrans

The following section describes the relevant environmental impacts associated with transport policy measures. Compared to the previously described impact sections, it becomes obvious that these impacts merely affect 'indirect' groups (on society, the economy, public bodies etc.) and not passengers or transport operators, since the latter are the agents of the environmental impacts. However these groups also belong to the indirectly affected groups. The impacts are detailed in Table 3-8 below.

Table 3-8: Impact fields B 5.1 – B 5.6. Environmental impacts

B 5	ENVIRONMENTAL IMPACTS	
B 5.1	Air pollutants	Change in air pollutants emitted by transport modes and affecting the environment (acidifying, eutrophying, photochemical, harmful pollutants).
B 5.2	Noise emissions	Change in the levels of noise emitted by transport modes and affecting the social and natural environment.
B 5.3	Visual quality of the landscape	Influences on the quality of the urban and non-urban environment from an aesthetic point of view.
B 5.4	Land-use	Land usage, e.g. reduction or limitation of urban sprawl (positive), greenfield developments (negative).
B 5.5	Climate	Impact on the average meteorological conditions including temperature, precipitation and wind that characteristically prevail in a particular region, measured over a period of 30 years by changes in the emissions of greenhouse gases and ozone-depleting substances.
B 5.6	Renewable or non-renewable resources	Usage of non-renewable as well as renewable resources; direct or indirect impacts, e.g. due to a change in the modal split or vehicle mileage.

Source: ProgTrans

3.3.3 C – References

C 1 Additional TPMs

Prior to the references, **other TPMs (C1)** illustrate the different TPMs allocated to the same subcategory. Different TPMs within one subcategory may have similar impacts, but the given impact assessment is only valid for the analysed measure. In some cases there is the possibility that measures of the same subcategory might even have opposing impacts on the same group.

C 2 References

A more extensive list of sources is given in the field **references (C2),** which concludes the fact sheet. Within this field, the sources may also be allocated to their “spatial” scopes (International, National, Regional / Local) – that means the main geographical coverage of each source’s content. In addition, the references are numbered to enable links between specific examples, main impacts (summary) or quantifications and the used source.

3.4 Asessment of impacts

3.4.1 Intensity of impacts

Each fact sheet gives information for two different “dimensions”. An **arrow** (pointing in various directions depending on the type of change) depicts the estimated or reported impacts caused by the TPM and the **colour** indicates whether this is a positive or negative impact according to the European transport policy objectives as outlined in the White Paper or other relevant EU documents. In this context, an arrow pointing upwards, for example, indicates a strong increase in transport costs. Thus, the intensity of an impact is also illustrated by the direction of the individual arrow as shown in the following Table 3-9.

Table 3-9: Intensity of change affected by TPM

↑	strong increase
↗	Increase
→	change of amount occurs, but is marginal, direction is unclear or increase and decrease occur at the same time
↘	Decrease
↓	strong decrease
	unrelated, no connection

Source: ProgTrans AG

If there is an empty box (unrelated, no connection), there is no evidence for a TPM impacting a specific group / segment. A grey shadowed box shows an invalid relation between the impact field and the affected group, i.e. the measure does not fundamentally affect this particular group.

3.4.2 Impact evaluation

Each field of the main grid with an arrow shows whether the change of intensity is in line with the main objectives of the EU transport policy.

Table 3-10: Impact effects of TPM

	Impact with positive effect (with respect to the TPMs and EU transport policy objectives)
	Impact with inconclusive effect (with respect to the TPMs and EU transport policy objectives)
	Impact with negative effect (with respect to the TPMs and EU transport policy objectives)

Source: ProgTrans AG

As mentioned above, the field **'summary'** at the top of the fact sheet gives a rough synopsis of the individual impacts explicitly assessed in sections B 2 to B 5. This summary enables a quick qualitative assessment of the segments affected by the individual policy measure. For each segment of relevance, the colour indicates the overall and dominant effects of the impacts as described above. In the absence of any specific information, the summarised impact assessment is based on individual judgement and the expertise of experts involved in the project.

4 Competitiveness

4.1 Introduction

Greater attention has been paid to competitiveness over the past two decades due to the limitations and challenges posed by globalisation. This chapter explores the concept of 'competitiveness' in section 4.2. It also discusses the measurement of competitiveness, especially its spatial component in section 4.2.1 and its sectoral component in chapter 4.2.3.

As the definition and measurement of competitiveness is being discussed, we provide a brief overview of the concept and the way it can be measured. It must be clear that this analysis does not claim to be complete concerning the definition and measurement of competitiveness. Instead, we aim to link the concept of spatial and sectoral competitiveness to the transport system, transport policy and the impacts of transport policy measures. This will be further explored in the chapters 4.2.2 and 4.2.4.

4.2 Defining and measuring competitiveness

There are many definitions of competitiveness, some of which are shown in Annex 4. In this section, our starting point is the definition provided by the European Commission [EC (2012a)] in its operational guidance:

'When identifying economic impacts, particular attention should be paid to factors that are widely considered as being important to productivity, and hence to the competitiveness of the EU. Competitiveness is a measure of an economy's ability to provide its population with high and rising standards of living and high rates of employment on a sustainable basis. Vigorous competition in a supportive business environment is a key driver of productivity growth and competitiveness.' [EC (2012a), p. 4]

The above definition is broad and valid for both spatial and sectoral competitiveness:

- **Spatial competitiveness** refers to competitiveness on a geographical level like a municipality region or nation.
- **Sectoral competitiveness** relates to the competitiveness between firms in different sectors like agriculture or industry. In both cases, the objective is to increase productivity.

A literature review makes it clear that there are different definitions of competitiveness. Also, there is a lively debate about whether competitiveness should only be related to firms or also to nations. In this research project, we use the definition given above and turn to the question of how to measure competitiveness on a spatial and a sectoral level.

Within ASSIST, the competitiveness analysis has the following rationales:

- To support the European Commission in making an initial comparison of the spatial and sectoral consequences of transport policy measures.
- To support the European Commission in deciding whether to apply policy measures which are shown to be disadvantageous or which negatively impact the geographical or economic structure / basis within the community.
- If there are impacts concerning spatial or sectoral competitiveness within the Union, the Commission should be aware of them at an early stage and prior to any release of papers or documents.
- To provide insights into impacts of TPMs in categories, to further prioritise them and reveal their relevance for non-transport related directorates.

Besides the various definitions of spatial and sectoral competitiveness which will be mentioned in the following chapters, the competitiveness analysis applied in ASSIST is based on the results of the impact assessments.

Thus, the spatial and sectoral impacts are reviewed individually and analysed and subsequently summarised for each category. The results are then differentiated into spatial and sectoral issues and consolidated within the eight categories.

4.2.1 Measurement of spatial competitiveness

In an exploratory article, Thompson (2003) shows that worldwide competitiveness is recorded in different countries annually by different indices, such as foreign direct investments and clusters of industries. Economic growth is positively affected by the transfer of technology and facilitation of knowledge in industry clusters. However, what these indices measure is uncertain as there is no widely accepted definition of competitiveness. There is even less consensus about the factors that contribute to national (and thus regional) competitiveness. This is also the case for national competitiveness programmes.

Concerning the factors that contribute to competitiveness, Cambridge Econometrics (2003) performed a study on the influencing factors of regional competitiveness. The study concludes that "*the causes of competitiveness are usually attributed to the effects of an aggregate of factors rather than the impact of any individual factor*." [Cambridge Econometrics / Ecorys NEI (2003), p. 7-1] It is therefore difficult to isolate effects. The study looked in more detail at GDP per capita, disaggregated into productivity, hours worked per employee, employment rate and dependency rate. Only productivity seemed to be important when analysing the growth of GDP per capita. Indicators of productivity in a region are catching up effects, R&D intensity, specialisation in high-tech activities, spillover effects and the educational level of the workforce. "*Infrastructure effects and investments showed little or no correlation with productivity levels*" [Cambridge Econometrics / Ecorys NEI (2003), p. 7-1]. This last point suggests that infrastructure is necessary, but not sufficient to explain (regional) economic performance.

Lengyel (2003) constructed a 'Pyramid Model' of competitiveness, which was enhanced by Gardiner (2004). Lengyel distinguishes direct and indirect components of factors that influence regional competitiveness. Economic output, profitability, labour productivity and employment rates are important factors. But success determinants with indirect impacts also need to be taken into account such as social, economic, cultural and environmental processes.

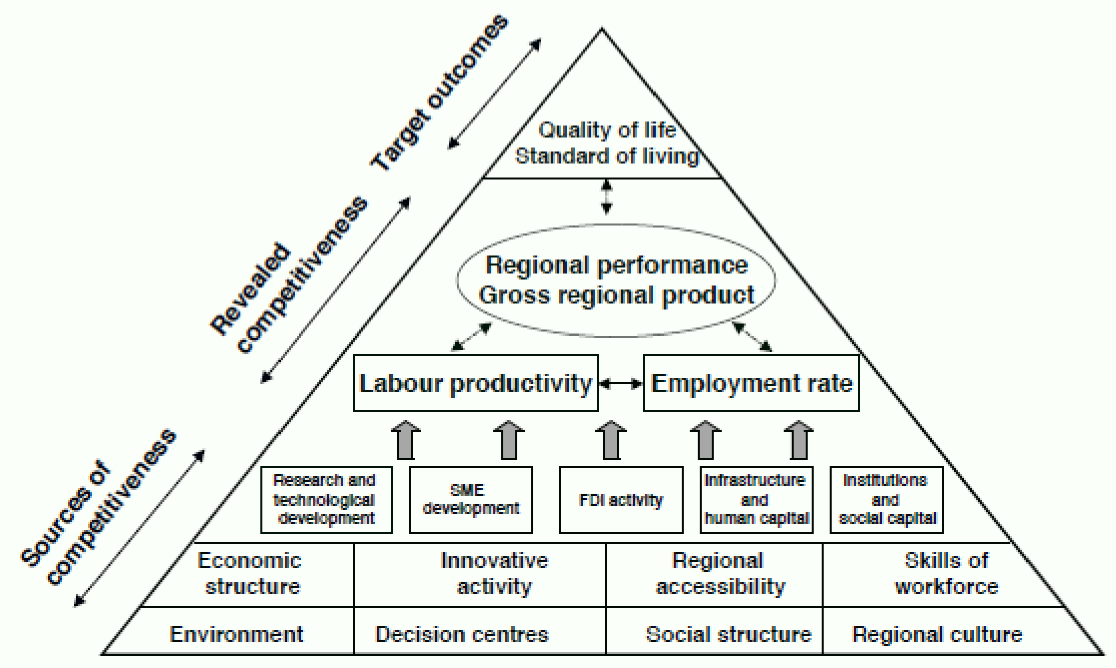
With regard to the objective of regional development programmes and the various characteristics and factors influencing competitiveness, Lengyel distinguishes three levels:

- *Basic categories* which measure competitiveness, including income, labour productivity, employment and openness.
- *Development factors* which have an immediate impact upon the basic categories.
- *Success determinants* comprising social and environmental conditions which have an indirect impact on the basic categories and development factors.

Lengyel places the characteristics that determine competitiveness on a chart, which forms a pyramid. Figure 4-1 illustrates this pyramid, which was improved by Gardiner (2004).

Concerning the development factors, Lengyel mentions certain indicators that, when taken together, provide an indication of the regional competitiveness. These indicators comprise research and technological development (RTD), small and medium sized enterprises (SME), foreign direct investment (FDI), infrastructure and human capital, and institutions and social capital. Infrastructure is regarded as serving competitiveness rather than improving it by catering to the needs of local sectors and clusters. This seems to be in line with the conclusion of Cambridge Econometrics on infrastructure [Cambridge Econometrics / Ecorys NEI (2003)].

Figure 4-1: Pyramid model of regional competitiveness



Source: Gardiner (2004)

Concerning the success determinants, Lengyel distinguishes the following:

- Economic structure
- Innovative activity
- Regional accessibility
- *S*kills of workforce
- Social structure
- Decision centres
- Environment
- Regional identity.

Accessibility is listed as a factor, which contributes to (regional) competitiveness. The accessibility, transport networks and geographical location of successful regions seem to be more advantageous than those of other regions.

As an example, the National Competitiveness Council (NCC) in Ireland uses a pyramid model to address the factors affecting national competitiveness. It distinguishes policy inputs and essential conditions. The policy inputs are related to the business environment, the physical infrastructure and the knowledge infrastructure. The essential conditions include business performance, productivity, prices and costs, and labour supply. All of these together should lead to sustainable growth. The factors are benchmarked against 21 other countries such as Singapore, the US, Switzerland, the Euro area and Denmark.

In the National Competitiveness Council's (NCC) report, physical infrastructure is regarded as an important factor for competitiveness: "*Infrastructure quality impacts upon many aspects of a firm's ability to do business – it determines the ease with which goods can be moved and the efficiency of delivering services remotely. The quality of a country's infrastructure also affects the mobility of labour and quality of life. Finally, the stock and quality of infrastructure can affect the attractiveness of the country in the eyes of investors and potential high skilled migrants* [National Competitive Council (2012), p. 103].

Not only at a national level, but also at EU level, policymakers are focusing on competitiveness. The EU has devised different strategies to make its economy more competitive. The current competitiveness strategy is laid down in the Europe 2020 strategy. The overall goal is to promote national and regional policies to encourage growth and jobs over the next decade [EC (2010c)].

Every two years, the WEF publishes the report "*The Europe 2020 Competitiveness Report: Building a More Competitive Europe"* on the competitiveness of the EU [WEF (2012b)]. The Europe 2020 strategy and its flagships form the starting point for the report. The flagships comprise items such as Digital Agenda, Innovative Europe and Education Training. The Competitiveness Report assigns scores to each country for the EU27 and for the US, Japan, Canada and the BRIC countries for each of the flagships.

However, there is no focus in this report on transport infrastructure. In line with other studies, the WEF defines national competitiveness as a set of factors, policies and institutions that determine a country's productivity.

At EU level, Schade [Schade 2006)] analysed the contribution of transport policies to the competitiveness of the EU economy. The analysis tried to address how transport contributes to the competitiveness of the EU. It looked at the operating costs of transport, congestion, trends, infrastructure and the productivity development of transport. Despite the valuable contribution of this analysis, "*how transport improves competitiveness could not be provided in a quantitative manner"* [Schade (2006, p. 2] and was addressed in a qualitative way.

To summarise this section, spatial competitiveness is a concept that looks at the **productivity** on a certain geographical scale, such as a region or a nation. Its productivity is benchmarked against other regions or nations. Productivity is dependent upon different factors, such as innovation, qualification of the labour force, state-of-the-art production processes, etc. These can be extended to include factors such as accessibility. We do not elaborate the other factors that can be included.

4.2.2 Spatial competitiveness related to TPMs

According to Gardiner (2004), spatial competitiveness can be measured by looking at the gross product, labour rate and labour productivity of a geographical entity such as a region or nation. Changes in several other factors induce growth of these indicators. One of them is accessibility. Gardiner mentions regional accessibility, but a region can easily be replaced by a nation. As transport systems determine the accessibility of a region or nation, we analyse the different TPM categories in the light of a change in accessibility.

Accessibility is a term with many definitions. It refers to the ease of reaching a place. Accessibility is often expressed as a function of generalised transport costs. These are often weighted with opportunities, such as jobs, inhabitants or shops. Generalised transport costs are usually based upon a mix of travel distance, travel time and travel costs. Travel distance can be translated into costs. Usually variable costs, such as fuel costs, are related to distance. Travel time is often related to fixed costs, such as driver salaries. Items such as reliability or comfort can also be translated into costs. Finally, transport may include fees or tolls. To summarise, an increase in generalised costs will reduce spatial competitiveness, while a decrease in generalised costs will increase the spatial competitiveness of a region.

One aspect must be kept in mind. As mentioned before, the opportunities available (jobs, shops, etc.) in a place determine the accessibility as well. An easily accessible place offering no opportunities will see no economic growth. This is also the case when looking at a region or country. So when assessing the TPMs or TPM categories, improving accessibility may increase competitiveness. For the remainder of this section, we will assess competitiveness for the different TPMs by looking at the impact on accessibility.

Pricing

Pricing TPMs influence all transport costs including travel or transport time (generalised costs):

In *passenger transport*, ‘pricing’ measures change transport costs and thus generalised costs. When applied to accessibility, any change in generalised costs will lead to a change in accessibility. If pricing measures are being taken, this will influence the accessibility and thus the competitiveness of a region.

For passengers, any change in transport costs affects their personal budgets. If transport services cannot be changed, higher or lower transport costs modify the individual's disposable income. This may impact the regional economy.

Concerning work-related transport, such as business, the extra costs might be borne by the employer. From the perspective of accessibility, there will be no change. Competitiveness is not at stake in this case. However, as the extra costs also reduce the employers' turnovers and profits, they may ultimately have some impacts on competitiveness.

In *freight transport* 'pricing' measures change the total transport costs and thus the total generalised costs. This in turn affects accessibility. However, like the work-related purposes in passenger transport, freight transport will pass its extra costs on to clients and shippers to a large extent. In the end, this will result in lower competitiveness, not through a direct change in accessibility, but through indirect effects on turnover and profit.

Distribution effects may occur as well for passenger and freight transport. These mainly concern transit traffic. If transport costs rise, consumer preferences may alter and lead to a shift in disposable income. Concerning freight transport, the transport costs will usually be passed on to the receiver. This will affect the region or nation where the goods are located.

Taxation

Taxation changes transport costs. How it does so depends on whether taxes concern initial costs or periodic costs. Initial costs concern taxes imposed upon purchasing a car, for example. Periodic taxes concern taxes that return periodically (monthly, yearly), such as the tax on using a vehicle.

Duties and VAT are also included in taxation measures. Changes in duties and VAT also impact accessibility. Those extra costs that can be passed on to clients, shippers or employers do not affect accessibility and thus competitiveness. However, in the end, these costs do have an impact on disposable income, turnover or profit. And if these are reduced, competitiveness may be at stake.

Effects may be redistributive as well, for example, in the case of duties or VAT. This might be felt by regions or nations other than those where the taxes or duties are levied.

Infrastructure

If infrastructure is altered, it depends whether the variables of time, distance or perception (reliability, comfort etc.) are changed, and thus the generalised costs. In general, any reduction in travel time or distance improves accessibility. An improvement in how infrastructure is perceived, such as its level of reliability or comfort, also increases accessibility and thus competitiveness.

Infrastructure measures concern both links and nodes for different modes in both passenger and freight transport. The links may concern road, rail, or waterways. Services are also included, such as changes in timetables. Nodes may be ports, terminals, stations or airports.

There are multiple TPMs that impact accessibility like:

- Removal of bottlenecks thus reducing travel time and increasing reliability
- Introduction of traffic management to reduce congestion and thus travel time
- Removal of a missing link, thus changing distance and travel time
- Change in capacity resulting in a change in travel time
- Change in maximum speed thus changing the travel time.
- Improving infrastructure, leading to increased comfort
- Increasing the frequency trains, buses or liner ships.

Whatever the measure, any change in distance, travel time or perception leads to change of accessibility and thus competitiveness. In this sense, there is no difference between passenger and freight transport. Both stand to profit from improvements in infrastructure.

Distribution effects may occur as well when developing or improving infrastructure. Transit traffic may also profit, thus increasing the competitiveness of other regions or nations. The extent of these effects depends on the volume of transit, which again will vary per region or nation.

Internal market

The internal market TPMs concern measures as liberalisation of markets, removing administrative and regulatory barriers, improving job quality and working conditions or introducing security certificates. These TPMs have less impact on travel distance or travel time. However, the liberalisation of transport markets also encourages new market entrants which may lead to better services or/and lower prices. Any reduction in transport costs will lead to reduced generalised costs and thus improve the accessibility of the EU, its member states or different regions within the member states. This will improve competitiveness on a spatial level.

Redistributive effects may occur, but this depends strongly upon the type of measure involved. If such effects occur, some regions or countries profit, while others are negatively affected.

Efficiency standards and flanking measures

TPMs classed as efficiency standards and flanking measures concern transport safety measures, environmental measures, as well as promotion, information and dialogue measures. These measures may increase transport costs in the short term as they require the introduction of new technologies. An increase of transport costs may negatively affect accessibility but improve the quality/safety of transport which is also important. Promotion measures will have an impact on competitiveness, but do not affect transport costs.

Transport planning

Transport planning influences spatial competitiveness at a local or regional level. TPMs in the ASSIST category of transport planning are mostly related to urban mobility. These concern the promotion of car sharing, P&R systems and urban logistics etc. Such measures should lead to more efficient urban transport which widens the range of transport options in urban areas. However, if there are any measures that limit accessibility, such as increased parking fees, competitiveness can be negatively influenced. In contrast, other areas may become comparatively more accessible and thus more competitive.

Research and innovation

TPMs in this category concern further technological developments of modes and infrastructure. These also include transport information systems, management and services. It must be kept in mind that research and innovation by themselves do not directly contribute to a change in accessibility. In fact, these TPMs can be regarded as preparatory measures for TPMs in other categories.

Concerning competitiveness, research and innovation can be seen as contributing to employment and the gross domestic or regional product. Transport research and innovation usually take place at institutes and organisations located in specific regions. As such, these organisations contribute to the local economy and its competitiveness.

Other

TPMs in the category ‘Other’ (‘Flexible working hours’ and ‘Teleworking’) have varying impacts upon accessibility. For instance, in the case of promoting telework, there is an important impact. However, the measure itself does not contribute to changes in accessibility as it only concerns the promotion. But, if it is implemented as a result, it will significantly affect accessibility and competitiveness.

Telework can reduce work-related transport costs because it replaces physical journeys. The extent of saved resources (time and costs) depends on the distance between the place of origin and destination. The exact impact on competitiveness is diffuse. Telework may substitute trips, but may also generate other new trips (for shopping or leisure). Although this field has been researched for some decades now, there are still some open questions.

4.2.3 Measurement of sectoral competitiveness

In addition to the definition of spatial competitiveness, the EC states that the indicators relevant for sectoral competitiveness can be grouped under four headings, which are:

- Industrial structure
- Industrial interrelations
- Growth and productivity
- External trade

The **industrial structure** comprises two factors: industrial specialisation, which covers the comparative advantages of countries, localisation factors and policy choices that determine the intensity of an industry’s presence in the specific member state. The second factor is the organisation of the industry, more specifically, the presence of economies of scale in the operation of various sectors.

Industrial interrelations cover the complexity of interrelations which increase with the level of industrialisation and the development of new products.

Growth and productivity on the one hand depends on the importance of the indicators of added value, degree of industrial maturity, speed of structural change and direction, as well as labour productivity per hour. On the other hand, it concerns the growth effects of competitiveness indicators such as unit labour costs (improves competitiveness in international markets) and the development of relative prices. Not least, the factor of profitability (gross operating rate) is another key indicator of success and the economic competitiveness of businesses.

The last group of indicators relevant for sectoral competitiveness covers **external trade** indicators such as world trade matrices, product trade composition, trade balances and indices of revealed comparative advantage [EC (2005e)].

Thus, as key dimensions of industrial performance and the relevant characteristics, the EC identifies labour productivity, unit labour costs, measures of international trade performances and indicators of revealed comparative advantages.

In comparison, O'Mahony and van Ark's definition exclusively concerns the competitiveness of the manufacturing sector, as the sector with the highest international trade. Similar to the above mentioned EC definition, the most relevant factors describing competitiveness are relative labour productivity and unit labour costs. *"Unit labour costs are defined as labour compensation per hour worked divided by labour productivity (in per hour worked terms)"* [EC (2003), p. 103].

It becomes obvious that, although competitiveness is a multidimensional concept, **productivity** and **unit labour costs** play a significant role in determining sectoral competitiveness.

Sectoral competitiveness and impact assessment

In general, in order to perform an integrated assessment of all impacts of current or future policies, a sectoral analysis should be useful to identify how the TPMs affect different business sectors and / or specific sectors.

Therefore, it first has to be determined whether a (transport) policy measure has a significant effect on the sectoral competitiveness of a business, assuming that one of the following aspects changes:

- Cost / price competitiveness: The sector's capacity to produce goods at lower cost and / or the ability to offer them at lower competitive prices. Often this is affected by direct or indirect changes of input or factor costs within production.
- Innovative competitiveness: There might be changes which concern the originality or quality of the goods and services supplied or the technological development and innovation, which result in lower input costs and output value.
- The undistorted access to external markets, an effective market competition and the sector's international market share.

Hence, sectoral competitiveness is closely linked with (increasing) productivity and its fundamental determinants as qualitative and quantitative changes of inputs and technological improvements as well as unit labour costs and price / quality competitiveness.

In addition to the impact assessment guidelines [EC (2009k)], the ASSIST impact assessment also identifies positive impacts on businesses, instead of mainly focusing on negative effects. However, the EC advises to screen for negative impacts of policy options if they specifically affect the rules concerning liberalisation and internal market measures, market barriers, specific commercial and competition rules, sectoral rules pursuing economic, environmental or regional policy targets as well as general rules steering economic operation [EC (2012a)].

It becomes obvious that there is a huge variety of definitions, concepts and indicators linked to sectoral competitiveness, which depend on the overall framework of analysis. It makes sense to start with to determine and emphasise that the general context of the subsequent sectoral competitiveness analysis is mainly based on the results of the TPM impact assessments.

For the ASSIST purposes, we decided to generally distinguish sectoral competitiveness for two different types of sectors according to the affected segment:

‘Intra-sectoral’ (modal) competitiveness

Hereinafter ‘intra-sectoral’ changes of competitiveness deal with the structural (modal) shifts within the transportation sector which imply changes concerning the competitiveness of transport operations. If possible, the changes to their competitiveness due to the individual transport policy measure will be explained using variable modifications in terms of cost, time and level of service (reliability, frequency etc.).

- Road transport operators
- Rail transport operators
- Inland waterway transport operators
- Maritime transport operators
- Air transport operators
- Public transport operators

'Inter-sectoral' competitiveness

In contrast, the 'inter-sectoral' level identifies the direct and indirect impacts and consequences of measures regarding the competitive preconditions for clustered economic sectors (and services) on a broader scale.

The main economic sectors whose competitiveness is influenced by both direct and indirect policy measure impacts are:

- Transportation sector
- Automotive sector
- Aviation equipment industries / Aviation research and development
- Retailers
- Jobs in the service sector / IT based jobs

Table 4-1: Results of the sectoral competitiveness analysis

Category	Transport operators (intra-sectoral)						Economy
	Road	Rail	IWW	Air	Maritime	Public Transport	
1.Pricing	+	++	+	++			
2.Taxation	+	+					+
3. Infrastructure	++	++	++		+	+	
4.Internal Markets	++	++	++	++	++		+
5. Efficiency	+		+				++*
6. Transport Planning	++	+				+	
7. Research & Innovation	++	++	+	+	+	+	+*
8. Other							+*

Source: Progtrans

Remarks:
++ major / + minor influence of impacts on competitiveness
Colouring: Predominant effect (positive/negative) for economic sectors according to Table 3-10
* Relevant economic sectors described in chapter 4.2.4

4.2.4 Sectoral competitiveness related to TPMs

In a holistic consideration of measures and their impacts on competitive aspects, it becomes obvious that positive effects prevail with respect to the general European policy objectives. Although negative intra- and inter-sectoral impacts and effects appear, they do not seriously influence the competitiveness of transport operators or economic sectors.

Secondly, it can be generally stated that transport policy measures affect aspects of “intra-sectoral” competitiveness to a much greater extent than “inter-sectoral” competitiveness.

Furthermore, the analysis revealed that some intra-sectoral transport operators are affected by TPMs much more than others; mostly road and rail transport service suppliers. This is clearly caused by the type (recipient) of measures in the different categories.

Pricing

Pricing measures generally lead to modified mode-specific transportation costs, thus affecting the competitiveness of transport modes. Most impacts related to competitiveness concern intra-sectoral issues such as the shift of passenger transport demand or the increasing competitiveness between transport operators of different modes. Compared with other categories it is obvious that pricing measures are some of the few which have a negative influence on sectoral competitiveness, especially for road and air transport operators.

Taxation

If there any impacts on sectoral competition related to taxation measures, they are negative ones. If transport costs increase, both, intra- and inter-sectoral competitiveness are affected. Only non energy-intensive industries can benefit from the analysed taxation measures (‘energy taxation’), because, at sectoral level, the energy-intensive sectors and especially those using coal are the most negatively affected in terms of production, although the overall impact remains small. In some sectors and countries, the prices may even decrease through the interaction of supply and demand in the labour and goods markets and their impacts on the cost of production factors.

Infrastructure

Most of the impacts related to sectoral competitiveness are positive and benefit land-based transport operators the most. Nearly all the impacts concerning sectoral competitiveness are related to positive modal competitiveness. This is due to the fact that the analysed TPMs mainly lower transportation costs and thus have a positive effect on the demand / supply of transportation services.

Internal markets

All the impacts concerning sectoral competitiveness affect almost all transport operators significantly as well as positively. As the category “Internal markets (intra-modal)” already states, the impacts mainly target specific transport modes and therefore do not affect other modes. Nevertheless, there are also impacts affecting the inter-sectoral competitiveness of businesses, for instance, the measures Single European Sky II and SESAR (aviation equipment industry, aviation research and development). The first measure is expected to decrease the competition between the airspace navigation service providers, while the latter should strengthen the European air transport industry (equipment manufacturing, research & development sector) compared to air transport industries outside the EU.

Efficiency standards and flanking measures

There are comparably few impacts affecting the sectoral competitiveness of the relevant segments. All the competitiveness-related impacts were assessed as positive; all the competitiveness impacts affecting transport operators are related to changes within specific transport modes rather than the competitiveness between modes. In general, the analysis revealed that measures within this category have the most frequent and positive (inter-sectoral) effects, particularly concerning the competitiveness of the European automotive industry.

Transport planning

All the impacts of the measures analysed within the category transport planning are on intra-sectoral competitiveness. In addition, they mostly affect public transport and / or road / rail transportation. It is obvious that ‘transport planning’, which mainly consists of measures related to urban mobility, basically positively influences the competitiveness of the (urban) public transport sector due to the external support provided and the fundamental political intention of shifting demand to help decongest urban areas. The economic sector comprising retailers (in urban areas) is affected positively by competitiveness impacts, mainly due to changes concerning the optimisation of urban transport management.

Research and innovation

Overall, the assessments concern the support of current research and innovation activities rather than targeting a specific objective of European transport policy. The analysis shows that competitiveness impacts within this category are intra- as well as inter-sectoral. Almost all the impacts are positive; mostly road and rail transport services benefit from sectoral impacts. More than one TPM implies increased intra-sectoral competitiveness for several transport modes (RTTI, E-Freight). The economic sectors most positively influenced in their competitiveness are the automotive industry and rail technology-related industries.

Other

The minor number of measures ('flexible working hours', teleworking') allocated to this category all have positive inter-sectoral impacts, which mostly concern service-related jobs (not directly production-related ones) due to the restricted field of application. This means that the measures help to increase enterprises' competitiveness, but there are no significant transport system-related impacts on travel and transport time or transport cost changes between transport modes and thus no intra-sectoral / modal shift.

It becomes very clear that the competitiveness analysis represents a first attempt to provide insights into the impacts of TPMs. It makes no claims to be complete; further and measure-specific assessments focussing on competitiveness are needed, preferably supported by additional quantitative investigations, interviews or surveys.

4.3 Excurse – ageing societies

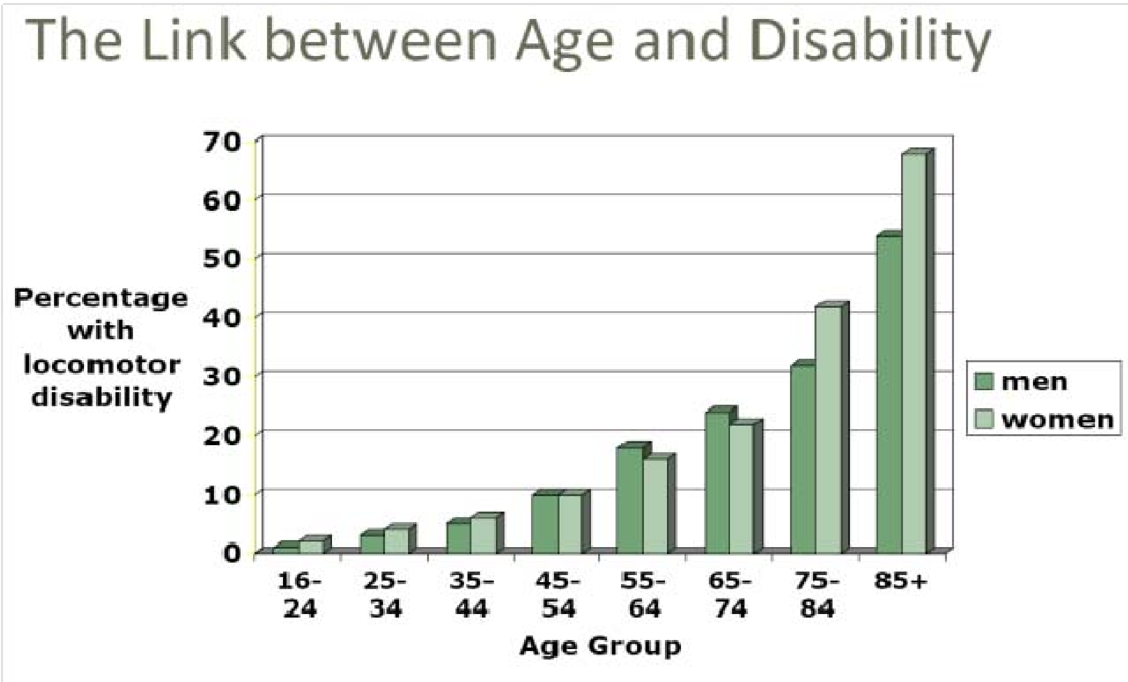
Transportation is a crucial sector for the whole society. It allows people to participate in business and in social life, as it brings people together. Derived from this needs, European transport policy has to take care that citizens have barrier-free access to the transport system.

The demographic change in most European countries and the increasing fraction of elderly people in several economies require an adoption process for different areas of upcoming policies. Demographic projections confirm that the share of people aged 65 years or more on total EU population will increase from 17% today up to 29% in 2050. The requirements and expectations of this growing group need to be considered and a way to adjust the system to their requirements needs to be found. In order to adapt the transport system to the needs of elderly people, an analysis of the specific transport patterns is required.

At first, no common and homogeneous transport pattern can be observed for the group of elderly people. A large fraction of elderly people is still physically and mentally able to realise its mobility needs without constraints. Nevertheless, the share of people with disabilities increases in older age classes (cf. graph below):

Generally, it’s possible to differ older people by physical and mental characteristics, travel patterns, life styles and transport needs [GOAL (2012)].

Figure 4-2: The correlation between age and frequency of disabilities



Source: Frye (2012)

- On average, elderly people make less daily trips than people of other age classes.
- The average modal split differs as well from other societal groups. Elderly people use more often bicycles, they walk or they use public trans-ports (Walker 2004).

This reflects the average behaviour of the current old generation.

In fact, differences between past and current travel surveys determine that the group of older people is getting more mobile. Their transport performance increased by 26 % from 1996 to 2004 [Frank (2004)]. Additionally, the share of older people with a driving license is increasing due to the steady growth of women with a driving license. This trend is supposed to maintain in the future due to a high share of people owning a driving license in the following generation; several studies confirm this trend [GOAL (2012)].

The state of health of old people plays an important role in their travel behaviour. They have less stamina and a reduced walking speed which indicates that they’re limited in the maximum distance to a destination [Kose (2012)]. Their ability of cognition and reaction directly affects other transport participants. When elderly people with a handicap take part in traffic, they have to face some difficulties and obstacles. Stairs and steps are causing problems for them as well as lacks in cognition lead to problems like recognising signs or traffic announces. They have an extended reaction time and therefore their accident risk in road traffic is higher (ILS NRW 2005). Not only as car drivers but also as pedestrians and cyclists they have to face a higher accident risk. Therefore, transportation safety issues play an important role in the design of specific transport policy measures.

Studies reveal that age does not exclude people from driving cars. Exclusion factors are “physical mobility and health status as well as driving competence and availability of a car” [GOAL (2012)]. As shown in the graph above, a high percentage of elderly people aren’t in the physical estate of driving a car. Therefore, an alternative mean of transportation for them is needed. Thus, the first thing coming in mind is public transport. But can public transport fulfil the expectations of older people?

Elderly people and public transport

When elderly people use public transport, the factor accessibility plays the most significant role. For handicapped and immobile persons a few things have to be considered. First of all they need to get to the next public transport station. A station near their home is essential; otherwise the risk of social exclusion increases significantly. A widely ramified net of access points to public transport is needed. Plans like using bikes to increase the radius of public transport without building new stations are counterproductive because immobile old persons most often are not capable of riding bicycles [Deutscher Landkreistag (2010)].

Second, immobile persons need an easy access to get into the means of trans-port. Therefore, barrier- free entrants and stations need to be developed. Currently, not all stations, trains and buses are barrier-free; however the present developments are positive. For the case of Germany, since 2004 all new stations, trains and buses need to be accessible and should be used barrier-free as far as possible (Deutsche Bahn 2005). In addition, many train stations have been restructured to fulfil the needs of immobile people. Nevertheless, revising and adapting all stations, trains and buses in Europe would require giant investments. In 2010, there were about 18.000 passenger trains running in Germany. In the EU, about 102.000 passenger trains are in operation [European Commission (2012h)].

Another aspect which needs to be kept in mind is the cost of public transport. Usually, public transport companies are not cost- effective. They are facing deficits and thus still need to be subsidized by national or local governments. This deficit will most probably even increase in future because of the following three aspects:

1. The demographic change does not only lead to a higher share of elderly people but also to less young people and students. Nowadays, public transport especially in rural areas mainly performs the transportation of students. With a declining number of these, the deficits will even in-crease. Besides, a decreased use of public transport by younger people cannot be made up by an increased usage of public transport by older people [Heinze (2007)].
2. A typical solution for the question on how to react with increasing numbers of elderly people is to invest in public transport. A dense and improved public transport network will attract new customers and especially old people. This hypothesis might be true for elder immobile persons, but it’s not likely that it will lead to an increased usage by elderly mobile people. Besides, improvement in public transport is linked with high investment costs.
3. Adapting public transport to the needs of older people means creating barrier-free access, which requires lots of investments. For example, re-constructing a bus station to be barrier-free costs about 15.000-30.000 Euro [Nahverkehr Rheinland (2012)]. Several examples demonstrate that in-vestments in barrier-free train stations millions of Euro [Osthessen News (2012); Rems-Murr-Kreis (2012)]. On average, German Rail invested about 720.000 Euro per station. About 1.600 stations (30%) still remain being not barrier-free which will cause investment costs of approximately 1.15 billion Euro [VDV (2012)].

Mitigating disadvantages for the current public transport system will cause further deficits for public transport. However, the operators of public transport are aware of the need to take older people demand into account. The International Union of Railways states that they need to manage “the effects on the rail sys-tem workforce of a population that is living longer” [UIC (2011)].

Other factors preventing elderly people from using public transport is the complexity of the ticketing system. Companies reduce staff for ticket offices and enhance online ticket sale and sales via machines. In many cases, online tickets are cheaper such that elderly people, due to their arduousness operating such purchase systems, have to cope with higher ticket prices than younger people. Nevertheless, regarding future generations of elderly people, it can be expected that they will be more familiar with information technologies.

Elder people and individual transport

Comparably, today’s generation of retired persons have a higher motorisation rate than each generation before. Even very old people that were driving by car for decades are convinced that they are able to drive their car safely. Nevertheless, their time of response is quite slow such that the risk of causing an accident increases. New technologies can reduce this risk. Car manufacturers offer for current passenger cars an increasing series of advanced driver assistance systems (ADAS) which can assist people while driving. These systems improve safety for the driver but also for all other participants in the transport system. Until now, manufacturers offer these systems still as costly extra equipment in most cars. In 2010, average costs for equipping a car with ADAS were about 3.200 €. According to experts, investment costs are expected to increase up to 4.300 € per car in 2015 [Deutscher Verkehrssicherheitsrat (2006)]. Additionally, there are still fundamental open judicial questions related to the use of ADAS.

Another technical innovation that enables elderly people to maintain mobile is the electronic bike. So-called e-bikes have an electric motor supporting the cyclist. Electronic bikes are an alternative for elderly people which still have a good sense for balance. They can help to overcome larger distances to public transport stations. As well as for passenger cars, there is a higher accident risk due to decreasing response time.

Consequences for EU transport policy measures

The rising share of people aged 65 or more in the EU can change the assessed impacts of at least a number of TPMs. The trip-making behaviour of this social group differs from the other age groups even if it shows tendencies to change over time. On average, less daily trips are made by persons in this group. On the one hand, the modal share of public transport and for walking is significantly higher than for the average population. On the other hand, the share of persons aged 65 or more owning a driving license increased significantly over the last decade. Nevertheless, the growing importance of this social group can induce a slight decrease of the overall transport demand.

As more and more elderly people still use their own car, especially the design of those TPMs that deal with innovations for passenger cars need to take care of the specific requirements of this social group. The upcoming generation of people aged 65 or more can be considered as increasingly competent in terms of information technology than the current one. Nevertheless, the transport industry has to consider specific disabilities of this group in designing ITS. Information needs to be provided and should be available in an easy readable way, with capital letters or even with an audio support. This concerns especially the TPM *‘Deployment of roadside-based ITS infrastructure for information services’*.

A policy that tackles the implementation of ADAS is the TPM *'Safety of road transport by means of ITS'*. Creating standards for passenger cars are a major benefit for elder people as they would not need to buy this technology as extra equipment.

Mitigating disadvantages for people aged 65 and above would mean to re-construct stations, trains and buses in order to make access and use barrier-free public transport systems. Especially this social group is often not able to compensate the necessary investments by higher ticket prices. As opposed, public transport companies even offer rebates to this social group. Increasing ticket prices for other age groups would lead to a decreasing modal share of public transport especially in urban areas which is not desired. Cordon charging systems like in London could be used to finance necessary investments in public transport. The *'Versement Transport'* system in France is another example for a successful approach to internalise these costs. Since 1973 all employers with more than 9 employees need to pay a small share of the total wages paid by their company as a contribution to the costs of public transport. The justification for such a cross-financing is given by the fact that public transport companies need to establish the maximum capacity for the peak hours which are mainly used to carry employees to and from their work place.

5 Main findings of TPM analysis

This chapter provides an overview of the main impacts of a significant number of TPMs. The purpose of this summary is to describe briefly each TPM and to highlight its key findings of the impact assessment focusing on economic, (especially) social and environmental impacts. It has to be emphasised that, where possible, social impacts in general or on groups have been defined in the context of economic and environmental impact assessments. The detailed TPM impact assessment is attached in Annex 3 in the form of fact sheets.

5.1 Pricing

Area charging / cordon pricing (c.f. Annex 4 – p. 187/188)

Description: Motorised vehicles are usually charged for entering or driving in an area, often a city centre. Motorised vehicles are charged for the use of road in a certain area and/or during a particular period of time. By increasing the cost of travelling at certain times, in certain areas and/or along certain routes, policy makers attempt to influence the demand for road use.

In area-based congestion pricing (“area charging”), drivers pay to enter a designated area and/or to drive in that area. The disadvantage of area charging is that it is (in practice) more difficult to implement than cordon-based pricing, especially if the charging area is large. This is because all cars within the pricing area have to be monitored. With “cordon-based pricing”, only cars entering the cordon have to be checked. The disadvantage is that vehicles that remain in the area (i.e. polluting vehicles) will never be charged.

Key findings: In practice, various aims can be distinguished when tolling systems are used: reduce car traffic and emissions (pollution/noise), finance public transport, create additional revenues, or a mix of these. Both systems (area charging, cordon pricing) result in a reduction of the modal share of the car, in favour of public transport and slow modes, resulting in a reduction of greenhouse gas emissions. Due to charging, car drivers are forced to reconsider their choice of mode (of transport).

Economic impacts: The effectiveness of the pricing measure to remove congestion depends on local conditions. It is important to realise that even after introducing the measure, congestion might remain: e.g. due to frequent loading/unloading of trucks in narrow streets without designated (un-)loading areas or insufficient travel alternatives (e.g. public transport). Therefore, before area charging / cordon pricing is introduced the local situation should be analysed. Policy makers can then design a well-balanced set of additional measures/solutions and communicate these to the public. Finally, the spatial and sectoral competitiveness between the charged and non-charged areas may increase. For example, shopping opportunities might be shifted to other non-charged areas.

Social impacts: Residents within the charged area will benefit from this. The use of public transport and slow modes will increase, car use will decrease. Society will benefit (directly or indirectly) from the collected revenues. Employers will show a tendency to move towards the outside of the charged area. It is likely that high income groups are not sensitive to charges. On the other hand, low income groups are more sensitive to this policy measure.

Environmental impacts: Provided a thorough analysis of the local situation has been conducted and the measure has been properly implemented the measure of area charging / cordon pricing will lead to less transport in the city centre, and with that to a reduction in pollution and noise.

Railway infrastructure charges directive [2001/14/EC] (c.f. Annex 4 – p. 189/190)

Description: This Directive encourages the establishment of fair and efficient charging systems for the use of infrastructure, thus allowing for fair competition between different transport modes. Investment in railway infrastructure is desirable. Infrastructure charging schemes will provide incentives for infrastructure managers to make appropriate investments where economically attractive. It paves the way for optimal use of existing rail infrastructure.

This transport policy measure adopts, as far as possible, the "user pays" principle, thus allowing private investors to charge the full cost of construction and maintenance. This creates acceptable revenue streams, which in turn will make railway infrastructure investments more attractive to private capital.

Key findings: Charges per train kilometre vary greatly in a comparison across countries. From less than 1 Euro per train kilometre in Scandinavia to charges of up to 11 Euros per train kilometre for freight in Eastern Europe. This cost diversity is partly due to genuine differences in costs because of ground conditions, average train weight, age levels, etc. However, it is likely that much is also due to differences in the degree to which governments are willing (and/or able) to bear the costs of infrastructure. Some countries aim at near full cost recovery, simply because of a shortage of government resources. In some countries rail infrastructure is subject to cross-financing.

Travel/transport-time and risk of congestion benefit from this measure, because aspects like trip planning are scheduled (with scarcity in mind) and reservations have been made for the use of ancillary services (station use, marshalling yards, etc.). In order to reduce costs, the lengths of trains can be extended.

Economic impacts: In case of fixed charges per passing, there is a tendency to run the longest possible trains. This is to reduce costs and is often at the expense of a reduced service frequency for freight shippers.

The Directive leaves room for interpretation. The implementation therefore shows great cost charging diversity. Such differences will continue to feed spatial competitiveness. It is important to note that charging and the use of capacity allocation schemes permit for equal and non-discriminatory access to all infrastructure users in a fair and non-discriminatory manner.

It is important to minimise the distortions of competition which may arise, either between providers of railway infrastructures or between transport modes, from significant differences in charging principles. To ensure this, the EU made up financial principles on behalf of free access to railway paths and to preclude cross-financing. These are:

- principle of transparency
- prohibition of cross financing
- principle of cost bearing
- accountancy separation of passenger and freight transport
- principle of open access to tracks

Social impacts: The assessment showed that the concerned measure does not have impacts on a social level. However, Directive 2001/14/EC concerns a charging system for the use of rail infrastructure. It is important to note that charging and capacity allocation schemes permit for equal and non-discriminatory access to all infrastructure users in a fair and non-discriminatory manner. Capacity allocation and planning / allocation of ancillary services (such as marshalling yards) are likely to have a positive effect on safety. However, this has not yet been quantified.

Environmental impacts: The assessment showed minor impacts on the environmental level. Inclusion of, for example, a noise component in rail infrastructure charges, raises some problems. Noise is a non-marketed good, the monetary value of noise abatement is therefore hard to calculate. Another difficulty is to estimate the effect on the noise level that one extra train will create. The advantage of such infrastructure charges is that it provides operators with an incentive to reduce their noise and pollutant emissions [Anger A.; Allen P; Rubin J. and Köhler J. (2008)]

Inclusion of air transport into the EU-ETS in 2012 (c.f. Annex 4 – p. 191/192)

Description: Since the beginning of 2012, emissions from all domestic and international flights that arrive at or depart from an EU airport have been covered by the EU Emissions Trading System (EU ETS). The overall aim of the inclusion of aviation in the EU ETS is to tackle the climate impact of aviation: In 2020 CO_2 emissions are to be 21% lower than in 2005. In general, it should be noted that the emissions reductions will not necessarily be made in-sector as operators can choose not to reduce their own emissions but to buy allowances to cover any excess for which they do not have free allowances.

Key findings: Overall, the air transport sector will be affected by the inclusion of air transport into the EU-ETS: it is expected that most airlines will pass on at least some of the administrative and allowance costs to air passengers via ticket prices, although the impact has so far been minimal. Alternative modes, especially rail, may benefit. However, there are many other factors to consider such as comparative modal prices, journey length, convenience and price elasticity, e.g. business vs. leisure.

Economic impacts: It should be noted that allowances are currently trading at a price much lower than expected so the costs are currently less than foreseen.

Adding air transport to the EU ETS is not expected to have negative impacts on economic growth in the EU or to reduce the EU's competitiveness relative to the rest of the world.

The impact on airline profitability will vary according to the size of the operator and business model. The change to airline profits is expected to be minimal compared to other factors affecting the industry at present such as operating costs and stagnant growth due to the economic crisis.

Social impacts: The overall social effect is likely to be very small; a modest negative impact on employment and lower income groups is expected due to reduced profitability of the air-transport sector.

Environmental impacts: At the EU level, including aviation in the emissions trading scheme may result in a change of yearly CO_2 emissions by -0.09% (allowance price of €5), -0.23% (allowance price of €20) and – 0.23% (allowance price of €40) in 2020 compared with no action scenarios.

Eurovignette - Directive (c.f. Annex 4 – p. 197/198)

Description: The Eurovignette Directive sets out the common rules by which Member States can charge heavy goods vehicles for the use of the road network by distance, time and location. The directives 1999/62/EC and 2006/38/EC recommend the introduction of tolls in all EU countries, requiring hauliers to pay when using interurban roads and main roads. The revision of the "Eurovignette" directive in 2011 introduces the internalisation of external effects.

Key findings: The experience show that transport operators pass on most of the additional financial burden to customers. Despite this, some transport operators regard the measure to be an unequal playing field, as similar measures do not apply to a competing mode such as inland shipping. If competing modes are not charged extra, then these modes become more competitive. In order to compete, transport operators are seeking to further improve their performance (e.g. optimising the load factor, number of empty runs, etc.). However, this is difficult as operators in this sector are already quite efficient. Furthermore, transport operators find it unfair to exclude passenger cars from the discussion and debate. The new directive however will allow the possibility of an additional congestion charge.

Economic impacts: The impact of the ‘Eurovignette’ has two sides. Authorities may decide to exempt isolated or economically weak areas from applying tolls or charges. Furthermore, charges are used to maintain or build infrastructure, which has a positive impact on employment. Negative effects concern the competitiveness of poorer countries and the EU territorial cohesion: poorer countries pay more to richer countries. Also, transport operators and public authorities face additional administrative burdens.

Social impacts: Regarding the social impacts, the measure provides a positive contribution to social cohesion on a regional level: authorities may decide to exempt isolated areas or economically weak regions from applying tolls or user charges.

Environmental impacts: The environmental impacts concern a reduction of noise levels and air pollution. Within modes, a shift may occur from road to rail or barge.

The “Eurovignette directive” concerns freight transport mainly on inter-urban links and therefore primarily impacts the regional and national level. In summary, the directive is a measure to implement the “user pays" and the "polluter pays” principle, to finance alternative modes of transport (cross-financing), to operate a 'modal shift' of freight away from roads (to rail, inland waterways) and to reduce pollution from road freight transport.

Airport charges directive [(2009/12/EC)] (c.f. Annex 4 – p. 199/200)

Description / Introduction: This Directive sets common principles for the levying of airport charges at Community airports. Airports offer a number of facilities and services related to the operation of aircrafts, from landing to take-off, and the processing of passengers and cargo, the cost of which they generally recover through airport charges. Airport charges are paid by the airports users, namely, airlines transporting passengers and/or freight. These charges are indirectly paid by passengers and freight customers via the ticket price or freight forwarding fee. The directive applies to EU airports above a minimum size, handling more than five million passengers per year.

Key findings:

Regarding the traffic impacts, a decrease of vehicle mileage can be expected due to higher transport costs. In return, the Directive encourages adequate quality level of services. The airports users and managing bodies have the possibility to conclude an agreement on the quality level of services in relation to the airport charges.

Economic impacts: The Directive is not likely to have significant impacts on competition: due to the already substantial investment costs the additional costs of the ACD do not create extra barriers to market entry. The Directive might reduce the incentives to compete because it obliges the airports and airlines to reveal financial information. This may also lead to additional administrative burdens. However, the directive might provide some competitive advantages for airports transporting less than 5 million passengers. The sectoral competitiveness (especially in relation to high-speed rail) is reduced due to the cost increases.

Social impacts: Health and well-being impacts are related with changes in local emissions and noise around airports. The wider societal impacts are limited. There will be no impacts on wider determinants such as income or crime.

Environmental impacts: Overall a positive impact on the environment is possible: the Directive on airport charges allows differentiated charging on the basis of environmental damage. The ACD is only supposed to have an impact on noise and greenhouse gas emissions where there is an impact on the costs of airport use and hence change in airport use.

In brief, the Directive aims at a greater transparency between airport operators and airlines regarding the calculation of airport charges. One negative impact is the expected price increase which is likely to be passed on to the passengers and freight transport operators.

Internalisation of external costs for specific modes of transport (road, rail, inland waterways, ports, airports) (c.f. Annex 4 – p. 193/194)

Description: Development of a system institutionalising the "polluter pays" and/or "end user pays the full costs including societal costs" principles, with a view to devising a charging system for application to all modes of transport and their users.

In order to define external costs properly it is important to distinguish between: (a) *social costs* and (b) *private costs*, which are directly borne by the transport user. The latter are sometimes referred to as internal costs, such as fuel/energy, own time, transport fares, transport taxes/charges. Social costs reflect costs which occur due to provision and use of transport infrastructure, examples being: capital costs, wear and tear of infrastructure, congestion, accidents, noise, air pollution, environmental costs, climate change etc.

External costs refer to the difference between social costs and private costs. The measure plans to charge these to the consumer, which otherwise would result in market inefficiencies. Determination of such external costs is therefore a prerequisite to develop strategies to internalise these into total costs and for the implementation of sustainable transport policies.

The measure will lead to the efficient use of the existing infrastructure. Furthermore, as users will pay for the additional costs they generate for society, this will help to ensure fair treatment of both transport users and non-users.

Key findings: Some sectors such as the aviation authorities have advocated their concerns about internalising external costs. Other industries (e.g. power generation, construction, chemical production) which also generate external costs are not covered by this measure.

The measure is expected to lead to more sustainable transport as it encourages manufacturers (i.e. vehicle manufacturers) to make their product more environmentally friendly and more energy efficient, due to market demand. Dependency on scarce and expensive fossil fuels will be reduced Health and well-being are likely to improve as the use of environmental friendly transport modes will increase. Travel mileage might be reduced due to increased costs. The measure aims at generating fair prices for each mode of transport, taking into account external costs.

Economic impacts: All transport costs are likely to increase, but the costs will be paid by the end user. Air transport costs bear relatively high social costs (infrastructure costs, noise, air pollution, etc.). Rail transport may benefit from the measure as its social costs are relatively small. Rail transport will therefore become more competitive.

Road transport costs will increase. Transport operators may pass on these costs and improve efficiency to remain competitive. Passengers will have to carry the costs themselves, they may ask for more efficient cars in order to reduce pollution costs. Also, they may shift modes due to increased costs.

The use of revenues from the measure is an integral part of the EU internalisation policy. Research [CE Delft (2007b)] has shown that 'the arguments in favour or against earmarking are more or less balanced'. This conclusion was reached after studying the relation of earmarking with efficiency, equity and acceptability objectives.

Social impacts: Health and well-being are likely to improve due to the use of environmental friendly transport modes. Society benefits from the principle 'polluter pays' as it will eventually lead to more sustainable transport. Due to the higher costs, some inequality will occur in passenger transport. Persons with higher incomes are likely to be able to bear the costs, while those with lower incomes may have to shift mode.

Environmental impacts: Dependency on scarce and expensive fossil fuels will be reduced. The global warming process might be slowed down. Other negative environmental impacts will be reduced.

Environmentally differentiated landing fees (c.f. Annex 4 – p. 195/196)

Description: The principal aim is to promote environmentally responsible behaviours by encouraging airlines to use aircrafts with lower noise and air quality impacts. The reason is that air transport involves adverse effects on the environment at both a national and an international level. This is particularly valid against the background of high growth rates in the volume of air transport in recent years. While at a global level discussions focus on the significance of the climate impact of air transport, at a local level the focus is on problems of noise. Particularly against the background of growing traffic volume, increasing efforts are being directed at problems of noise mitigation, and economic instruments are becoming even more important. One promising option is the creation of economic incentives for the use of environmentally sound technologies (with less noise and lower emissions) by airlines. To stimulate the use of silent or less noisy aircrafts and to discourage the use of noisy aircrafts, many airports apply a pricing differentiation over and above the base landing and take-off charge.

Key findings: The most desired impact is to stimulate airlines to take into account as one factor among many, the emission fees when choosing new engines for their new aircrafts, therefore making aviation a cleaner mode.

The measure has no identified impact on traffic demand, however higher costs might reduce vehicle mileage very limitedly.

Economic impacts: Economically the measure is not a popular one. Practically the operators either pay the higher tax, or implements cleaner engines, but in any case they have to increase ticket prices for passengers, or lose their efficiency and competitiveness.

Social and environmental impacts: The measure has definitely benefits in terms of the social and environmental issues. Using cleaner engines causes less noise and air pollution, less night flights improves the quality of life (especially for those who live close to airports). Beside the positive impacts it should be mentioned that lower income groups may be disadvantaged from the measure due to higher costs of aviation.

In any case, negative economic effects are negligible, beside the positive health and social effects both on residents, the society and passengers.

PPP promotion/support: PPP systems e.g. build-operate-transfer (BOT) (c.f. Annex 4 – p. 201/202)

Description: Public-Private Partnerships (PPP) arrangements are the partnership of private and public cooperation. Their main objective is to reduce the investment of public funds and to benefit from the participation of the private sector. In a PPP arrangement, the public and private sectors collaborate in the construction and/or maintenance of public infrastructure projects. The Commission has identified four principal roles for PPPs. They should provide: additional capital, alternative management and implementation skills, a value added to the consumer and the public at large and a better identification of needs and optimal use of resources. The PPP arrangements aim to accelerate infrastructure provision, to reduce lifecycle cost, to provide better risk allocation and to enhance public management.

Key findings: The implementation of PPPs in the investment of transport infrastructure projects will have positive impacts on the economy, on the government households and the success of the projects. It concerns transport investments of all transport modes and services.

As for traffic impacts, PPP promotion can lead to an acceleration of infrastructure provision and a faster implementation of infrastructure projects. Additionally, it improves the quality of service.

Economic impacts: Economically, the TPM induces a reduction of transport cost for users/business and increases the income of public authority and the private sector. PPPs are expected to spread the cost of financing the infrastructure over the lifetime of the asset, thus reducing immediate pressures on public sector budgets. The private sector may be able to generate additional revenues by the use of spare capacity.

Social and environmental impacts: As for social impacts, the success of PPP can generally help the authority to achieve project goals and improve the quality of service of the transportation system. Environmental impacts can both be positive or negative. This depends on the propriety of projects.

5.2 Taxation

Energy Taxation Directive [(2003/96/EC)] (c.f. Annex 4 – p. 203/204)

Description: The Energy Taxation Directive (2003/96/EC) represents the Community framework for the taxation of energy products and electricity. The highest minimum tax rates were introduced for oil fuels (excluding international aviation and shipping). Coal and electricity minimum tax rates were introduced but at extremely low levels. The objective of this TPM is to reduce emissions and influence consumer behaviour, encourage the industry to select low-energy products and to push the use of renewable energy sources (RES).

Key findings: It is expected that this measure leads to an increase in fuel costs. As such, it may shift some traffic from road and rail to other modes for both freight and passenger transport. This in turn will have a positive impact on the use of public transport and slow modes as these become comparatively more attractive, both in terms of emissions and transport costs. The impact on freight will be less substantial, as transport operators may pass on the extra costs to the shippers or consumers. Related to the increase of transport costs, it is also expected that the vehicle mileage by road and rail will decrease. Vehicle mileage of public transport is likely to increase.

Economic impacts: The economic impact is related to the increase in transport costs. Both road and rail are expected to envisage an increase in costs. This will have a negative impact on the revenues in the transport sector if the increase cannot be passed on to shippers or consumers. Also the sectoral competitiveness may decrease. On the other hand, public income will increase. This will enable further improvements in the transport system.

Social impacts: The social impacts are limited to an improvement of health and well-being for the society as a whole, but also for residents near motorways or power plants. It is expected that the increase in taxation has an impact on employment in the road, rail and public transport sector. However, studies conforming this have not been found..

Environmental impacts: The environmental impacts will show an improvement of air quality (fewer emissions), climate change and the use of non-renewable resources. These improvements concern the entire society.

Vehicle taxation (circulation & registration taxes) (c.f. Annex 4 – p. 205/206)

Description: Vehicle taxes are imposed in numerous countries around the world. They can be either levied annually (known as vehicle circulation tax), on the new vehicles' first registration, or on the changes of the vehicles' ownership. In many cases the revenue is earmarked and must be spent on transport infrastructure. Tax rates usually depend on the vehicle’s environmental or engine performance, weight, age, or value.

Key findings: Overall, vehicle taxation negatively influences road competitiveness; however in social terms increasing safety and health level are expected.

Economic impacts: Experience shows that the tax reduces vehicle mileage and limits the risk of congestion. Vehicle taxes can be collected at national or local level. In some countries the revenues must be spent on maintaining or developing roads. The costs of transport increase while competitiveness suffers from the measure.

Social impacts: In social terms, the TPM raises some equality problems. Lower income groups have (on average) older cars, with higher emissions, and in many cases (depending on the national law) their tax rate is higher. However, the state should not support the spread of old and high emission vehicles, with differentiated rates.

Environmental impacts: Vehicle taxes decelerate motorisation, which connote lower emission of air pollutant and greenhouse gases. If tax rates depend on the vehicles' environmental performance, this effect can be more powerful.

Company car taxation revision (c.f. Annex 4 – p. 207/208)

Description: Providing cars for private use is usually a low-tax way of employee remuneration. As a result, nowadays approx. 50% of new cars are bought by companies, and the majority (e.g. 70-80% in Belgium and the Netherlands) of company car mileage is non-business use. Besides the large losses in state revenues, this "subsidy" leads to undesirable environmental and traffic effects, therefore taxation of company cars would be socially beneficial.

Key findings: A smaller (or no) gap between free car usage and other ways of employee remuneration would reduce excessive car usage and average car size as well. Total mileage, fuel consumption, air pollution and congestions would be reduced, besides increasing state revenues. A decrease in mobility of labour would be a side effect.

When employees commute at a low-cost (or free) by company car, the average distance between their home and workplace gets longer. It causes congestion on main roads from the suburbs. In some countries even free fuel can be provided for private routes without paying additional taxes, which also leads to excessive car use.

Economic impacts: EU governments now lose tax revenues which amount to on average 0.5% of the GDP due to unequal taxation of company cars and other ways of remuneration.

Social impacts: Lower mobility of labour, as workers face higher commuting costs.

Environmental impacts: The environmental side of the TPM is: the average value of company cars is significantly higher than private ones. While there is a strong correlation between a car's value and its GHG emissions (as well as fuel consumption), high company car taxes may reduce the average car size, pollution and consumption.

CO_2 based annual vehicle circulation tax (CO_2 taxation) (c.f. Annex 4 – p. 209/210)

Description: Circulation taxes are traditionally based on the vehicle's weight, age, value, engine size or horsepower. Some countries have modernised their CO_2 based circulation tax system in order to reduce GHG emissions. The European Community's objective is to reduce CO_2 emissions of the new car fleet to 120 g/km on average. Vehicle taxes can significantly determine the composition of the car fleet, therefore CO_2 based circulation taxes could effectively raise the market share of low-carbon vehicles.

Key findings: The changing composition of the car fleet results in more energy efficient vehicles, which means lower CO_2 emissions. Some impacts indicate that especially slow modes and public transport mileage will increase, due to the more expensive private car ownership. **Economic impacts**: The measure basically increases tax revenues, but if the sum of tax revenues is unchanged, CO_2 based tax reform only means a rearrangement of tax burdens. The real impact depends on the method of application.

Social impacts: The spread of low-emission cars may improve traffic safety through reducing unnecessary speeding, which results in a positive social effect.

Environmental impacts: GHG emissions can be reduced significantly. Replacing high-performance cars with low-emission vehicles reduces fuel consumption.

5.3 Infrastructure (Transportation and information / communication)

Reduction of TEN-T network missing links (c.f. Annex 4 – p. 211/212)

Description: The TEN-T policy has helped to complete a large number of projects of common interest, interconnecting national networks and overcoming technological barriers across national borders. Amongst the success stories is the high-speed railway line linking Paris, Brussels, Cologne/Frankfurt, Amsterdam and London. It has not only interconnected national networks and marked a breakthrough of a new generation of railway traffic across borders, but it has also provided citizens and business travellers with a competitive travel option within Europe. The wide consultation process, the external expertise, the ex-post assessments conducted and the internal analysis used over the last two years have shown that the European Union does not dispose yet of a complete trans-European infrastructure network, and especially not for rail and inland waterways, where essential parts are still missing and constitute important bottlenecks. The infrastructure network in the EU today is indeed fragmented, both from a geographical and a multi-modal perspective. It is also not sufficiently integrated in the international trade flows that feed the European internal market. Despite important efforts towards improvement, European rail and inland waterway networks are still lacking capacity and efficiency.

Key findings: Impact assessment shows a significant improvement in choice of transport mode due to complete, competitive networks for all modes (rail, iww, road) and energy efficiency and usage due to smart administrative processes and complete network.

Eliminating cross border missing links will provide seamless traffic flows (both for passenger and freight) on the TEN-T network, the result will be reduced transport times, decreased risk of congestion and better service.

Economic impacts: In economic terms the measures support regional development and economic growth. Due to reduced congestion and time savings, transport costs decrease significantly. Furthermore, the TPM provides better accessibility to third countries.

Social impacts: Social effects of the measure definitely improve the accessibility to services, especially for freight companies, and supports employment along the corridor.

Environmental impacts: Regarding the environmental side of the impacts, the measure aims at reducing GHG emission and noise level, while the reduction of carbon dioxide emissions makes it possible to realise a significant improvement in climate change effects.

New infrastructure to eliminate bottlenecks (c.f. Annex 4 – p. 216/217)

Description: The TEN-T policy helped to complete a large number of projects of common interest, interconnecting national networks and overcoming technological barriers across national borders. These have not only interconnected national networks and marked a breakthrough of a new generation of railway traffic across borders, but it has also provided citizens and business travellers with a competitive travel option within Europe. The wide consultation process, the external expertise, the ex-post assessments conducted and the internal analysis used over the last two years have shown that the European Union does not dispose yet of a complete trans-European infrastructure network, and especially not for rail and inland waterways, where essential parts are still missing and constitute important bottlenecks. The infrastructure network in the EU today is indeed fragmented, both from a geographical and a multi-modal perspective. It is also not sufficiently integrated into the international trade flows that feed the European internal market. Despite important efforts towards improvement, European rail and inland waterway networks are still lacking capacity and efficiency.

Key findings: The TPM causes significant improvement in choice of transport mode due to complete, competitive networks for all modes (rail, iww, road) and also positive effects on energy efficiency and usage through providing barrier free transport for road, rail and iww.

Traffic impacts include reduced transport times, decreased risk of congestion and better service due to seamless traffic flows (both for passenger and freight).

Economic impacts: The measures support regional development and economic growth as well as sectoral competitiveness. Due to reduced congestion and time savings, transport costs decrease significantly and also provide better accessibility to third countries.

Social impacts: The measure definitely improves the accessibility to services, and supports employment along the corridor. The reason for this is that a smart flow network attracts industrial or commercial companies.

Environmental impacts: Environmental impact can be summarised as follows: reduced GHG emissions and noise levels, as well as carbon dioxide emissions make it possible to realise a significant improvement in climate change effects.

Railway infrastructure improvement towards multimodal freight (combined transport) (c.f. Annex 4 – p. 215/216)

Description: Within the framework of the promotion of the environmental friendly modes, the European Commission has launched a number of research projects aiming at evaluating technical and organisational innovations that can improve the performance of the freight transport operations in the rail sector. The creation of a European intermodal transport network is a high-priority objective of the European Community and one to which the European Commission has dedicated studies, specific legislation and very considerable funds. Freight rail improvements include strategies that make infrastructure more efficient and encourage freight to move by rail. Investment in freight rail relocation/ improvements or the construction of new intermodal centres can consolidate freight movement to rail corridors while removing some long-distance truck traffic from congested corridors.

Key findings: The TPM influences mode choice (multimodality) by making rail transport smoother. Increased volumes transported by railway (instead of road) improve energy efficiency. The technical measures include the introduction of railway traffic management systems, capacity extension, track development in terms of increased speed limits, which together make the mode more attractive and competitive than road transport.

The above mentioned freight railway infrastructure improvements will provide seamless flows for goods on the European network, this will result in reduced transport times, decreased risks of congestion and better service regarding traffic impacts.

Economic impacts: In economic terms the impacts are without any doubt positive. Increased competitiveness and revenues for operators are advantageous to the national economy. Economic advantages of combined transport are widely known. Due to reduced congestion and time savings, transport costs decrease significantly.

Social impacts: Social effects are limited; however the measure definitely improves the accessibility to services, especially for freight companies

Environmental impacts: The measure aims at reducing GHG emissions and noise levels, while the reduction of CO_2 emissions makes it possible to realise a significant improvement in climate change effects.

Support of onshore power supply (OPS) in ports (c.f. Annex 4 – p. 217-219)

Description: Ships generate a significant amount of air pollutants while moving, but also when mooring at berth in a port. When berthed, ships require power to support procedures like loading / unloading, heating / cooling, lighting and other on-board activities. Nowadays, this power is generally produced by auxiliary engines (mainly diesel generators on board) that produce considerable amounts of carbon dioxide (CO_2), air pollutants and noise emissions.

As an alternative to current on-board power generation, vessels can be linked up to OPS, i.e. connected to the local / external electricity supply grid. Currently, most ports are neither equipped with OPS to supply vessels with electricity, nor are vessels equipped to receive power from OPS systems.

Key findings: Mainly residents near harbours and workers (in ports and on ships at berth) will benefit from reduced air pollutants and noise emissions. Still, OPS will require high installation / implementation costs for ports, ship owners and public bodies.

The use of OPS focuses entirely on vessels at berth, hence not during their journey. Therefore, no traffic impacts can be expected. Even service and comfort will not change significantly as it was not indicated as an argument to use or install OPS in a questionnaire on “current status and future plans regarding Onshore Power Supply 2009” from 53 worldwide ports.

Economic impacts: The annualised total OPS system costs for maritime transport operators depend on three factors: (1) size of ships' engines, (2) installed technology (ship age dependent (retrofitting)) and (3) on costs for electricity and marine fuels. Ports will have to invest in OPS systems and will charge ships to compensate for their investments. Furthermore, public bodies will have to invest in power grids to deliver the needed power to ports and ships. Ports will be able to increase their attractiveness and competitiveness by installing OPS.

Social impacts: The main reasons for maritime transport operators to invest in OPS are the environmental benefits and the improvements of working conditions for workers at ports and on ships. The usage of OPS will positively influence the well-being of workers in ports or on ships because of the reduction of air pollutants and noise emissions. Nevertheless, safety issues have to be considered when port workers have to work with high voltage cables.

Environmental impacts: If renewable energy sources are used, OPS can almost neutralise CO_2 emissions and other air pollutants (depending on the energy source) which positively influences residents near ports. Still, the effect on emissions will depend a lot on the energy source used. If the electricity which is used is produced by coal power plants then the net effect of air pollution will be marginal.

Overall, environmental and economic impacts will largely depend on the energy source which is used for OPS. Energy used from e.g. coal power plants will only re-locate air pollutants from ports to power plants. Furthermore, OPS ask for high implementation costs for maritime transport operators, ports and public bodies.

Green transport corridors (c.f. Annex 4 – p. 220/221)

Description: The concept of transport corridors [COM(2007)607] is marked by a concentration of freight traffic between major hubs and by relatively long distances of transport. Along these corridors industry will be encouraged to rely on co-modality and on advanced technology in order to accommodate rising traffic volumes while promoting environmental sustainability and energy efficiency. Green transport corridors will reflect an integrated transport concept where short sea shipping, rail, inland waterways and road complement each other to enable the choice of environmentally friendly transport. They will be equipped with adequate transhipment facilities at strategic locations (such as seaports, inland ports, marshalling yards and other relevant logistics terminals and installations) and with supply points initially for biofuels and, later, for other forms of green propulsion. Green corridors could be used to experiment with environmentally-friendly, innovative transport units, and with advanced ITS applications

Key findings: The main findings of the TPM assessment concern improvement of multimodality (especially growth in the use of rail and iww), significant improvement in energy efficiency, some impact on route choice.

Basically, as a result of implementing green corridors, transport of goods moves from road to rail and iww. Therefore risk of congestion and transport time decreases. Vehicle mileage increases on rail and iww, while road vehicle mileage decreases.

Economic impacts: The economic impact of the measures grouped under the heading "Sustainable quality and efficiency" should positively impact logistics cost components by improving logistics training, allowing shippers to apply quality criteria in the selection of transport operators and helping transhipment platforms improve their performance and efficiency by comparing themselves with other operators as such. Simplification of logistics chains will bring about major savings due to a reduction in the administrative burden and a mitigation of the costs incurred through legal uncertainty as regards liability in multi-modal transport chains.

Social impacts: In social terms the measure will improve training levels and create new career perspectives for logistic employees. The introduction of new technologies, particularly in the field of IT will increase the logistics sector's need for specialists and add value to the competencies of staff.

Environmental impacts: The action will help to address CO_2 emissions, the greenhouse effect, noise, and several related issues by helping to reduce unnecessary transport activity, improving the integration of transport modes and the attractiveness of those which are more environmentally friendly and by facilitating the consideration of qualitative criteria – including environmental impacts – in customer choice. The notion of "green transport" and the priority area urban transport will help apply new, environmentally friendly technologies to where their impact will be greatest.

Bus priority lane (c.f. Annex 4 – p. 222/223)

Description: The basic idea of the TPM is to give priority to public transport buses in cities (e.g. bus priority lanes) and outside of cities (e.g. high occupancy vehicle lanes). The aim is to make public transport more reliable, reduce travel time, help mode change and provide a higher level of service. The tool enhances the flexibility of buses where it is required and the reliability of trams in congested, inner areas. There are several types of measures, which can be adapted to most of the cities according to their size, network, key constraints, public transport system etc. In this regard, there is a wide range of solutions like mixed-used lanes which are dedicated to buses only in peak hours or totally segregated 'bus corridors' (e.g. BRT – Bus rapid transit, Metrobus in Istanbul). A well-constructed system revitalises the surroundings and in many cases gives space back to pedestrians and cyclists. This can, however, affect private car transport badly and therefore a key factor for the measures' success is to find the right balance.

Key findings: The assessment of the TPM shows that the objectives can be achieved: facilitating the provision of a faster, more frequent and more reliable bus service; creating better conditions for cyclists; reducing travel times for public transport; improving public perceptions of the quality of the public transport service; increasing public transport usage.

The primary changes caused by the measure are promising, like the avoidance of staying in peak-hour traffic and the improvements in public transport service.

The effect on traffic can be summarised as follows, it is very positive for users of public transport and slow modes, transport time as well as risk of congestion decreases and service and comfort increase; however, this may affect car traffic negatively.

Economic impacts: In economic terms, the measure does not support passenger traffic, however increases the sectoral competitiveness and revenues for transport operators.

Social and environmental impacts: There are definite benefits for the society and environment: Through the reduction of car traffic and revitalisation of the area, impacts on safety and health are naturally positive for public transport users, workers, and residents alike, while significant environmental improvements are expected along the corridor from the reduction of air pollution and noise.

Deployment of roadside-based ITS infrastructure for information services

(c.f. Annex 4 – p. 224/225)

Description: The increasing demand for mobility (both of people and goods), the environmental problems and road safety require a high performance road transport system where drivers, vehicles and infrastructure are integrated into one reliable, efficient and smart transport system. These objectives can be realised by services and systems supported by an integrated approach of intelligent vehicles and intelligent infrastructure supporting the driver. These intelligent systems and the interaction between vehicles and roadside are today enabled by advanced information and communication technologies.

The services/systems are dealing with:

- Up-to-date traffic information, traffic management, congestion reduction, improved mobility
- Increased road safety and security,
- Reduction of environmental problems,
- Development of sustainability.

The intelligent infrastructure is the key component in the support, management and interaction between the drivers/vehicles and the network operator.

Key findings: The benefits of the TPM come from the following effects: reduction of congestion, avoidance of accidents, increase in road safety and security, reduction of environmental problems.

The measure mainly influences traffic by addressing the following issues through traffic management: reduction of congestion (also reduction of transport time), avoidance of accidents (improvement of safety, improvement of mobility). Another issue which has an important impact on traffic is the reduction of transport times. As a result of all these measures, service and comfort improves.

Economic impacts: The measure has very limited economic impacts, however the system definitely reduces transport costs, accident related costs (health and insurance, because of reduction of accidents) and makes road transport much more competitive.

Social impacts: The measure has also very limited social impacts, but due to the reduction of accidents and conflicts, it provides significant positive impacts in the field of safety and security.

Environmental impacts: Roadside-based ITS infrastructure helps traffic to avoid extreme situations, congestions, accidents, and other anomalies. These effects make it possible to reduce air pollution, noise emission, and climate change, while the constructed infrastructure has a bad effect on the visual quality.

Promotion of intermodality via provision of dedicated information and guidance to hubs (c.f. Annex 4 – p. 226/227)

Description: The policy measure helps to improve traffic management and the interconnection of transport modes, in order to better optimise the use of the existing infrastructure and to balance traffic demand over the networks. Dynamic information and personalised routing support and guidance will result in enhanced interaction between individual and collective transport modes, including public transport for passengers, while connections to rail and inland waterways for freight and city logistics are optimised. Road users will benefit from predictable journey times, less congestion and smoother traffic conditions. Dedicated measures include: support for wider deployment of (roadside-based) ITS infrastructure for information services, provision of warnings and dynamic speed harmonisation; the development and roll-out of inter-operable road pricing and city access control mechanisms and the promotion of intermodality via provision of dedicated information and guidance to hubs

Key findings: The main outcome of the measure is the improvement of multimodality, therefore making the transport chain more effective.

Dedicated information inspires transport companies to use intermodal hubs, therefore making the transport chain more effective, especially road transport.

Economic impacts: The measure has very limited economic impacts, however, the system definitely reduces transport costs, accident related costs (health and insurance, due to a reduction of accidents) and makes road transport much more competitive

Promoting intermodality helps to optimise different transport modes, therefore improves cost efficiency. All affected transport modes can benefit from co-, inter-, and multimodality

Social impacts: Several studies, consultations and workshops prove that intermodal transport decreases the risks of accidents, therefore improves the safety of passengers, workers in the transport sector and residents.

Environmental impacts: Less road vehicle mileage and increased use of more energy efficient modes (rail, iww) result in positive environmental impacts like decrease of air pollution and climate change.

5.4 Internal markets

EU-wide common job quality and working conditions for truck drivers (c.f. Annex 4 – p. 228/229)

Description: Regulating job quality and working conditions (SEC(2008)2632) for truck drivers applies to road transport services, establishing common rules on access to the profession and to the market, setting in particular minimum standards of working time, driving time and rest periods (e.g. enforcement and use of tachograph) for professional road transport (including self-employed drivers).

Key findings: This measure is/was?? introduced to ensure minimum harmonised social rules throughout the EU. In addition, other objectives are related to create fair conditions for competition, to promote and harmonise safer technical standards and conditions, to guarantee that road transport rules are applied effectively and without discrimination.The measure is considered effective in improving drivers (employees in transport) health and safety.

The application and enforcement of rules on working time / rest time for drivers might cause an increase in transport cost and time. The regulation may encourage transport companies to optimize loading factors or, the other way round to use smaller truck types below the current 3.5 tons limit, e.g. vans that have to comply with less strict regulations. The two effects offset in terms of possible impacts on congestion.

Economic impacts: The impact on road transport operators might be negative in terms of costs: employers complain since working hours are reduced but salaries have remained the same, thus increasing costs and reducing their revenues. However, according to the literature it is estimated that increases in costs should be not higher than 1% or even less. In any case, the increase in costs and transport time could be avoided by optimizing loading factors.

The application of the regulation is also expected to increase the administrative burden of implementation and enforcement costs for public bodies, even though the use of tachographs might reduce the administrative burden and provide more effective enforcement. It should be considered that enforcement plays a key role for the effectiveness of the TPM and to avoid distortion in competition. Nevertheless, there is a lack of public enforcement in the EU Member States, often due to the reduction of public budgets. Also, some countries have a very narrow interpretation of the Directive (e.g. exact duration of resting time) which would require a harmonisation of enforcement, e.g. harmonised classification of infringements.

Social impacts: The regulation has positive effects for truck drivers e.g. concerning health and safety, also reflected in an improvement of road safety thanks to the reduction of accident risk related to drivers' fatigue. Nevertheless, in several countries it is perceived that the existing problem of a shortage of truck drivers might be affected negatively by the TPM, requiring even more drivers due to the limitation of working hours. In addition, the danger of over-regulation may contribute to the problem of a shortage of drivers, as it can impose a series of complications (following rules, operating additional devices, etc.) and thus become less viable. Transport companies will face additional costs, due to having to provide driver training. On the other hand, due to the better working conditions, the regulation might make the job of truck drivers more appealing and create a more long-term job commitment for lorry drivers which is beneficial to the sector.

Environmental impacts: Depending on the choice of the optimisation of load factors or the use of additional (smaller) trucks to haul the same amount of freight, the impacts in environmental terms might be slightly positive or negative: in the end, it can be stated that impacts are uncertain and probably with minor variations.

In summary, the regulation has a positive impact on job quality and working conditions for truck drivers, whereas it might result in some negative economic impact for transport operators and public bodies. Strategies exist, however, to limit these consequences.

Elimination of restrictions on cabotage (c.f. Annex 4 – p. 230/231)

Description: Cabotage refers to national road transport services operated for reward or hire in a country other than the haulier's country of establishment. Hauliers who carry out cabotage operations must hold a community authorisation. This means that they must be established in an EEA state, and that they must fulfil the requirements for access to the profession.

At the moment there are restrictions in the EU which stipulate that foreign hauliers are not allowed to undertake more than three cabotage operations in seven days within the same country of first unloading (EC(1072)2009). By eliminating these restrictions, the EU aims to establish a single European market, and thus full liberalisation. The focus is on efficiency improvement, especially in international transport.

Key findings: The main impact of the elimination of current restrictions on cabotage is an increased pressure on the price of transport services and the profitability of road freight hauliers. Hereby, the impacts on transport operators, service providers, public bodies and employment in the transport sector strongly depend on the country of origin.

The elimination of restrictions on cabotage only helps to reduce vehicle mileage, if the cabotage trips are performed on the return trip of an international delivery. Only then, there will be less traffic and consequently fewer road accidents, which cause benefits for all road users and society. The argument of reducing road freight traffic becomes invalid if non-linked cabotage might be considered in the future. The 2010 cabotage performance of 1.2 billion vehicle-km avoids 2.5% of empty running corresponding to

0.6% of total (laden and empty) mileage in the EU-27 and roughly 1% of domestic (national) traffic performance. [Vellay C., Volny M., Winder A. (2010)]

Economic impacts: Operating road freight from countries with low labour costs will become an attractive possibility for transport operators. It should be noted that the shift towards low labour cost countries also has a secondary effect, as the wages of these lorry drivers are expected to rise over time. As a consequence, a road freight transporter will need to operate from other low income countries that are located even further away. This may lead to extra costs and additional empty vehicle mileage.

The liberalisation of cabotage will create a downward spiral of the wages of mobile workers mainly in the old EU member states. Additionally, there is a shift (also of taxes) towards low labour costs countries. This impact on the spatial competition will cause market disturbances in some countries, in particular in high-wage transit countries.

Social impacts: In addition and although legal, the public views the trend to establish branch offices in low wage countries negatively. By establishing such branch offices, some companies circumvent the rules and create advantages over their competition. This might improve employment in the low wage countries, but it probably does not improve their social conditions. An adverse effect might be that employment in their base country will come under pressure. Less vehicle mileage results in a reduction of accidents and thus increases safety.

Environmental impacts: Less vehicle mileage results in a reduction of air pollutants and has a positive effect on climate change. However, the effect on climate change is expected to be negligible compared to domestic or bilateral transport, it still has significant influence.

An identical system on the elimination of restrictions on cabotage is already in use in the Benelux. Hauliers of these countries are allowed cabotage without restrictions in Belgium, Luxemburg and the Netherlands. The example demonstrates that eliminating restrictions is favourable for the environment, reduces congestion and has a positive effect on the profitability of transport operations.

Opening of the domestic rail passenger market; Community railway liberalisation [SEC(2004)236, COM(2004)139] (c.f. Annex 4 – p. 232/233)

Description: The opening of national markets for freight and passenger transport has been widely supported by EU legislation since 1991. Open European-wide passenger markets encourage greater competition for railway companies in order to increase the quality of service. They can induce a significant shift towards European high-speed rail network. The European Railway Agency (ERA) has invested millions of euro to promote the interoperability and to harmonise technical standards of railway systems. The TPM aims to promote the use of environmental-friendly railway transport. It is expected to improve the quality of service of railway passenger transport and to reduce the financial burdens of public service. Furthermore, the TPM enhances the integration of European-wide railway system management and operations.

Key findings: Opening national and international market and integrated European-wide railway network may reduce travel time and cost of passenger transport and have positive effects on environment and health. However, the competition between different operators for long IC and High Speed services can lead to a reduction of the supply of regional services and eventually increase the travel cost for passengers. It has also negative impacts on airline industries due to the competition of integrated railway system.

As it concerns traffic impacts, the TPM can improve the occupancy rates of current railway infrastructure capacity and indirectly promote the development of a multimodal passenger transport system.

Economic impacts: Improved accessibility to railway connected locations influences the competitiveness of these areas positively. If the occupation rate of existing railway infrastructure capacity is increased, the revenues in the railway transport sector are improved.

Social impacts: As for social impacts, the liberalisation of the market may lead to labour and skill shortages in the transport sector in the future.

Environmental impacts: A modal shift towards railway transport reduces air and noise pollution and transport-related greenhouse gases emissions and thus has a positive environmental impact.

Remove administrative and regulatory barriers (c.f. Annex 4 – p. 234/235)

Description: Inland waterway transport (IWW) is a less polluting, low energy consuming and low transport cost mode for good and passenger transportation. It is promoted by the EU in the context of sustainable and efficient transport. Studies on the administrative and regulatory barriers in the field of IWW revealed that current rules and regulations of member states hinder fluent operations of IWW. To promote the IWW, the European Commission reviewed existing administrative and regulatory barriers and proposed the NAIADES Action Programme to harmonise them. The objectives of the TPM are to remove regulations and administrative barriers between Member States for promoting iww transport, improve its efficiency and reduce the transport costs based on regulatory and administrative barriers.

Key findings: The reduction of administrative and regulatory barriers bears the potential to reduce administrative costs, transport costs and travel time. It can raise the competitiveness and efficiency of IWW.

Economic impacts: Concerning traffic and economic impacts, the measure reduces the transport time of IWW due to harmonisation and simplification of administration. For operators and administrators, it reduces operation cost as well as transport costs for businesses. Concerning public and administrative burdens it is positive due to removal of the regulatory barriers.

Social impacts: The TPM is able to solve non-compliance with existing working and resting time regulations of a number of enterprises, resulting in a significant improvement of operation safety conditions. [EC (2008p)]

Environmental impacts: Inland waterway transport remains the most energy-efficient and environmental-friendly of all modes of transport. The promotion of IWW has positive impact on the environment and lead to less greenhouse gas and air pollutant emissions.

Stimulate the integration of inland waterways into the transport system (RIS integrated with eFreight and eCustoms) (c.f. Annex 4 – p. 236/237)

Description: Inland navigation represents an environmental-friendly, safe and reliable mode of transport. However, a certain lack of reliability and flexibility provide a challenge for the seamless integration of this mode into intermodal transport chains. The objective of the River Information Services (RIS), which represents the European standard Intelligent Transport System (ITS) implementation in inland shipping, is to support this integration. RIS are regulated under Directive 2005/44/EC. RIS provide harmonised information services, such as vessel positions, status of fairways, missing administrative reports in order to improve traffic and transport management in inland navigation. RIS further includes interfaces to other transport modes, e.g. port and terminal management by providing estimated time of arrival (ETA) updates for planning and monitoring of shipment operations. The development of the harmonised RIS improves the safety and efficiency of freight transport by inland waterway. The harmonised RIS on inland waterways is a related EU policy in EU e-Freight Policy context. It puts in practice the concept of 'single window' and allows the tracing of goods in real time to ensure intermodal liability and to promote clean freight transport.

Key findings: This measure supports the management of vessel traffic and improves the efficiency and safety of navigation. IWW users and suppliers benefit from a simplified administration process and fast information exchange resulting in an increasing freight modal shift from road to IWW. The integration of harmonised RIS in e-Freight policy context enhances the liability with other transport modes creating positive impacts for road, rail and maritime freight transport.

The development of RIS improves the safety and efficiency of inland waterways and reduces its transport time. It provides harmonised information services able to interface with other transport modes.

Economic impacts: The TPM improves the competitiveness of European companies by reducing transport costs and times in the supply chain. It stimulates a freight modal shift towards inland waterways.

Social impacts: As it concerns social impacts, the safety of navigation can be improved due to a better monitoring of dangerous goods in ports and rivers via RIS. The authorities benefit from electronically available information which allows them to streamline administrative processes. The enhanced safety communication with the vessels in the event of accidents leads to less injuries/fatalities and improved environmental calamity abatement.

Environmental impacts: The TPM increases the monitoring of air pollution in port terminals and can improve accident prevention and maritime safety. Better environmental protection can be achieved via the calamity abatement support. Moreover, it contributes to a modal shift of freight from road to waterways, leading to a reduction of fuel consumption, air pollutants and greenhouse gases.

Simplification of formalities for ships travelling between EU ports – Blue Belt (c.f. Annex 4 – p. 238/239)

Description: The 'Blue Belt' is a concept for European maritime transport without barriers. Nowadays, administrative formalities (mainly documentary controls and customs) concerning maritime transport between EU ports are still considered equal to going beyond EU borders. As a consequence, maritime transport requires extensive administrative procedures (e.g. veterinary and plant protection controls, customs, port formalities). These administrative procedures are identified as one of the key bottlenecks for further expansion of maritime transport. In order to improve the competitiveness of maritime transport, it is necessary to remove administrative procedures for intra-European sea transportation.

Key findings: The ‘Blue Belt’ policy increases the attractiveness of maritime transport considerably. Not only transport times between EU ports will decrease, also employment will increase and cooperation between EU ports will be strengthened.

Economic impacts: Administrative procedures at ports cause high costs and delays which makes maritime transport less attractive for transporting goods within the EU. The 'Blue Belt' policy will lead to a reduction of such costs as well as a simplification of administrative procedures. The entire maritime transport sector will benefit and the 'Blue Belt' will boost the attractiveness of maritime transport. Compared to non-EU ports, the spatial competitiveness of the EU (ports) will increase.

Social impacts: Port authorities save time when transport between EU ports requires fewer administrative procedures. Still, increased maritime transport will ask for well-trained seafarers and port workers. This rise of employment is positive, but with regard to the current shortage of seafarers, additional efforts will be necessary to train and recruit (highly educated) employees and seafarers. The lesser administrative procedures allows authorities to focus on higher risk areas (terrorism, human trafficking).

Environmental impacts: The environmental impacts are heavily determined by the modal split of transport and the rise of transportation. Assuming that transport across all modes will continue to grow and maritime transport will have an additional increase due to the 'Blue Belt' policy; transport will lead to increasing environmental impacts. Maritime transport may be more energy efficient than road transport, it still produces air pollutants, $C0_2$ emissions and requires non-renewable resources for combustion.

The ‘Blue Belt’ policy is very important to ensure and promote the attractiveness of maritime transport. Implementation is mainly advantageous to transport operators and port authorities. The air quality and climate will be negatively affected due to increased greenhouse gas emissions.

Single electronic environment for all port/maritime transport related information exchanges and management – e-Maritime (c.f. Annex 4 – p. 240/241)

Description: The EU “e-Maritime” initiative is seen as a milestone for the achievement of the strategic goals of the EU Maritime Transport Strategy 2018. The e-Maritime initiative recognises the critical role of ICT for improving maritime transport administration efficiency. The EU e-maritime initiative anticipates a new era of e-business solutions based on integrated ICT systems and tools. The ultimate goal for the EU e-Maritime initiative is to make maritime transport safer, more secure, more environmentally friendly and more competitive by improving knowledge, facilitating business networking, and dealing with externalities.

Key findings: The e-Maritime initiative improves the efficiency of maritime transport administration and increases the modal shift to maritime transport and creates a seamless multimodal freight transport environment. It may improve the maritime transport capacity and increases its utilization.

The TPM is able to reduce administration burden and facilitate data exchange of different agents, e.g. users, operators and administrators and stimulate the utilisation of maritime transport.

Regarding traffic impacts, it increases overall safety of maritime transport and has positive impacts on transport time and costs and thus leads to a modal shift towards maritime transport.

Economic impacts: Transport users benefit from the support of information exchange service between administrators and maritime operators. Increasing the reliability of data exchange is valuable for safety and business processes. In addition, harmonised standards and processes support the development of the maritime transport related ICT sector.

Social impacts: Job skills can be improved by introducing new ICT measures. Time consuming administrative procedures are reduced. It has positive impacts on job quality in terms of improved access for the workforce to professional development on e-training services and improved information, education and entertainment services.

Environmental impacts: Increase the efficiency of maritime transport and the use of renewable resources. The measure has positive environmental impacts in terms of reduction of accidents relevant for the environment.

Job quality and working conditions for crew members (c.f. Annex 4 – p. 242/243)

Description: Maritime transport is probably the most globalized type of transport but not the less regulated. The main regulation does not come from the EU; it derives from the SOLAS Convention, generally regarded as the most important of all international treaties concerning the safety and the management of merchant ships. To improve working condition and professional attractiveness, the EU engages in maintaining high standards for job training of crews to ensure high quality and safe shipping operation and applying information and communication technologies (ICT) to improve crew's living quality at sea. These measures need EU contribution in revision of the STCW Convention, promoting the cooperation and exchange between training institutions of Member States. The objective of the TPM is to implement the ILO 2006 Maritime Labour Convention (MLC) to improve working and living conditions on board. It should support the rapid ratification by Member States, support the research of human factors in risk assessment for maritime safety and environmental protection and improve board health care and promote the goal-based framework for the safe manning of ships.

Key findings: The TPM can improve the working skills and the environment of crew and seafarers towards a safer and higher quality of life at sea.

It has no traffic impacts.

Economic impacts: The measure can make maritime labour market more attractive. It can reduce the problem of lack of seafarers and its impact on a whole range of related industries. Nevertheless, training and ICT equipment's for improving job condition may increase operation costs.

Social impacts: The TPM has significant positive social impacts on safety, security and job skills. The job environment and the maritime labour market will become more attractive. The implementation of the ILO 2006 Maritime Labour Convention (MLC) improves the working and living conditions on board of ships

Environmental impacts: As for environmental impacts, the measure has marginal impacts on the emission of air pollutants and on the use of non-renewable resources. Improving skills of crews can reduce the safety and environmental damage risk of human factor at sea.

Implementation of the Single European Sky Initiative SESAR (c.f. Annex 4 – p. 246/247)

Description: The TPM is about the implementation of the Single European Sky ATM (Air Traffic Management) Research. It is part of the Single European Sky initiative (SES), which generally aims at harmonising the European air traffic management network and meeting the projected traffic by the year 2020. By accelerating and simplifying the exchange of information, SESAR will bring ground and air control closer together, introducing a paradigm change in ATM. The improvement of technologies means that the exchange of information will not just be between air traffic controllers and pilots, but will also improve the information flow from airline operation centres, meteorological services and airports, i.e. the overall network performance. Its key objectives are to increase capacity, improve safety and environmental performance and to reduce costs.

Key findings: The introduction of the SESAR technologies and operational improvements will directly lead to an increase in flight efficiency and punctuality by increasing capacity, reducing delays and improving reliability, flexibility etc. This is positive for the service and comfort level of air passengers and will increase the system's capacity. In general, SESAR is expected to have distinct positive impacts on air transport operators, passengers as well as the "indirectly" affected segments such as society, economy and residents.

The transport costs for operators and passengers will decrease, although the asset costs occurring in the implementation phase for airspace operators, air navigation service providers and airports will increase significantly. In addition, lower income groups are expected to be influenced positively by lower travel costs.

Economic impacts: The higher efficiency of air travel improves the productivity in the transport sector, which positively affect wages. In addition, the capacity gains might have direct, indirect and induced effects on the wider economy (incl. employment) as the capacity gains will accommodate the projected growth in traffic demand. Competitive advantages for the European air transport industry are also expected, (equipment, research and development) due to increasing demand, not least due similar programmes being duplicated in other parts of the world.

Social and environmental impacts: The identified social impacts feature the increasing level of health and safety (lesser accidents) for passengers, residents and society as a whole. The higher level of security (preventing crime and terrorism) for society and operators is also of major positive importance as well as lower emissions of noise and air pollutants (CO_2, NO_x, SO_x). The flight path efficiency gains will help to prevent climate change and the consumption of resources. But an increasing number of flights lead to more people being exposed to aircraft noise, if technological improvements do not keep pace with traffic growth. [EC (2008a)]

Single European Sky II (c.f. Annex 4 – p. 244/245)

Description: The Single European Sky II (SES II, EC(2008)389) is an initiative to reform the structure of the European air traffic control to meet the future capacity and safety needs. The Single European Sky (SES I, EC (549/2004)) package in 2004 did not deliver the expected results. For example, the process of integrating functional airspace blocks, regardless of national borders, has been confronted with political and economic hurdles. In addition, the Member States have not taken the necessary steps to improve the system's cost efficiency which will be intensified by the adjusted regulations (charging scheme).

A massive increase in demand for air transport overtaxes the capacity of the aviation infrastructure and the (historical) fragmentation of air traffic management hinders the optimal use of this capacity. In addition, unused capacities induce an unnecessary financial burden for aviation. Furthermore, safety requirements have to be improved and environmental awareness is putting pressure on the image and environmental performance of aviation.

Key findings: Implementing SES II will have positive impacts on the European aviation market (passengers, operators) and its indirectly affected segments (residents, employees, economy, society, public bodies) mainly resulting from: decreasing transport costs, increasing revenues for air transport operators, more employment within the aviation sector, decreasing air pollutants and noise emissions.

With regard to the impacts on traffic the establishment of SES II incl. FABs (functional airspace blocks) will reduce the number of delays by decreasing the travel time / increase the flight efficiency (lower risk of congestion, decrease of vehicle mileage) for passengers and operators; in addition this increases the service and comfort for aviation passengers in general. Significant flight efficiency improvements due to the reduction of route extensions (decreasing vehicle mileage) between and within participating countries are expected.

Economic impacts: Concerning the economic impact, high implementation costs of SES II have to be expected for public bodies. During the operation phase, flight efficiency will increase due to the implementation of FABs, hence transport costs for operators and travel time for passengers will decrease. The usage of scarce sources (e.g. radio frequencies) will help to improve the cost efficiency of air navigation services (ANS) and air traffic management (ATM), hence administrative work of public authorities will diminish and public income will increase.

Social impacts: Strengthening the European Aviation Safety Agency (EASA) by SES II in the areas of airport infrastructure equipment, operation, ATM and ANS will improve safety for passengers as well as the standards and rights of employees in these sectors.

Environmental impacts: The optimisation of network management and flight-efficiency will lead to less air pollutants, noise emissions and decreases the usage of energy / resources. Furthermore, the reduction of flight inefficiencies will positively affect the greenhouse gas emissions and climate change.

In general, SES II will improve the performance and sustainability of the European aviation system. Improved ATM will lead to shorter flight routes and optimised flight profiles (through FAB). High implementation costs for public bodies can be stabilised by potential savings (due to increased efficiency) during the operation phase.

SafeSeaNet (European maritime information system) (c.f. Annex 4 – p. 248/249)

Description: In order to overcome information exchange problems in maritime transport and to fulfil the obligation stipulated by Directive 2002/59/EC (to establish a Community vessel traffic monitoring and information system), a pan-European system named SAFESEANET (‘SSN’) has been developed. SSN is concerned with the exchange of information between member states in relation to vessel arrivals and departures, hazardous material transportation, alerts, waste, security and ship data for monitoring purposes.

The objectives of the measure are 1) to enhance the safety and efficiency of maritime traffic, 2) to improve the authorities’ response to incidents, accidents or potentially dangerous situations at sea (including search and rescue operations) and 3) to contribute to improved prevention and detection of pollution by ships.

Key findings: This measure contributes to the increase of sea transport safety (freight and passenger). It also improves the environmental protection due to the reduction in incidents and speedier search and rescue services.

Economic impacts: SSN is further expected to increase efficiency of port logistics by cutting costs due to decreased delays, faster clearance and release. SAFESEANET increases the competitiveness of European ports by reducing the administrative overheads of businesses and maritime authorities once the system is in place. This will be achieved through the implementation of a Single Window whereby standardised electronic information is exchanged with a single entry.

Social impacts: The information provided in the SSN system may also be useful to other public authorities, such as Customs and Border Police.

Environmental impacts: Pollution by transport operators will decrease due to SSN as this system provides an improved emergency response in case of pollution at sea.

End-to-end security certificates (c.f. Annex 4 – p. 250/251)

Description: 'End-to-end' security certificates provide the opportunity for transport operators to secure freight throughout the entire supply chain. 'End-to-end' means that the cargo will be checked at or close to its point of departure and remains secured (screening is only needed at boarding) for the entire supply chain. The 'End-to-end' certificate aims to improve the security level of freight transportation without limiting the free flow of goods. The system has to be adjusted to the proportional risk and the value of cargo.

Typical supply chain security activities include the credentialing of supply chain participants, the screening and validation of the cargo content, notifying the destination country in advance of the content and ensuring the security of cargo while in-transit (locks, tamper-proof seals).

Key findings: In particular, transport operators (especially those providing multimodal transport services) will benefit from one integrated and comprehensive 'End-to-end' security certificate.

For cargo which requires security it is desirable that this is performed at the point of departure and that its integrity is maintained throughout the journey. This 'End-to-end security' will replace existing safety measures at airports and ports and will ease transport of cargo throughout the entire supply chain. Service and comfort improves if such a certificate is integrated into existing systems for secure maritime and air transport.

Economic impacts: An 'End-to-end' certificate generates positive economic impacts on all parties involved in multimodal transport. In general, it will simplify and reduce the costs of administrative procedures (e.g. security paper work when shifting between transport modes) which will reduce the probability of delays and decrease transport times overall. Due to the higher level of security insurance costs will decrease,

Social impacts: One of the main targets is to protect European freight transport against possible terrorist attacks. Therefore, international cooperation must be further strengthened to achieve a higher level of security. The higher level of safety will be beneficial to employees and operators of the transport sector. In contrast, employment at customs is negatively affected when cargo does not need to be checked at every change of transport mode.

Environmental impacts: The environment is not directly affected by the introduction of “End-to-end” security certificates. However, a main pre-requisite for low-carbon services (within freight transport) is the availability of standards for the environmental impact of freight transport. Security certificates can initiate such standards which will lead to a reduction of greenhouse gas emissions.

To summarise, if cargo is secured at departure for the entire supply chain, “end-to-end” security certificates will accelerate multimodal cargo transport, because of fewer administrative procedures (e.g. customs) during the supply chain.

Stimulate bundling freight transport to make optimal use of road, rail and iww (c.f. Annex 4 – p. 250/251)

Description: Bundling is the process of transporting goods which belong to different flows in a common vehicle (like train, barge or truck) or other units during part of their journey. Freight operators are dissatisfied with the presence of numerous administrative and institutional barriers at terminals, the quality of operations and sub-optimal transhipment processes. This situation calls for new concepts of bundling freight into consignments and new transhipment schemes, which in turn will require advanced designs of intermodal terminals. The measure simulates freight transport bundling, which is one of the key driving forces of container service network dynamics. The bundling of cargo typically involves several layers starting with the consolidation of parcels onto a pallet up to the bundling of a large number of containers onto a trunk line at sea or in the hinterland.

Key findings: The overall impact of the measure, especially in traffic and economical means is definitely positive. Freight bundling improves multimodality, trip frequency and timing has to be suited to a kind of timetable, which makes transport more reliable and calculable. In addition to this energy efficiency will also improve due to optimisation of flows and loading factor.

Traffic impacts can be summarised as improvement in all conditions. Significant impact can be measured in service and comfort, also in risk of congestion. A reduction of transport time is likely, as well as vehicle mileage optimisation (due to optimisation of different transport modes). Hence, bundling of freight transport helps to use the resources in the most optimal rate, therefore reduces costs, risk of congestion and improves service and comfort.

Economic impacts: The reason of the TPM is to rationalise transport volumes and optimise the chain. The principal impact is the decrease of transport costs. The overall effect of the measure is the improvement of multimodal transport. That means, the number of vehicles decreases on roads and the traffic on rail and iww increases. Principally, the specific costs of road transport are higher than the others (except air cargo) so the overall costs reduce, including externalities. Through more efficient and effective transport chain, competitiveness (sectoral and spatial) improves as well

Social impacts: The social impacts are limited; the only recorded effects are the limited improvement of health and safety.

Environmental impacts: Intermodal, combined and multimodal transport modes are (per definition) more environmentally aware than only road transport. Therefore energy efficient bundling freight transport causes less air and noise pollutants.

5.5 Efficiency standards & flanking measures

Safety of road transport by means of ITS (Intelligent car initiative - (e- Safety initiative)) (c.f. Annex 4 – p. 254/255)

Description: The Intelligent Car Initiative is a policy framework set up by the European Commission to tie up all activities relating to 'intelligent' automobiles. The term covers all vehicles that are equipped with modern information and communication technologies (ICT) to increase road safety and/or the flow of traffic, or to reduce the environmental impact of road transport. For the benefit of road users and society in general, e-Safety is working for a quicker development and increased use of smart road safety and eco-driving technologies. The objective of the TPM is to avoid accidents (especially fatal ones) on European roads, and not at last to reduce congestion.

Key findings: Overall the TPM results in increased road safety, reduced environmental pollution, and decreased levels of congestion.

Traffic impacts include reduced congestion, higher level of service and comfort. It may affect vehicle mileage, e.g. in case of an accident, alternative routes are suggested.

Economic impacts: Regarding the economic effects road transport is the winner of the game. Due to more reliable traffic flows (fewer accidents, less congestion) insurance costs decrease and sectoral competitiveness increases. Overall, transport costs for operators (transport companies) will definitely reduce (taking into consideration that these primary effects result in a more efficient road transport system).

Social impacts: The social impacts are limited, however, the level of safety of transport users, and also non-users increases.

Environmental impacts: The environmental impacts can be summarised as follows: both air and noise pollutants decrease as a result of system efficiency.

European Road Safety Action Programme RSAP (c.f. Annex 4 – p. 256/257)

Description: Of all modes of transport, road transport is the most dangerous and the most costly in terms of human lives. For this reason, the 'RSAP' (2003-2010) proposes a series of measures such as stepping up checks on road traffic, deploying new road safety technologies, improving road infrastructure and measures to improve users' behaviour. The RSAP includes 60 measures which are quite diverse, but together cover all aspects of road safety. The measures are aimed at the three well-known areas of road safety:

- Road users: RSAP aims to encourage road users to improve their behaviour, in particular through better compliance with existing legislation, through basic and continuous training and by combating dangerous practices.
- Vehicle technology: RSAP aims for technical harmonisation and support for technological progress should help to make vehicles safer. With respect to vehicle technology a distinction can be made between actions aimed at improving active safety of vehicles and those at passive safety of vehicles.
- Road infrastructure: by defining and disseminating best practices and elimination of black spots, road infrastructure can be made safer.

Key findings: The RSAP will improve safety for both passengers and transport operators. The risk of congestion will be reduced due to lesser accidents, thus improving travel and transport times. On the other hand, specific safety measures involving an adaptation of the speed limits may lead to longer travel times..

Economic impacts: The economic impacts can be regarded as the other side of the coin. The RSAP brings along some extra transport costs for passengers and transport operators, such as safer but more expensive vehicles. The measure also imposes costs on those local governments that have not yet implemented the measures. On the other hand, insurance costs and health service costs may decrease. For households, the saving of lives reduces both economic (e.g. loss of income) and psychological damage. With respect to public bodies, an increase of costs is foreseen, due to extra investments in infrastructure, in order to make it safer.

Social impacts: The social impacts mainly concern mainly safety and health. The TPM will lead to a reduction of injuries and deaths among elderly people and children. This in turn also has a positive impact on the use of slow modes, as these are often used by vulnerable road transport users.

Environmental impacts: In general the RSAP actions do not have an impact on the environment. Only actions that result in a speed reduction will lead to a change in emissions and pollution.

Legislative framework on passenger rights on multimodal journeys with integrated tickets under a single purchase contract (c.f. Annex 4 – p. 258/259)

Description: An appropriate legislative framework on passenger rights has to be established and completed in order to ensure uniform access conditions for passengers as well as a basic level of service quality for multimodal journeys with integrated tickets under a single purchase contract. Rules on transport services should guarantee non-discrimination, assistance in case of disruption of their journey, transparency of travel conditions, the right to be treated with dignity and full respect of the terms of their contract.

Key findings: This measure has been introduced to ensure both a level playing field for the industry and a European standard of protection for the citizens, also in the context of promoting a competitive and sustainable expansion of collective multimodal passenger transport. Passenger rights are based on three cornerstones: non-discrimination, accurate, timely and accessible information, immediate and proportionate assistance. Currently the majority of case studies including a passenger rights framework are related to regional / national contexts (concerning rail-air, rail-bus or air-bus connections). Nevertheless, the legislation would aim at achieving results also at international level.

There is a lack of evidence from actual experiences, but it is expected that the measure has positive effects for passengers, with benefits in terms of accessibility, reduced stress and uncertainty related to travelling. In terms of traffic impacts, it mainly affects the feeling of protection (and therefore quality of the services) of various users / social groups.

Economic impacts: The impact on costs for transport operators might be slightly negative: a minor increase might occur in order to comply with regulations, especially for a refund in case of delays or cancellations. Nevertheless, passenger costs should not be affected. It might be stated that thanks to increased passenger protection through the legislation the expenditure for private insurance contracts related to disruption during multimodal trips might be reduced.

Social impacts: Benefits in terms of accessibility and reduced stress and uncertainty related to travelling are expected for users. In addition, specific benefits are foreseen for disabled passengers (or with reduced mobility), no discrimination and the provision of accessibility and assistance at no additional cost. As a result, an increased equality of treatment and opportunity is offered.

Environmental impacts: No impacts are foreseen in environmental terms.

In summary, the regulation has a positive impact on passenger conditions in terms of accessibility, equality and improved transport services, whereas it might result in a minor negative economic impact for transport operators.

CO_2 emission limits for HDV, LDV, cars etc. (c.f. Annex 4 – p. 262/263)

"CO_2 emission limits" is a regulation measure that sets CO_2 emission performance standards for new vehicles registered in the European Union. According to regulation (EC) 443/2009 European car manufacturers are forced to achieve the target of 130 g CO_2 per kilometre for the average new car fleet registered in Europe in 2015. Until 2020, the average fleet is required to emit at maximum 95 g CO_2 per kilometre. The final target also depends on the average mass of cars per manufacturer. Similar to the regulation for passenger cars, regulation (EC) 510/2011 sets CO_2 emission standards for new light duty vehicles (LDV). The CO_2 emission target for new LDV registered in the European Union is 175 g/km in 2017 and 147 g/km until 2020.

The main objective of the measure is to reduce transport related CO_2 emissions by improving fuel efficiency of fossil fuel cars or by accelerating the diffusion of alternative fuel vehicles. Another important objective consists in creating incentives for vehicle manufacturers to invest in new technologies and strengthen the competitive position of the European transport industry.

Economic impacts: There are two main impacts of the measure on the European transport system: Investment costs for vehicles are expected to increase by about 6% which can result in fewer vehicles being registered. Improvements in fuel efficiency and a higher share of alternative fuel vehicles lead to decreasing fuel costs. Considering the whole vehicle lifecycle, benefits from fuel cost savings compensate by up to 75% of the higher investment costs. Fuel cost savings are expected to induce a rebound effect in terms of increasing passenger-km by car of up to 7% by 2020.

Social impacts: The main positive social impact of the measure is the stimulation of the European labour market and employment due to new innovations in vehicle technologies. As low income groups have small motorisation rates, the measure impacts this social group only marginally. Mainly people with medium to high income are affected and benefit from fuel cost savings despite higher investment costs for fuel efficient vehicles due to their higher average yearly mileage.

Environmental impacts: The measure is very effective in terms of a reduction of CO_2 emissions. Fuel efficiency improvements also effect air pollutant emissions positively. Furthermore, less fossil fuel is consumed.

Regulation of international legislation: European directives: emission standards Euro I –VI (c.f. Annex 4 – p. 264/265)

Description: The emission standards apply to all motor vehicles with a “technically permissible maximum laden mass” over 3,500 kg, equipped with compression ignition engines or positive ignition natural gas (NG) or LPG engines. The regulations were originally introduced by the Directive 88/77/EEC followed by a number of amendments. European emission standards Euro V, which came into force in 2008 and will be replaced by Euro VI in 2013, define the acceptable limits for exhaust emissions of new vehicles sold in EU member states, especially regarding emissions of carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NO_x), particulate matter (PM) and smoke. The objective is to set harmonised rules on the construction of motor vehicles and to improve air quality by reducing pollutants emitted from the road transport sector.

Key findings: The EURO standards do not impact on the traffic, but on the supply side of vehicles (car and lorry manufacturing industry) and European fleet composition. The standards therefore affect the purchase of the types of vehicles rather than their usage. The expected increase in transport activity occurs independently of the EURO standard regulation. With respect to CO_2, the increase in transport activity will (in the period 2006-2016) be counterbalanced by the introduction of more fuel-efficient cars following the voluntary agreement of the car industry and the promotion of biofuels and CNG.

Economic impacts: The Directive has a positive impact on the economy, especially on the vehicle manufacturing industries as they benefit from developments in clean engine design. Also, an improvement in air quality will improve public health, thus enabling the national governments to generate savings in the longer term. Concerning costs, the purchase of vehicles may become more expensive, due to the introduction of new technologies. This may influence the competitiveness of the road transport sector, compared to rail and inland waterways. Then again, vehicle manufacturers and the road industry may profit from the technological improvements.

Social impacts: Concerning social impacts, no major impacts are expected, except for health and well-being of residents. The society as a whole benefits from the reductions in CO_2 and NO_x and air pollutants, such as PM (particulate matter). Note that, forecasts indicate that the introduction of Euro VI will have no significant impact on CO_2 emissions or sales of diesel vehicles. Furthermore, some believe that higher vehicle expenditure may lead to social exclusion. However, no empirical evidence has been found for this aspect.

Environmental impacts: Studies suggest that Euro VI will have a significant role in reducing NO_x emissions from road transport. It is forecasted that in 2020 with the introduction of Euro V, the total NO_x emissions from light duty vehicles will amount to 706 kilotons. However, with Euro VI emissions this will be around 534 kilotons. Therefore, the total NO_x emissions from light duty vehicles in 2020 will be 24% lower than they would be with just Euro V being introduced.

Noise emission standards [SEC(2008)2203, SEC(2011)1505] (c.f. Annex 4 – p. 266 -268)

Description: Noise emissions generated by transport means reduce the quality of human life. Particularly noise from road traffic, but also from rail and aviation, is a major problem in urban and suburban areas. Noise represents the third biggest environmental burden which causes diseases (after air pollution and exposure to smoking).

Currently, the legal background concerning noise emissions and their transport means related restrictions are different between and within Member States which leads to frustration and additional production costs. It is therefore necessary to harmonise rules at the EU level including the limitation of noise emissions from transportation (SEC(2008)2203 for rail, SEC(2011)1505 for motor vehicles). This TPM will solely assess noise pollution from road and rail transport.

Key findings: It is evident, that road and rail passengers will benefit from improved comfort of travelling. On the other hand, it is expected that costs for travelling will rise. However, noise emissions standards have significant positive impacts on residents (especially for night-shift workers) and slow mode users in urban areas.

Economic impacts: The introduction of noise emission standards will result in additional costs for rail and road transport operators. Trains and road vehicles will have to be designed (or adjusted / retrofitted) to meet the determined noise emission standards which will lead to extra investments (production, development-, engineering- and testing-costs). The research and development activities required to meet the standards will (likely) positively affect employment; but such additional employment will disappear when adjustments have been successfully achieved within the whole market. In contrast, employment in automotive sector may decrease due to a lower demand for more expensive vehicles. Furthermore, maintenance costs for trains will decline because of smoother braking systems (for rail), which are required to meet the standards.

Social impacts: Well-being, mainly for residents in urban areas (where noise emissions contribute to a significant amount of health problems) will increase considerably due to noise emission standards for road and rail transport. Nightshift workers will significantly gain a higher level of quality of life, as these are particularly negatively influenced transport noise emissions which occur in the daytime.

Environmental impacts: Reducing noise emissions at their source, through measures related to vehicle propulsion, tyres, road surfaces and traffic management (speed limits, free flow of traffic), is far more effective than end-of-pipe measures like noise barriers. End-of-pipe measures, which aim to increase the distance between source and recipient or by hampering noise propagation, increase the use of land and have a negative impact on the visual quality of the landscape.

In contrast, road and rail passengers will benefit from the improved level of travel comfort, due to quieter road vehicles and trains. On the other hand, transport costs will rise due to higher production costs for transport operators who will pass on higher costs to the consumers. Assuming the substantial negative impacts of noise emissions in urban areas, noise emission standards are highly favourable for residents, especially those living near motorways and busy railroad tracks, and society in general by a reduction of health insurance costs.

Biofuels directive / Introduction of a biofuels quota / Bioethanol quota (c.f. Annex 4 – p. 260/261)

Description: This Directive promotes the use of biofuels in the EU. The Directive (EC2003/30) stipulates that 5.75% of all transport fuels should be replaced by bio fuels in 2010 and up to 10% in 2020.

Key findings: Although the intention of the Directive is positive, it may have some negative side effects.

On the positive side, there is the development of biofuel as an alternative to fossil fuels. This will result in a reduction of emissions, especially CO_2 emissions. Also, new technologies to produce biofuel are being developed. [see WorldBank (2010), World Energy Council (2010), UNCTAD (2008)].

The main challenge is to develop biofuels which do not compete with the food chain. This forms the other side of the coin. For example, Tabeau (2009) indicates that the Directive has an impact on the markets for cereals, oilseeds and sugar. The imports to Europe grow more than double. The study shows that domestic prices of biofuel crops and sugar are expected to rise by 25% and 19% respectively.

Economic impacts: It is expected that the Directive may have consequences for third countries and international relations. Concerns are about food security, food prices, the infringement of farmers' rights, biodiversity and pollution in the third countries. On the other hand, the bio fuel industry will grow. New and emerging technologies will be helpful in overcoming problems and further introduction of bio fuels. The World Energy Council states that technology is a key factor for the enhancement of production (food and bio-energy) and the increase of output, and all this without adverse economic and environmental implications.

Social impacts: Social impacts are partly related to the economic impacts, such as farmers' rights and food prices. These may further cause income inequalities, especially in third countries.

Environmental impacts: The environmental impacts concern CO_2 emissions. A Canadian study indicates that a substitution of 10% gasoline means a 62% reduction in net greenhouse gas, on a per-litre base (see KD communications 2011).The use of biofuels concerns mainly road transport. An often mentioned incentive for using biodiesel is its capacity to lower greenhouse gas emissions compared to those of fossil fuels. Whether this is true or not depends on many factors. Especially the effects from land use change have a potential to cause even more emissions than would be caused by using fossil fuels alone. In third countries the Directive may have a negative effect on land use by their residents (see Actionaid 2012).

Fuel efficiency labelling for new cars (c.f. Annex 4 – p. 271/272)

"CO_2 and fuel efficiency labelling for new passenger cars" is an information campaign which ensures that information about fuel economy and CO_2 emissions of new passenger cars is made available to consumers. According to Directive 1999/94/EC and 2003/73/EC, the availability of information about fuel efficiency could influence consumers to buy fuel efficient cars. Therefore, a simple and understandable labelling scheme is required.

The main objective of the measure is to inform consumers about the fuel economy and CO_2 emissions of new passenger cars and to raise the awareness of the environmental burdens. Another important objective consists in creating incentives for vehicle manufacturers to invest in new technologies and strengthen the competitive position of the European transport industry.

Key findings: There is one main impact of the measure on the European Transport System: The availability of information affects consumer behaviour: consumers tend to buy fuel efficient cars with lower CO_2 emissions due to environmental as well as economic reasons. Improvements in fuel efficiency lead to decreasing costs of operation. This effect can induce rebound effects in terms of increasing the modal share of passenger cars and slightly increased yearly mileages.

Economic impacts: The main positive economic impact of the measure is the stimulation of the automotive sector to invest more in R&D resulting in new innovations in vehicle technologies. The consumers' decision to buy more fuel-efficient cars forces the manufacturers to adapt to this behaviour.

Social and Environmental impacts: The measure is effective in terms of a reduction of CO_2 emissions; a reduction between 0 around 5 % is estimated but as most reviewed studies did not consider rebound effects of lower costs of operation, the impact will be around 3 %. Improvements in fuel efficiency also affect air pollutant emissions positively. Furthermore, less fossil fuel is consumed. An additional taxation of CO_2 emissions is assumed to increase the impact of the measure. The only social impact of this measure is a minor positive impact on health as increasing fuel efficiency leads most often to less air pollutant emissions.

There are two possible types for the labelling scheme: a relative and an absolute one. The adequate type of car labelling would be a relative one because consumers tend to buy the more efficient cars compared to other cars of similar size. Also the impact on energy efficiency is higher with a relative than with an absolute one.

Eco-Driving (c.f. Annex 4 – p. 269/270)

Description: Eco-driving (from the longer term “economical and defensive driving”) is a style of driving that saves energy consumption, reduces air pollution emissions and creates a safe and relaxed driving atmosphere. It involves a number of activities that begin even before a driver turns on the engine, including route planning and basic vehicle checks. Eco-driving can also be supported by ITS / RTTI and general vehicle-infrastructure communication.

Eco-driving is an alternative that does not require significant investments; it only requires educational programmes, and if possible a strategic monitoring or enforcement system. Thus, it is considered one of the most cost-effective approaches to reduce fuel consumption, increase safety and improve air quality. The measure is also applicable for drivers of passenger cars and not limited to transport operators.

Key findings: In summary, eco-driving is not only an ecological measure, but it also implies economical and defensive driving.

Economic impacts: The main benefits include cost reductions, due to savings in fuel consumption and time savings: eco-driving training can be very effective to decrease fuel consumption by 3-11 % and thereby reducing the impact of increased oil prices on transport costs in road transport. On average 10 % fuel savings could be observed directly after the eco-driving course. The average reduction of the main fuel consumption rate is in the range of 9.5 % on the highway and 11 % in the city. This positive benefit is maintained approximately for six months, after which its effect reduces rapidly. The long term effect is less well known, but is expected to be significantly smaller: 5-7 % savings after a year or more. [GTZ (2005), CE Delft (2009)] Other sources claim that the long term effect of applying eco-driving is a reduction in fuel consumption of between 3 % to 4.5 %.[TNO (2006)] The reductions in variable costs due to reduced fuel consumption, repairs, maintenance, tyres, lead to greater profit margins and revenues and lower user costs for passenger cars. The time savings can be achieved through trip consolidation and anticipation of traffic conditions.

Social impacts: Furthermore, the drivers benefit from higher levels of safety. Stress reduction for professional drivers lead to higher job satisfaction. Note that the positive effects of eco-drive training decreases over time in absence of refreshment training

Environmental impacts: The main environmental benefit from eco-driving concerns the reduction of fuel consumption and CO_2. Furthermore, eco-driving also reduces air pollutants such as hydrocarbons, carbon monoxides, particulates and nitrous oxides.

Introduction of speed limitation for light commercial road vehicles (c.f. Annex 4 – p. 273/274)

Description: A light commercial vehicle (LCV) is defined as a commercial road freight vehicle (N1 vehicle class in EU legislation) with a maximum weight (GVW) of 3.5 tonnes. Currently, LCV underlie the same speed limitations as passenger cars. The number of LCV has been increasing fast and meanwhile accounts for almost 15 % of Europe's road vehicle stock.

There are two main reasons for the implementation of a speed limit for LCVs: Firstly, such vehicles contribute significantly to the increase of greenhouse gas emissions of transport. Secondly, accidents in which LCV are involved are often serious, especially for the crash opponent (twice as high compared to passenger cars).

Key findings: On the one hand, travel time increases due to the speed limit imposed on LCVs but on the other hand, travel time will decrease due to less congestion because of fewer accidents. If differences in speed between road users grow then this may negatively affect the traffic flow by hampering it. However, the net effect concerning the more homogeneous traffic flow is expected to be positive.

Road transport operators will have lower transport costs because fuel and maintenance costs for LCVs will decrease due to lower top speeds. These benefits will outweigh the increased costs because of the minor decrease in travel times.

Economic impacts: Besides reduced fuel and maintenance costs, several other economic benefits will occur due to the introduction of a speed limit for LCVs. Furthermore, less vehicles will be off the road for maintenance (due to accidents or overcharged engines), the chance of employees being involved in accidents or suffering injuries decreases; the image of transport operators using LCVs will enhance (greener image and less often involved in accidents), although they will suffer from longer travel times.

Social impacts: The well-being of residents near motorways and the entire society will increase through the decline of air pollutants (NO_x, PM10) and noise emissions. In addition, the level of safety will increase substantially for all road users (including slow modes). Lower speeds reduce stopping distances, allow more time to recognise hazards, increase the ability of other road users to judge vehicle speed and time before collision and reduce the likelihood that a driver loses vehicle control.

Environmental impacts: Lower maximum speeds for LCVs will lead to several positive impacts on the environment, such as: reduced air pollution (NO_x, PM10, CO_2), less noise emissions, a decrease in fuel consumption of LCVs (higher fuel efficiency). In addition, lower top speeds and results of safety benefits incentivise the market and the production of lighter and less powerful LCVs. Practical experiments in the Netherlands have shown that speed limits (limited to 110 km/h) imposed on vans and light trucks resulted in 5% fuel savings. [European Transport Safety Council (2008)]

In brief, the introduction of speed limits for LCVs will decrease the environmental impacts of LCVs significantly by a crucial increase of the road safety level, without causing major economic or social disadvantages.

5.6 Transport planning

Promoting car sharing / car clubs (c.f. Annex 4 – p. 275/276)

Description: Car sharing describes car rental for a short period of time, charged by a combination of time and distance. Other than rental cars, the cars can be rented for short time periods (per hour). On the one hand, car sharing can be a substitute for a privately owned car, on the other hand it offers mobility possibilities for people who do not want or cannot afford their own car. Car sharing offers the opportunity to avoid purchasing a company car for (small) businesses.

This TPM aims to promote the instalment and extension of car sharing / car club organisation in European cities in order to reduce the dependence on private cars without restricting mobility.

Key findings: In general, car sharing can promote multimodal transport. This means that mobility can grow, especially within urban areas, without further harming the environment. However, low income groups and people without a car will have improved access to motorised private transport. Moreover, society and residents in urban areas will benefit from reduced air pollutants and noise emissions.

Economic impacts: Transport costs for road users, specifically car owners, will decrease substantially. This mainly accounts for car users who have a low vehicle mileage or use their car only sporadically. The costs for public bodies operating a car sharing system will depend on the operating model (private / public) and the amount of funding needed during the implementation phase.

Social impacts: Car sharing will mainly be beneficial for people who do not own a car or people incidentally using a car. The first mentioned group will clearly have better access to motorised private transport. Furthermore, multimodal transport will become more attractive which increases the accessibility for all transport users, especially within highly congested cities.

Environment impacts: Car sharing leads to a reduction of car ownership and intensifies a modal shift from road to slow modes and public transportation (through improved possibilities for multimodal transport). Additionally, in general cars are smaller and comparably new, thus car sharing will lead to a decrease in air pollutants, CO_2 emissions, fuel consumption and noise emissions.

Park and ride systems (urban) (c.f. Annex 4 – p. 277/278)

Description: Park and ride systems (P&R) are parking facilities at the periphery of cities often linked to public transportation. As a consequence, users will have the possibility to switch modes of transport, e.g. bus or other modes of public transport. Park and ride systems are mostly aimed at commuters, but also at people who make irregular trips to the inner city as well as tourists. The concept aims to improve the accessibility of people who are poorly connected to public transportation and therefore are reliant upon the usage of a car.

Key findings: The measure reduces traffic in the inner city but might also increase it in the peripheral or suburban areas. This will have positive effects on health, safety, emissions and land use (parking spaces) in the inner city, but has the opposite effect on the suburban areas. Hence, park and ride systems will (likely) reduce road traffic in the urban area by increasing it in the peripheral or suburban areas. The amount of users changing their journey or shifting mode highly depends on changes in user behaviour. Implementation costs to promote park and ride systems are crucial to boost the attractiveness of multimodal transport.

Economic impacts: The spatial competitiveness of local businesses and shops increases in regions where only selected cities or towns have park and ride systems. Especially during the implementation phase, public bodies will have to subsidise the parking spaces, as they are be too expensive and not attractive enough to switch modes. By using park and rides systems the need for urban road maintenance and expansion of road infrastructure is reduced, although public income is expected to decline due to lower parking fees.

Social impacts: On the one hand, the reduced traffic in the inner city has positive effects on road safety and emissions within cities (especially slow modes) and is beneficial to the well-being of the residents of the city. On the other hand, road traffic will increase in peripheral and suburban areas which will lead to more accidents and traffic outside city centres.

Environmental impacts: The effect on absolute vehicle mileage is difficult to determine. The effect on CO_2 emissions and thus the effect on climate are ambiguous. Parking spaces near the edge of cities will require land and decrease the level of visual quality.

Promotion of energy efficiency commercial vehicles (delivery vans, taxis, buses) (c.f. Annex 4 – p. 279-280)

Description: This TPM aims to promote the use of energy efficient commercial vehicles in the European Union. Energy efficient commercial vehicles can be defined as vehicles with a significant degree of energy transformation, often capable of using electricity (also hybrids), hydrogen, biogas and liquid biofuels in high blends. In order to enlarge the market share of energy efficient commercial vehicles, there is a need to provide support for Member States through facilitating and structuring the exchange of knowledge and reveal best practices for promoting the purchase of clean and energy-efficient commercial vehicles.

In order to enlarge the market share of energy efficient commercial vehicles it is necessary to take the environmental impacts of vehicles over their whole lifetime (cradle to grave) into account by influencing the purchase decisions for public transport (buses) and commercial vehicles (LCV - light commercial vehicles, HCV - heavy commercial vehicles). For public transport (buses) the EU aims to include energy consumption, CO_2 emissions and emissions of the regulated pollutants such as NO_x and PM. This way, energy efficient commercial vehicles will become more cost attractive for (local) authorities and transport operators. It is important to mention that this TPM does not aim to shift freight from short-sea shipping, rail and inland waterways to road transport.

Key findings: To summarise, the promotion of energy efficient commercial vehicles will have a positive effect, due to less air pollutants, on road users (including slow modes), transport operators, residents in urban areas and the whole society (especially for children and people with reduced lung function).

Economic impacts: Although energy efficient commercial vehicles have a higher price than conventional ones, they will save transport operators money during their time of operation. In addition, the promotion of energy efficient vehicles will increase the demand for those vehicles which will enable producers to expand their production and lower their production costs (and prices). To achieve this, public funding will have to support the whole product development and innovation chain from research to market introduction in a more integrated approach on creating more energy efficient commercial vehicles. In addition, health service costs are expected to decrease for society and especially residents, the demand for non-renewable resources will decrease (and their prices will not increase as much as without measure) and the sectoral competitiveness of the European automotive sector will enhance.

Social impacts: Employment in transport will benefit only for a few years from the higher demand for energy efficient vehicles. The additional demand for employment in the transport sector during the implementation phase will decline after a few years and employment rates will return to current levels. The health (well-being) of residents and society will arise.

Environmental impacts: Energy efficient commercial vehicles will positively affect fuel consumption (fewer resources needed). Furthermore, energy efficient commercial vehicles (as defined in the description) will cause less air pollutants (especially in urban areas) and reduce CO_2, NO_x and PM emissions.

Introduction of city logistics / Urban freight distribution / urban consolidation centres (c.f. Annex 4 – p. 282-284)

Description: Based on COM(2009)490, also freight logistics have an urban dimension because the distribution of goods to their final destination within the city is an essential part of the supply chain. Several different concepts exist concerning city logistics. The main target of urban freight distribution is to avoid traffic passing through cities and metropolitan areas by implementing technical and planning measures (like urban consolidation centres / city logistics). City logistics incorporate many activities (i.e. production, commerce and supply) between different actors, which appear in form of inner urban goods transport or distribution of interurban freight, fulfilling a substantial contribution to the economy, city life and operations. There is the possibility to deploy smaller, cleaner and more efficient vehicles for the local distribution of goods.

Key findings: Altogether, main impacts are very positive and mainly concern transport operators (road/public transport), retailers, residents, local public bodies as well as the overall society.

The problem of urban freight distribution is often not considered a key priority project for national authorities and thus is mainly considered a local project. Still, there are several examples in Europe of successful urban freight distribution centres (like ‘City Plus Milan’, ‘City Cargo Amsterdam’, ‘RegLog Regensburg’, ‘SpediThun’, etc.). Inner city road freight traffic decreases by app. 20% (number of trucks; vehicle-km). [BESTUFS II (2006): Deliverable 5.2 Quantification]

Economic impacts: In terms of economic impacts, investments (for vehicles / adjustment of infrastructure) are needed during implementation. During the operation phase, costs of inner city infrastructure maintenance will decrease, but costs for transport operators will increase (additional step of cargo handling in the supply chain).

Furthermore, congestion will decline and efficiency (fewer trucks running empty) will increase significantly within inner city areas. Thus, there are significant positive impacts for shop owners and retailers (sectoral and spatial competitiveness) because of the definition and limitation of delivery times, leading to a more predictable workflow and overall better logistical organisation.

Social impacts: Noise emissions and air pollutants within cities will decrease, especially near highly frequented inner city roads, which will positively affect the well-being of nearby residents as well as their traffic safety level on urban roads and the overall accessibility of the city centre. In addition, employment in freight distribution and storage will grow and job quality for road freight transport employees will increase (less stress caused by inner city driving and better access to distribution centres).

Environmental impacts: Urban freight logistics will have the positive effect of declining vehicle mileage driven by heavy commercial vehicles within cities. The reduction of the heavy trucks vehicle mileage will be beneficial for the environment because of increasing air quality and declining noise emissions. As a consequence, this will further increase the attractiveness of such cities for residents and tourists.

Low emission zones (LEZ) / Environmental zone (c.f. Annex 4 – p. 288-290)

Description: A 'low emission zone (LEZ)', also called 'Environmental zone', is a specific area mostly within cities, where the usage of specific transport modes is restricted or prohibited. It is a defined geographical area that can only be entered by vehicles meeting certain emission criteria. Hence, the purpose of a low emission zone is to restrict the most polluting vehicles entering the area in order to prevent dangerous levels of air pollutants, which have severe consequences for public health.

Key findings: In 2009, low emission zones were established in about 70 European cities, however defined by different access rules and different enforcement methods. The rules are determined by national, regional and local legislation and differ between each country. The instrument has been proven to effectively help Member States to meet air quality limit values. The old and very young population benefit most from the implementation of this measure.

Economic impacts: Nevertheless, the introduction of LEZ leads to several economic disadvantages such as: increasing transport costs (change of routes), additional capital costs (replacement of old vehicles before the end of their economic lifetime) and a reduction of revenues for directly affected companies (businesses within the zone).

Costs reductions will mainly occur through lower health service costs for residents within the LEZ.

Social & environmental impacts: Especially children and the elderly will be positively affected by a reduction of air pollutants (health benefits) as these are the age groups which suffer most from transport emissions. Overall, the quality of life will increase substantial within LEZs.

The positive impacts on the environment closely relate to the positive social impacts. This means air quality will improve (less NO_x, PM and also emission reduction of CO, HC, CO_2) safety level and noise emissions within LEZs will decrease.

In brief, LEZs will force transport operators and public bodies to invest in a renewal of the vehicle fleet and the implementation of LEZs, although this encourages the usage of these environmentally inefficient vehicles in developing countries (increasing shipment). However, other road users (especially slow modes); residents near busy and highly polluted roads and society as a whole will clearly benefit from reduced air pollutants and noise emissions. Moreover, LEZs can boost the quality of life within cities and increase the attractiveness of cities (for residents, but also for tourists and businesses).

Influencing demand for sustainable transport – promotion of cycling within urban / suburban areas (c.f. Annex 4 – p. 285-287)

Description: In order to improve the quality of life within cities it is crucial to enhance and promote sustainable mobility. A demand-oriented approach to foster sustainable mobility is based on information, co-ordination, motivation and traditional, infrastructure oriented transport planning.

As this TPM will solely focus on cycling as the relevant transport mode, two types to influence the demand for cycling exist: (Local) authorities can improve the attractiveness of cycling by expanding their cycling infrastructure (1). Furthermore, cities, companies and schools can promote cycling for example by introducing awareness campaigns. Such measures are often referred to as 'soft measures', which are designed to encourage people to use bicycles (in combination with public transport) for journeys that were previously made by car (2).

Key findings: Influencing the demand for sustainable transport by cycling, targets to increase the popularity of cycling, which will lead to a modal shift from passenger cars to slow modes.

Economic impacts: Road transport operators and the car industry will face negative impacts because of the initiated modal shift from road to slow modes and public transport. Reduced vehicle mileage of passenger cars will lead to a decrease in demand for cars which will influence the employment in the car industry. Public bodies, responsible for cycling infrastructure, will have to invest in new cycling infrastructure or promotion campaigns. However, the modal shift from road to slow modes requires investments in cycle infrastructure and maintenance, which are comparably cheaper than investments in car infrastructure. The societal health service costs will decline in the long term.

Social impacts: Concerning social impacts; health levels of slow mode users will increase due to a better physical condition e.g. less chance of cardiovascular diseases and a minor chance of becoming overweight. The well-being of residents and society as a whole will increase due to the modal shift from road to slow modes and public transport, mainly because air pollutants and noise emissions will decline substantially. Nevertheless, the risk of being killed in a road accident is six times higher for cyclists and pedestrians than for car users. A well-designed infrastructure, especially at intersections, can increase the level of safety for cyclists significantly.

Environmental impacts: Short-distance trips (< 10 km) by car are the most fuel - inefficient trips and generate comparably more emissions per kilometre than long-distance trips. These short-distance trips can be replaced by cycling, which means a significant decrease in the production of air pollutants and noise emissions on the local scale. In addition the visual quality of landscape (cycling requires less parking space) will increase, climate will benefit from less GHG emissions and the demand for non-renewable resources will decline.

Promoting cycling will have positive impacts for all road users (especially slow modes), public transport operators, residents and society, who will benefit from increased well-being, safety and physical activity.

5.7 Research & innovation

Electromobility on roads (c.f. Annex 4 – p. 291/292)

Description: The TPM 'Electromobility on roads' describes the fostering of electric road vehicles. This means, the support of research and development leading to an increase in efficiency and the improvement of safety and reliability of vehicles with electronic propulsion. Overall, it is assumed that the promotion of research and development of this measure is expected to increase the number of electric road vehicles (passenger and freight vehicles).

This assessment focuses on passenger road vehicles, public transport vehicles (buses and coaches) and light-duty vehicles (LDV). Heavy duty vehicles (HDV) will not be taken into account because these are expected to remain based on internal combustion engines (ICE) for the foreseeable future. Electromobility encompasses semi and full hybrid electric vehicles, plug-in hybrid electric vehicles and battery electric vehicles, while this TPM focuses on the last two types of vehicles.

Key findings: Mostly, residents in urban areas, who suffer severely from traffic emissions, and society in general will benefit significantly from an increased market share of electric vehicles. Transport operators and road users (except for slow modes) will have to adjust their travel behaviour and will face higher costs of purchasing. Still, the fostering and promotion of electric vehicles (technologies) will have to be embraced by road users because they will need to replace their vehicles and change their behaviour. The exact amount of people changing or buying electric vehicles is difficult to predict.

Economic impacts: Additional funding for research and technology of electric vehicles will increase the entrepreneurial competitiveness and strengthen businesses involved in the production of electric vehicles compared with non-EU businesses. If people are willing to purchase electric vehicles they face higher implementation costs, but reduced operational costs (fuel costs). Through the additional funding for the promotion of electric vehicles an increased demand is expected which thus will lower the production costs and the purchase prices. In contrast, energy suppliers will benefit from higher energy demand.

Social impacts: Increasing demands will positively stimulate employment within the electro mobility sector, but will lead to fewer jobs within the oil and petrol industry. The health level and well-being of residents and society will rise, especially near motorways and within cities. Especially handicapped people (blind / low vision pedestrians) constitute a social group with an enhanced safety risk.

Environmental impacts: Increasing electro mobility will reduce noise emissions. In addition, whereas the reduction of air pollutions is detectable on the local level, it is uncertain on a national or international scale, because the environmental impacts depend on the energy mix used for charging electric vehicles. In addition, large scale production of lithium or lithium-ion batteries is environmentally difficult at the local scale.

To summarise, the environment will benefit by an increasing share of electric vehicles and, if renewable resources are used, for charging. However, as battery capacity is limited (and thus electric vehicles have a limited driving range) and purchase costs are comparably high. In general, significant funding is needed to stimulate production and decline the negative economic impacts.

H2 Fuel cell vehicles (c.f. Annex 4 – p. 293/294)

Description: This TPM comprises development and market introduction of road vehicles propelled by hydrogen (H2) as energy carrier and converting the H2 by fuel cells into electric energy that drive electric motors. H2-FCVs provide the opportunity of road transport to eliminate emissions of local air pollutants and significantly reduce noise emissions. If hydrogen is produced from electricity that in turn is produced from renewable electricity sources H2-FCVs also constitute an option for carbon-free transport. The latter would as well reduce fossil energy consumption, thus reducing fossil energy imports and increasing energy security of the EU.

Obstacles for market introduction of H2-FCV include the high cost of vehicles, in particular caused by the cost of the hydrogen fuel cell (HFC), and the lack of sufficient refuelling infrastructure for H2. This is commonly addressed as the hen-and-egg problem of H2-FCV: no fuelling stations mean no sales of cars, no sales of cars mean no build-up of fuelling stations. Therefore a TPM 'H2 Fuel Cell Vehicles' involves a bundle of measures to foster RD&D as well as to set the right incentives for market introduction at the right point of time.

Key findings: The TPM H2 Fuel Cell Vehicles is double-edged. On the one hand it will enable to reduce air pollution and transport noise in urban areas, in particular benefitting disadvantaged social groups (lower income) living alongside larger roads. On the other hand measures to foster the introduction of H2-FCVs at least for cars may subsidise better-off person groups to purchase H2-FCVs during market entry, while other groups still could not afford to purchase these cars as rather premium and luxury class cars will be equipped with the technology at market entry. Introducing H2 for public transport, i.e. for buses, would again be beneficial for disadvantaged groups relying more on public transport as the technology is expected to be more comfortable than diesel buses e.g. in terms of noise, exhaust emissions and vibrations.

All person groups should benefit in those countries that achieve a lead market position increasing their competitiveness and enabling them to become an exporter of H2-FCVs when these penetrate the global vehicle markets.

Technological improvements regarding e-mobility charging systems (c.f. Annex 4 – p. 297-299)

Description: The TPM 'Technological improvements regarding e-mobility charging systems' covers the development of charging systems for private and light commercial electric road vehicles. Technological improvements of charging systems are expected to increase the efficiency, reliability and uniformity of charging E-mobility transport. Public and governmental investments will directly lead to more research on E-mobility charging systems and indirectly, in the long run, lead to a rise of the number of efficient E-mobility charging stations. Increasing the distribution of efficient E-mobility charging systems by implementing a wider charging network is of fundamental importance for the widespread acceptance of electric vehicles. This impact assessment focuses on the influences of improvements of e-mobility charging system for private and light commercial road vehicles.

Key findings: The electric car user will benefit from the technical improvements and increasing number of charging stations. An extensive network of charging stations offers electric car users the opportunity to broaden their geographical range of travel by being independent from charging batteries at origin. Presumably, the impact of an improved charging system cannot solely improve the attractiveness of and demand for electric vehicles. In addition, mainly rural areas, which at first will not be equipped with charging systems, will face proper disadvantages compared to urban areas.

Economic impacts: Whereas higher and (temporal) uncontrolled charging can significantly increase peak loads, many of the current electricity grids are not designed (capacity) for enormous amounts and demand of electric vehicles. As a consequence, public bodies will first of all have to invest in power grids. Companies involved in electric vehicles production will be positively affected by the increased funds for fostering E-mobility charging systems which will lead to more employment. Mainly rural areas, which at first will not be equipped with charging systems, due to efficiency reasons (lower population density and demand), will face proper disadvantages compared to urban areas. This will lead to increasing spatial competition between (sub) urban and peripheral areas.

Social impacts: Basically, there are two important social impacts. First, social inequality will grow between urban and peripheral areas (assuming that charging stations will mainly be located in highly dense areas). Second, the electric car user will benefit by having more charging opportunities to increase the driving range (not because of better battery performance, but because of the possibility to charge countrywide in a short time). Increasing funds fostering e-mobility charging systems will lead to more employment for companies involved in electric vehicles and charging systems.

Environmental impacts: In general, the implementation of new technologies for charging systems will have (both positive as negative) impacts on the environment when it will generate an increased usage of electric vehicles. The reduction of air pollution and noise emissions is only on the local level (concerning residents) unambiguous. In general, the level of air pollutants depends on the production of the electric energy, which depends on the energy mix used (nevertheless the electricity mix also varies widely depending on geography, time of day and season). Life cycle emissions of electric vehicles will be much lower compared to petrol and diesel vehicles, if they are charged with sustainable energy. If not charged with sustainable energy, life cycle emissions can even increase compared to traditional powered vehicles. The reduction of (fossil) fuels strengthens the energy security.

GALILEO (c.f. Annex 4 – p. 295/296)

Description: Satellite navigation applications have become very important in the European Union. The aim of GALILEO is a radical improvement of location accuracy and compatibility with other GNSS. Furthermore, it aims at enhancing Europe's technological navigation independence through its own satellite infrastructure, in order to guarantee the provision of services that are nowadays central to our economy and on which our quality of life and our safety depend.

Another objective is to become independent of the GPS time signal. GPS satellites generate an accurate time signal. This signal provides support for all high speed communications, optical and electrical networks. A sudden loss of the GPS time signal would be catastrophic. With that in mind, Europe should not depend on external services, be at risk from future changes to such services, or from excessive future fees.

Key findings: When fully operational, GALILEO will provide high accuracy positioning data, without signal loss. The two first GALILEO satellites were launched in late 2011. Due to delays and cost overruns, the initial launch plan (30 operational satellites by 2014) has been reduced. The current plan involves launching a total of 24 instead of 30 satellites by 2015.

Economic impacts: Improved location accuracy and the absence of signal loss will, in general, have a positive effect on transport operations.

GALILEO makes satellite navigation services suitable for safety-critical applications, like flying/landing aircrafts or navigating ships through narrow channels even under foggy conditions. Other implementation examples are: tracking/tracing in the medical sector (e.g. ambulances, organ transport), in the security/safety sector (e.g. missing children), road tolling and charging, unmanned vehicles, precision steering guidance when sowing or harvesting crops, etc.

Furthermore, GALILEO will offer accurate time signals necessary for the Synchronous Digital Hierarchy (SDH) network, making Europe independent of GPS time signals.

Social impacts: Networks like GSM, radio broadcasting, banking systems, pay terminals, security systems depend on such SDH time signals. Loss of this time signal can result in network failure. This needs to be avoided as it will create chaos and leave room for criminal activities. Society will therefore benefit from GALILEO. Residents in "urban canyons" benefit, as emergency services (e.g. ambulance, security) or commercial vans can now easily locate their address.

Environmental impacts: The assessment showed that the concerned measure does not have impacts on an environmental level.

E-Freight (c.f. Annex 4 – p. 300/301)

Description: Currently, different documents are being used for freight transportation according to the different modes of transport. This procedure is expensive and entails administrative costs for multimodal transport. Hence, the enhancement of multimodal freight transport is one of the main objectives of the European transport policy which should be supported by the introduction of e-freight, as a procedure for handling all processes related to the movements of goods by all modes in real time and paperless. Moreover, the improvement of freight transport management will simplify the identification and location of freight regardless of transportation mode. As a transport policy measure within the frame of multimodal transport of goods the development of E-freight supporting technologies (RFID, DSRC – Dedicated short range communication) overall aims to simplify the information exchange of freight and transport in general.

Key findings: As a result, overall freight transport (and especially multimodal freight transport) will benefit significantly from the measure. The most important improvements are: lower transport costs for carriers, higher security level, more service and comfort and the ability of real-time monitoring of cargo.

Economic impacts: During the implementation phase public authorities and businesses face significant additional administrative burdens due to construction, organisation and integration of E-freight into the existing schemes. However, savings through reduced transport times, increased service options (monitoring, higher service, less paper work) and more reliable delivery of cargo are beneficial for transport operators (and their revenues) and (local) authorities. The transport operator's spatial and sectoral competitiveness will increase.

Social impacts: The main social impact is the increased level of security, although this level already is quite high in Europe. E-freight will request the implementation of new safety standards which will be equal for all modes of transport and all participating countries. This will require highly automated security checks, which use the newest technologies and standards. Furthermore, the health of society is positively affected because of a rising safety level.

Environmental impacts: E-freight will promote multimodal transport of goods and will strengthen rail and inland waterway transport. Hence, the energy usage for freight transportation will decrease and energy efficiency will increase. The environment and hence the society and residents will benefit from increased multimodal transport based on a reduction of air pollutants and noise emissions near congested motorways.

Overall, (multimodal) freight transport will become more efficient and effective. Mainly, transport operators will benefit from the increased safety, real-time information on delivery times and less administrative burdens during the operation phase, although the investment costs should not be disregarded.

Provision of real time traffic and travel information (RTTI) (c.f. Annex 4 – p. 302/303)

Description: Traffic participants are more and more confronted with traffic problems like congestion, delays, road works and accidents. The mobility of people and goods is growing and the rising demand cannot be fully supported by transport infrastructure investments. Furthermore, road works, traffic accidents and congestion hamper traffic flows and cause delays which lead to significant extra costs for transport operators and society. In order to meet future mobility demands, it will be crucial to increase the efficiency of road infrastructure by distributing traffic participants on the basis of real time mobility network loads. Real time traffic and travel information (RTTI) is able to meet the needs of traffic participants regarding travel, without substantial investments in new transport infrastructure.

Key findings: Currently, transport users and transport operators do not have the possibility to make truly informed decisions before and during their journey. With RTTI travel or transport time will become more reliable and it will be possible to adjust your journey on current traffic information. This will lead to well distributed traffic flows and improve the access to (multimodal) transport systems.

By far and most important, the success or failure of RTTI largely depends on changes in user behaviour. Hence, if traffic participants do not significantly change their behaviour through RTTI (keep the same routes and modes as they used to do); the impact of RTTI of course will be moderate. If the behaviour will change, the key findings are that road congestions will decrease, public and railway transport will be better accessible, slow modes will become part of the end-to-end transport chain., residents near busy motorways will suffer less from environmental pollution, but also public bodies have to invest in the RTTI infrastructure, which will result in less expenses in the long run.

Economic impacts: RTTI will lead to a reduction in transport time and thus to reduced transport costs for all road users. Moreover, RTTI enables traffic participants to switch between different modes of transport more easily. Nowadays, multimodal transport fails to provide a fully frictionless 'end-to-end' journey. With the introduction of RTTI, it will become easier to change modes and to acquire information, which will also become more transparent. Public bodies will have to invest in RTTI in order to install, maintain and operate traffic information systems and data centres. However, expenses on traditional infrastructure (mainly new roads) will decrease (assuming that traffic will be shifted to other modes).

Social impacts: By introducing RTTI, information will become more transparent and accessible to all traffic participants. Safety will increase by dynamic traffic management systems because their ability to display danger warnings, speed regulation and re-route traffic to less dense parts of the network.

Environmental impacts: Air pollutants (NO_x, PM), noise emissions and greenhouse gases emissions will decrease in highly congested regions (through traffic management), but will increase in other areas.

Use of speed limitation devices in lorries and coaches (c.f. Annex 4 – p. 304/305)

Description: This TPM is about the legal obligation for the usage of speed limitation devices, which allow a defined maximum speed for lorries and coaches. The device is designed to restrain the engine when a lorry or coach reaches a pre-programmed maximum speed. With the speed set at an optimum level, it increases the safety level (for drivers and other road users), but reduces fuel consumption and maintenance costs. Heavy vehicles like lorries and coaches (over 3.5 tonnes) pose a higher risk to road users than other vehicles when involved in a crash. Research proved that speeding contributes to about one third of all fatal accidents.

Key findings: The economic costs and benefits have not been studied properly yet. Lower speeds will lead to longer transport times, but in contrast reduced fuel consumption, less congestion and decreasing costs for maintenance will be beneficial for transport operators. The net effect for light weight vehicles is positive, but no cost-benefit analyses have been conducted for lorries and coaches. Speed limitation devices will significantly improve road safety for all road users (including slow modes). This will lead to fewer accidents and reduced health service costs for road users and society. In addition it will significantly decrease environmental impacts (pollutants, noise, GHG emissions).

Economic impacts: The purchase and installation costs strongly depend on whether the device is installed when a vehicle is manufactured or at a later date (retrofit). Transportation costs will increase due to a longer travel time, but the fuel and maintenance costs will decrease due to the lower speeds. Public bodies will receive less excise tax and probably the public income (speeding tickets).

Social impacts: The main social impact is the increased well-being of residents near motorways and the increased level of safety for all road users. Lower speeds reduce stopping distances, allow more time to recognise hazards, increase the ability of other road users to judge vehicle speed and time before collision and reduce the likelihood that a driver loses vehicle control. The transportation labour market will not be affected, because installation costs of speed limitation devices will be equalized by savings in maintenance costs.

Environmental impacts: Speed limitation devices will reduce maximum speeds which will result in several positive impacts for the environment, such as: reduced air pollution (NO_x, PM_{10}, and CO_2), less noise emissions and decreasing fuel consumption by lorries and coaches. Besides, speed limitation can incentivise the transport market to produce lighter and less powerful trucks and coaches and declines the additional land-use due to lower demand for new roads based on enhanced capacities

To summarise, lower speeds will lead to slightly longer travel times for transport operators. This disadvantage will be easily compensated by the improved safety for all transport users; a substantial decrease of environmental impacts for residents near motorways; and decreasing operating costs (like fuel, maintenance and health service costs) for transport operators partly due to higher energy efficiency.

Compulsory safety standards in road vehicles (c.f. Annex 4 – p. 306/307)

Description: Road safety is a major societal issue and causes huge costs (approximately 130 billion € in 2009) for society. Although significant improvements concerning road safety have been made, much more still has to be done to reach the European 'zero vision' target (zero fatalities on European roads by 2050).

Technology is expected to contribute substantially to reach the 'zero vision' target for road transport. There are several road safety systems. This TPM will focus on two road safety systems: Advanced Driver Assistance Systems (ADAS) and Vehicle-Infrastructure interface (V2I = Vehicle-to-Infrastructure).

Key findings: In general, ADAS and V2I systems have the potential to deliver major positive impacts for road users, residents and society. There are clear benefits for slow modes, residents near motorways and society, due to improvements of road safety, the shortening of travel times and the reduction of traffic pollutions and emissions. However, before these systems can be successfully implemented, it will be essential to improve their acceptance among private vehicle users. Currently, private vehicle users do not fully accept ADAS and V2I systems due to privacy issues and the feeling of “losing control of driving”.

Economic impacts: The reduction of travel and transport times will decrease the costs of transportation. Furthermore, the reduced maintenance and insurance costs will be redeemed by purchase costs of road safety technology systems (related to ADAS systems); however the net effects are still inconclusive yet. Public bodies face high costs for the construction of the required infrastructure (related to V2I systems). Additionally, the public sector will be responsible for maintaining and operating the installed technology systems.

Social impacts: Several studies prove the contribution technology makes towards improving the safety record of road transport. Technologies like ADAS and V2I systems will decrease the number of accidents because they can interfere at times and the point when drivers lose concentration or fail to recognise dangerous situations. Still, private vehicle users are sceptical regarding privacy issues and technologies resulting in the fact that they will lose some driving tasks to a technology which they do not entirely trust.

Environmental impacts: Innovative ADAS and V2I systems will encourage changes towards a more sustainable driving behaviour which enhances sustainability and will result in a reduction of traffic pollution emissions (NO_x, PM and CO_2).

Technology will substantially reduce the number of fatalities. Furthermore, technical safety systems help to optimise traffic flows and thus will reduce the risk of congestion. The major hurdle which needs to be overcome concerns the lack of acceptance by private vehicles users.

European rail traffic management systems ERTMS (c.f. Annex 4 – p. 308-310)

Description: More than 20 (national) signalling and speed control systems in rail operation exist throughout Europe. It is envisaged to counteract this pluralism by the introduction of one common system, ERTMS (European Rail Traffic Management System), which aims to increase the competitiveness and dynamism of the rail sector. Further, ERTMS targets to promote the integration of rail freight and passenger market and to harmonise the signalling and speed control system throughout the EU rail transport infrastructure.

The ERMTS system consists of two core components: GSM-R (Global System for Mobiles - Railway) and ETCS (European Train Control System). The key prerequisites for a successful implementation of ERTMS are: the specifications needed to be widely accepted and applied, the establishment of a central management and the strict compatibility of the system.

Key findings: ERMTS will stimulate the European rail transport market by decreasing delays, increasing track capacity, reducing transport time and improving punctuality and safety (operators, passengers, employees and society). However, ERTMS will not be able to improve the performance of rail transport significantly without other measures which optimise the operational structure of the railway network.

Economic impacts: ERTMS will facilitate a growing market share of the European rail transport. This is expected to create a more competitive market for suppliers and will reduce the costs for railway operators and public bodies in the long term. These reduced costs will improve the competitiveness of railways (freight and passengers) on the spatial and sectoral level. It is expected that costs of ETCS, used on its own, are appreciably lower than those of conventional systems. Initially, high investments/asset costs are required to install the system. After implementation, the ERTMS will have lower maintenance costs and thus a positive impact on the public income (if infrastructure management is financed by public bodies) and the revenues of the train operating companies, not at least due to an optimised planning of rolling stock operations..

Social impacts: Concerning safety, current trends suggest that the costs of the European train control system will decrease sufficiently, allowing many non-signalled lines to be gradually equipped with ETCS. Such progress is vital, as unfortunately signalling-related accidents still occur far too frequently on lines without speed-control systems. Furthermore, safety increases for track workers and train operation for train drivers will become less complicated.

Environmental impacts: The environmental impacts are clearly positive. Negative impacts (based on increasing air pollutants and a high energy consumption) are diminished assuming a modal shift from road to rail.

Deployment of rail freight corridors [COM (2008)852] (c.f. Annex 4 – p. 311-313)

Description: The European Commission intends to establish a European railway network where freight trains are prioritised over passenger trains (COM(2008)852). Nowadays, passenger and freight trains both operate in parallel on the European railway infrastructure (a so-called mixed operation). The mixed operation leads to a number of difficulties which are mainly based on the limited track capacity available for freight trains. This capacity restriction, combined with several other issues mainly concerning the lack of interoperability of international rail freight transport, impede the growth of rail freight transport and hinder its competitiveness (compared to road freight transport). The deployment of dedicated rail freight corridors can be performed in two ways, either by using existing railway tracks or by building new tracks (“Betuweroute”). Both concepts are targeting a modal shift from road freight transport to rail freight transport.

Key findings: The deployment of rail freight corridors will increase the attractiveness and competitiveness of rail freight transport. Furthermore, congestion on roads will decline and road safety will improve. Rail passenger transport, road freight operators and the people living nearby dedicated rail freight corridors will be negatively influenced.

Economic impacts: The deployment of such freight corridors in the European Union will decrease transport costs for rail freight transport. Dedicated freight tracks will not only reduce transport times, but also improve reliability. This enables transport operators to optimise the planning and improve their rates for on-time delivery respectively the punctuality. The dedication of rail freight corridors is expected to increase spatial competitiveness between countries (or regions) and will lead to improved attractiveness of affected regions.

Social impacts: The modal shift generated by the implementation of such a measure has a direct effect on road safety. Heavy duty / commercial vehicles (trucks) make a substantial contribution to the number of road accidents, casualties and the severity of injuries. Reducing the number of trucks will improve road safety for all road users (including slow modes). Employment in the transport sector will be affected both positively and negatively. On the one hand, rail transport operators will face increasing demands for rail freight transport and subsequently benefit from their improved competitiveness as transport operator. On the other hand, road transport operators will lose a certain amount of cargo to rail transport operators.

Environmental impacts: A modal shift from road to rail transport will have significant benefits for the environment. Less road freight transport will increase air quality in terms of reductions of NO_x and PM emissions; residents near busy motorways will benefit substantially from this modal shift. But the contribution of rail transport to noise pollution (especially freight trains) is considerable, which will negatively affect residents near future dedicated rail freight corridors. There will be an approximate reduction of 75% in CO_2 emission if the shift from road to rail occurs. On condition that necessary speed control systems will be conducted, the road safety level will significantly increase (1:25 – 1:40).

5.8 Others

Promotion of flexible working hours, terminals, gating (c.f. Annex 4 – p. 314/315)

Description: The promotion of flexibility of working time refers to the length and distribution of working time. It includes various forms: flexitime (allowing employees to select their arrival and departure times), compressed work week (where employees work more hours in fewer days than the usual 8-hour per day schedule), staggered shifts (setting different intervals across the morning to define the beginning of the working day for employees), etc.

Key findings: This measure is expected to spread traffic over a longer period of time around peak periods (therefore aiming at reducing congestion and promoting an efficient use of public transport services) and improve job satisfaction as well as the quality of life of workers. At the same time companies could enjoy higher productivity (a +3% increase has been estimated in one application in the US [EPA (1998)] even though on the other hand possible investments might be required to set up the time working schedule and explaining it to employees, as well as for security and utility expenses in case the building’s operating hours have to be extended. Indeed, promoting flexible working hours is more than just a transport policy measure and its social impacts are only partially linked to transport.

The application of flexible working hours impacts on the distribution of trips during the day, depending on the individual working schedule; as a result, less congestion and reduced transport time for road transport (in the range of 7-18% [Victoria Transport Policy Institute (2010)]) can be observed, mainly during peak hours. In addition, different time distributions and congestion levels might produce a mode shift.

Economic impacts: As a result of the different distribution of trips during the day / the week, public transport operators might face a slight increase of cost due to the required adjustment of their services; in addition, their revenues might be slightly affected, depending on mode choice. From the employers’ point of view, competitiveness of enterprise might be increased, despite possible investments which might be required to set up the time working schedule and explaining it to employees, as well as for security and utility expenses in case the building’s operating hours have to be extended.

Social impacts: In general, the application of the policy is expected to increase job satisfaction and quality of life of workers. Flexible working hours might be particularly attractive for some social groups, e.g. for people with children or ageing employees approaching retirement. At the same time, it should be considered that flexible working hours are not applicable to all employees. High-income jobs (flexible because mainly based on working on a computer) or several low-income jobs might apply a flexible schedule, while some workers (i.e. factory staff) cannot benefit from this policy.

Environmental impacts: As a result of the possible reduction in terms of traffic impacts, positive impacts on air pollution, noise emission and climate change might occur (a 16% reduction of emissions has been measured in the US. [EPA (1998)] Nevertheless, the environmental benefits strongly depend on the number of people involved and switching between modes of transport. The reallocation of traffic will reduce impact during peak hours, but increase impact during other times of the day: therefore, the 'net' effect is unclear.

In summary, flexible working hours should be regarded as something more than just a policy measure since a significant part of its potential social effects concern individual workers and are bound to change of their working conditions. With reference to the transport sector, the potential impact on mobility is probably not high, unless applied as one component of a comprehensive programme of demand management.

Promotion of teleworking (c.f. Annex 4 – p. 316/317)

Description: Teleworking can be defined as a method of organising and/or performing work in which a considerable proportion of an employee's working time is spent away from the firm's premises, using information technology and technology for data transmission (i.e. the Internet). It includes various forms of telework: home-based, mobile, teleconferencing and others.

Key findings: This measure is expected to cut travel demand (by reducing commuting) and improve job satisfaction as well as quality of life of workers. At the same time companies could enjoy higher productivity even though on the other hand possible investments might be required to set up home / mobile equipment, planning program, security and utility expense. Indeed, teleworking is more than just a transport policy measure and its social impacts are only partially linked to transport.

Evidence from the application of teleworking suggests that a reduction of commuting trips is achieved, resulting in less congestion and reduced transport time for road transport mainly during peak hours. Nevertheless, the effect on mobility is variable and generally not very large. When 10% of the workforce telecommutes on any given day, total household travel is reduced by 1% or less. [DTLR (2002)] In some cases also a rebound effect is mentioned with more passengers-km observed (related to non-commuting purposes) rather than less.

Economic impacts: In case of reduced use of car and collective modes, a possible reduction of transport costs for passengers might be observed. On the other hand, as a result, revenues in the transport sector might be slightly reduced. From the perspective of the enterprise, sectoral competitiveness might be increased, resulting from efficient and effective staff utilisation; in addition, the company might achieve possible savings due to decreased absenteeism, tardiness and turnover, and increased productivity. Nevertheless, private investments might be required to set up home / mobile equipment, planning program, security and utility expense.

Social impacts: From a social point of view, teleworking can improve the balance between company and private life, increasing quality of life. In addition, teleworking can increase job opportunities for groups with limited mobility and might be particularly attractive in some cases, e.g. for females or ageing employees. As a result, possible positive impacts on employment might be observed. At the same time, it should be considered that teleworking is basically applicable for knowledge services and not manual working. This means that only specific categories of employees can enjoy the related benefits.

Environmental impacts: In case of an overall reduction of trips, possible minor positive impacts on air pollution, noise emission and climate change might be observed.

In summary, teleworking should be regarded as more than just a transport policy measure since a significant part of its potential social effects concern individuals as workers and are due to change their working conditions. In pure transport terms the potential to reduce mobility is probably not high, unless applied as one component of a comprehensive programme of demand management.

5.9 Main findings of the individual impact assessments

Hereinafter, the chapter will present the **general** findings resulting from the impact assessment elaborated within the second work package:

- It is obvious, that the extent of impacts of individual TPMs strongly depends on the geographical area of implementation (scale), the individual design (e.g. measures within the same category do not necessarily have the same design) and how the measure is supported (financially, politically etc.). Hence, the assessment results and their subsequent usage in the ASTRA–EC model and in the handbook are of general nature.
- The overall assessment of the TPM clearly shows that,, if any social groups are affected, these are mostly income groups.

Economic impacts

- Regarding responsiveness to economic impacts (in the sense of being influenced), the most frequently affected segments are transport operators, who are clearly positively influenced by the majority of policy measures, especially by ‘E-Freight’ and ‘End-to-End’ security certificates. In comparison, other segments such as passengers, society, the economy etc. are less frequently affected by economic impacts.
- All TPMs belonging to ‘Internal Markets’ and ‘Infrastructure’ generate no negative impacts.
- Pricing and taxation measures challenge transport operators, users and the economy as a whole. As pricing and taxation measures naturally influence transport costs directly, their efficiency depends on the economic environment and the preconditions of their implementation.
- Transport costs, sectoral competitiveness and revenues in the transport sector are the economic impact fields most frequently addressed by the selected and analysed TPMs.
- ‘End-to-end security certificates’, ‘E-freight and ‘Elimination of TEN-T bottlenecks’ are assumed to have the most positive economic impacts on transport costs, revenues, spatial and sectoral competitiveness and insurance costs.

Social impacts

- Positive impacts in social terms are mostly expected for residents, the society, the economy, employees and public bodies. Especially measures like the introduction of ‘SESAR’, ‘End-to-End security certificates’, ‘low emission zones’ as well as the

‘European Rail Traffic Management System (ERTMS)’ have undisputable benefits for these groups.

- Many TPMs contribute to improve safety and health; by far the most (positively) affected social impact fields.
- There is no transport policy measure which affects the cultural heritage or culture in general.
- To summarise, transport policies do not adversely affect societal issues or specific social groups. Only a very few measures have effects on specific social groups.

Environmental impacts

- Although as mentioned above, the social impact analysis showed many positive results, the environmental effects of transport policies are even more beneficial. Almost 95% of all impacts are environmentally positive.
- The TPMs investigated will help significantly to reduce air pollutants and noise emissions, which also has a direct positive impact on the societal environment.
- Measures allocated to ‘transport planning’ (‘Influencing demand for sustainable transport – promotion of cycling within urban / suburban areas’, ‘City logistics’) and ‘infrastructure’ (‘Reduction of TEN-T missing links’, ‘Green transport corridors’, ‘Deployment of roadside-based ITS infrastructure for information services‘) have the most frequent environmental impacts.
- The TPMs ‘Noise emissions restrictions’ and ‘Park and ride systems’ are the measures with the most positive impacts on the environment. In contrast, the visual quality of the landscape and the land use are least affected by transport policy measures.

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Annex 1: Classification of transport policy measures

Transport policy measures (TPM) in bold style depict the 61 selected and available impact assessments.

Category		
	Subcategory	Transport policy measure (TPM)
1 Pricing		
1.1	Infrastructure charging / Access management schemes	Heavy goods vehicle charging **Area charging / Cordon pricing** Vignette system (e.g. Eurovignette**)** Toll systems **Railway infrastructure charges (Directive 2001/14/EC)**
1.2	Internalisation of external costs (of selected external cost categories and individual modes)	Heavy goods vehicles charging based on fuel efficiency **Airport charges directive (Directive 2009/12/EC)** **Inclusion of air transport into the EU-Emission Trading System in 2012** **Eurovignette Directive** **Internalisation of external costs for specific modes of transport (road, rail, iww, ports, airports)** Inclusion of other modes into the EU-ETS Faiway fees (maritime sector emission specifications) **Environmentally differentiated landing fees**
1.3	Public funding of transport	Framework for earmarking revenues from transport for the development of integrated and efficient transport systems Multiannual funding framework of the EU Public service obligations Subsidising single wagon load business English bus concession Free public transport
1.4	Other / new financing instruments	**PPP promotion/support: PPP systems e.g. build-operate-transfer (BOT)** EU transport project bond

2	**Taxation**	
2.1	Fuel taxation	**Energy Taxation Directive (Revision of directive' 2003/96/EC)** Fuel tax for different modes
2.2	Transport taxation	**Vehicle taxation (circulation & registration taxes)** **Company car taxation (revision)** Harmonisation of mode specific VAT systems on passenger transport Reduction of tax relief on long working trips / Pricing of long working trips **CO_2 based annual vehicle circulation tax (CO_2 tax)** Change in vehicle registration fee and vehicle excise duty

3	**Infrastructure**	
3.1	European TEN-T network - cross border missing links	**Reduction of TEN-T network missing links** Internal connections within the TEN-T core network, shaping the Single European transport area External connections of the TEN-T core network, linking the Single European transport area to neighbouring countries
3.2	European TEN-T network - key bottlenecks (freight and passenger)	Extension of infrastructure to eliminate bottlenecks **New infrastructure to eliminate bottlenecks**
3.3	European TEN-T network - multimodal freight corridor structures	Increase TEN-T Network intermodal connection points Create multimodal freight corridor structures in the context of the core network **Railway infrastructure improvement towards multimodal freight (combined transport)** Integration of inland waterways into the transport system
3.4	EU transport infrastructure in view of energy efficiency needs and climate change challenges	Infrastructure investments aiming at improving the transport energy efficiency Area-wide e-mobility infrastructure **Green transport corridors (COM (2007/607)** **Support of on-shore power supply (OPS) in ports**
3.5	Planning procedure (timing, communication framework, environmental issues)	Streamline planning procedures for projects with European interest

3.6	Capacity and quality of transport systems	**Bus priority lane** Infrastructure extension/upgrade outside TEN-T: capacity extension of existing infrastructure Infrastructure extension/upgrade outside TEN-T: quality improvement Infrastructure extension/upgrade outside TEN-T: new infrastructure Construction of new cycle paths Promotion of new railway sidings (new construction, extension, reactivation)
3.7	Intelligent Transport System (ITS)	One common functional open in-vehicle platform **Deployment of roadside-based ITS infrastructure for information services (provision of warnings and dynamic speed harmonisation)** **Promotion of intermodality via provision of dedicated information and guidance to hubs**

4 Internal markets		
4.1	Internal market (intramodal) - road	**EU-wide common job quality and working conditions for truck drivers [SEC(2008)2632]** **Elimination of restrictions on cabotage** Harmonisation of driving licenses Permits and quotas: Permits and quotas regulate the number of activities or TIR output within a specific area Introduction of Gigaliner
4.2	Internal market (intramodal) - rail	Company neutral revenue support (CNRS) for freight movers Strengthen the European Railway Agency and ensure European railway harmonisation Splitting the role of former State-owned operators between infrastructure managers and operators Reinforce the network of rail regulators (to monitor railway markets and to act as an appeal body) **Opening of the domestic rail passenger market; Community railway liberalisation [SEC(2004)236, COM(2004)139]** "European train driver's licence" Achieve a single vehicle type authorisation and a single railway undertaking safety certification Liberalisation of rail infrastructure

4.3	Internal market (intramodal) - inland waterway transport	**Remove administrative and regulatory barriers (mutual recognition of boatmasters' certificates, local / port authorities with harmonised port dues, canal fees, opening times)** **Stimulate the integration of inland waterways into the transport system (RIS - integrated with eFreight and eCustoms)** Port formalities directive and "Blue Belt – Blue Lane" concept, Strategic Masterplan sea-hinterland for waterway transport Standardisation of technical requirements for IWW transport (transparency of labelling the environmental impact of vehicles, quality waterway corridors, transhipment infrastructure, flexible fleet capacity, full RIS deployment, transport and documentation systems) Comprehensive action programme for the promotion of inland waterway transport NAIADES
4.4	Internal market (intramodal) - maritime	**Simplification of formalities for ships travelling between EU ports ("Blue Belt")** Elimination of Customs' formalities for intra-EU sea transport of EU, EU cleared and in- transit goods **Single electronic environment for all port/maritime transport related information exchanges and management - eMaritime** Review of restrictions on provision of port services to promote competitive and open environment (technical-nautical and cargo-handling services) Tighten up the maritime safety rules (minimum social rules in ship inspections, genuine European maritime traffic management system) **Job quality and working conditions for crew members** Phasing out single hull tankers in Europe National port structure (development of national hub and spoke system)

4.5	Internal market (intramodal) - air / aviation	**Implementation of the Single European Sky initiative (SESAR)** Revision of the slot regulation to favour more efficient use of airport capacity Cooperation between EU regulatory powers and Eurocontrol Common rules for the operation of air services in the European Community **Single European Sky II (COM(2008)389)** Air capacity: Promotion of voluntary action by industries to facilitate better use of existing infrastructures (air-rail ticketing, local capacity implementation plans) Air capacity: Improving the use of the existing infrastructure (capacity assessment methodologies, early dissemination of relevant research results, monitoring airport performance, collaborative decision-making framework, Advanced-Surface Movement Guidance and Control Systems) Air capacity: Provision of new infrastructure
4.6	Transport security - cargo	Definition of new rules on air cargo screening (Action Plan on Strengthening Air Cargo Security) Enhancement of security of cargo in ports / Ship and port facility security **SafeSeaNet (European maritime information system)** Rules concerning intermodal transport of dangerous goods ensuring interoperability
4.7	Transport security - passenger	Definition of common detection performance standards and certifications procedures for detection equipment Promotion of the development of more effective and privacy-friendly technologies Security rules at airports Security scanners at airports SEC(2011)1327, COM(2009) 272 Publication of information on the performance of different airlines
4.8	Transport security - land transport	Establish a permanent expert group on land transport security Urban transport security Interurban transport security

4.9	Transport security - “end-to-end” (Increase the level of security along the supply chain without impeding the free flow of trade)	**‘End-to-end’ security certificates** Procedures for restoring the functioning of the supply chain after distortions linked to security (design of European and national mobility continuity plans) Enhancing supply chain security SEC(2006)351, COM(2006)79
4.10	Multimodal transport	Improve the knowledge of potential transport options for shippers and forwarders by promoting new business practices (3rd party logistic providers) Support deployment of new vehicles and vessels and retrofitting **Stimulate bundling freight transport to make optimal use of road, rail and iww** Liability regimes for intermodal transport Eco-innovation in freight transport Marco Polo programme (Regulation 923/2009) Promotion of handling installations for intermodal transport

5	Standards & flanking measures	
5.1	Standards - transport safety	Road infrastructure safety management [(2008/96/EC)] **Safety of road transport by means of ITS (Intelligent car initiative (e-Safety initiative))** **European Road Safety Action Programme (RSAP)** Development of an aviation safety management system at EU level with the support of the European Aviation Safety Agency (EASA) [SEC(2009)477] Requirements for tunnels Safety rules and standards for passenger ships [Council Dir 98/18/EC; Dir 2004/25/EC] European Maritime Safety Agency Road penalty point system, daytime running lights, cable barriers, driver information systems
5.2	Standards - passenger rights	Single EU framework regulation: Introduction of passenger rights regulation valid for all modes (EU Codex, Charter of basic rights) Code of Conduct for computerised reservation systems (airlines) **Legislative framework on passenger rights on multimodal journeys with integrated tickets under a single purchase contract**

5.3	Standards - environment	**CO2 emission limits for HDV, LDV, cars etc.** Retrofitting freight wagons for rail noise mitigation in the EU **Noise emission standards [SEC(2008)2203, SEC(2011)1505]** **Biofuels directive [Directive 2003/30/EC] / Introduction of biofuel quotas; Bioethanol quota** **Regulation of international legislation: European directives: emission standards Euro I –VI. Standards for controlling air pollution** Promotion of new low-emission and river-compatible inland waterway vessels
5.4	Flanking measures - promotion, information, dialogue	CO_2 labelling for new passenger cars **Fuel efficiency labelling for new cars** Low resistance lubricants legislation; Usage of ultra-fluid lubricants **Eco-driving** Labelling scheme for tyres (consumption, noise)
5.5	Flanking measures - regulation	**Introduction of speed limitation for light commercial road vehicles** Speed limitation of public road transportation vehicles Harmonisation of speed limits on motorways Priorities for bus and rail – “rights of way” for public transport Densification of buildings and housing (in the catchment area of public transport)

6	Transport planning	
6.1	Mobility strategies and plans	Compulsory (inter-)regional transport/mobility plans Regional level cooperation of transport service providers Crosslinking modes (better integration of various public transport systems) Promoting slow transport modes for commuting / in free time **Promotion of car sharing / car clubs** Car pooling for businesses and households Promotion of "Corporate mobility management (car pooling)" New ticketing system in public transport (e.g. pre-paid electronic wallet – mobile phones) EU wide mobility plans for passengers and goods to be activated in case of sudden transport crisis (disruptive event - e.g. ash cloud) Public transport management systems (follow and locate every transport mean and observance of time tables)
6.2	Urban mobility - plans & audits	Introduction of sustainable urban transport plans (SUTP's) Route planning –city terminal Promoting cycling: Improving road infrastructure and parking facilities for bicycles, increasing road safety and security for cyclists, improving intermodality with public transport **Park & Ride systems (urban)** Bike rental systems
6.3	Urban mobility – certification and labelling	Support for pioneering towns and cities - CIVITAS network 'Smart cities initiative'
6.4	Urban mobility - management & monitoring	Parking ratio to support local accessibility, economy and environment; Active parking policy Rights-of-way for the public transport Freight vehicle lanes Emission efficient freight vehicles on public (bus) lanes **Promotion of energy efficiency commercial vehicles (delivery vans, taxis, buses etc.)** Fare and schedule coordination

6.5	Urban mobility - urban logistics strategies	Reduction of supply chain links / support initiative supply-chain networks **City logistic / Urban freight distribution / Urban consolidation centre etc.** Spreading urban freight transport distribution over a day; Over-Night delivery/distribution "Last mile" concepts Collection point network for private good deliveries
6.6	Urban mobility - "zero/low emission" strategies	**Low Emission Zones (LEZ) / Environmental zone** Noise emissions restriction **Influencing demand for sustainable transport – promotion of cycling within urban and suburban areas** Low emission public transport vehicles
7	Research and innovation	
7.1	Technology - vehicles	**Electro-mobility on road** Safety systems for commercial and private road transport (Advanced Driver Assistance Systems) **H2 Fuel Cell vehicles** Sky Sails in maritime transport Improvement of vehicle technology regarding energy efficiency and emissions (air, noise) for each transport mode
7.2	Technology - transport infrastructure / system	**Technological improvements regarding e-mobility charging systems** Security and safety technologies in vehicles (crash avoidance applications, intersection support systems, eCall) 'Intelligent transport infrastructures' to ensure monitoring and interoperability for different forms of transport and ensure communication between infrastructure and vehicles (ITS) **GALILEO** Potential of new or unconventional transport systems (e.g. unconventional systems for good distributions)
7.3	Technology - transport information systems, management & service	Smart mobility / ticketing services **E-Freight** TAF (Telematic Applications for Rail Freight) VTMIS (Vessel Traffic Management and Information Systems) **Provision of real time traffic and travel information (RTTI)**

7.4	Framework - transport safety	**Use of speed limitation devices in lorries and coaches** **Compulsory safety standards in road vehicles (Driver assistance systems, seat belt reminder, eCall, vehicle-infrastructure interface etc.)** Enhancement of maintenance and certification of rolling stock and infrastructure **European Rail Traffic Management System (ERTMS)** Improvement of safety in public transport River Information System (RIS)
7.5	Framework - promotion & incentives	Regulation of intermodal loading units to foster intermodal traffic Information regarding CO_2 emissions of freight and passenger transport Measures to promote increased replacement rate of inefficient and polluting vehicles Demonstration / pilot projects for electro mobility and other alternative fuels Online travel planning tool
7.6	Framework - technology and infrastructure	Fostering H2 fuel cell batteries Mandatory biofuels quotas resulting in higher penetration rates of biofuels Joint Technology Initiative (JTI) in the area of aeronautics and air transport **Deployment of rail freight transport corridors [COM(2008) 852]**
8	Other	
8.1	Alternative commuting solutions	**Promotion of flexible working hours (and opening hours), terminals, gating** **Promotion of teleworking**

Source: ASSIST Team

Annex 2: Notes on the 1st ASSIST Workshop

1st ASSIST Workshop - Summary minutes

Date: 08.02.2012

Time: 09.30h – 16.00h

Venue Park Plaza Hotel, Utrecht

‘External’ Participants	
Prof. Henk Becker	Utrecht Centre for Applied Sociology (Utrecht, NL)
Andrew. Bray	European Regional Airlines Association – ERAA (Surrey, UK)
Vincenzo Carpinelli	International Union of Railways – UIC (Paris, FR)
Pieter Hilferink	NEA (Zoetermeer, NL)
Olga Ivanova	TNO (Delft, NL)
Andreas Justen	German Aerospace Centre – DLR (Berlin, DE)
Stephan Koester	Railteam B.V. (Frankfurt a.M.; DE)
Dr. Holger Kramer	Institute for shipping economics and logistics – ISL (Bremen, DE)
Goda Perlaviciute	University of Groningen (Groningen, NL)
Frans van Schoot	European Cyclists’ Federation – ECF (Brussels, BE)
Prof. Frank Vanclay	University of Groningen (Groningen, NL)
Lode Verkinderen	European Road Haulage Association – UETR (Brussels, BE)
Pim Warffemius	Dutch Institute for Transport Policy Analysis – KIM (The Hague, NL)
Hans van der Werf	Central Commission for the Navigation of the Rhine CCR (Strasbourg, FR)
Dr. Dimitrios Xenias	Cardiff University – Tyndall Centre for climate change research (Cardiff, UK)

Peter Szatmari	European Commission – DG MOVE (Brussels, BE)
ASSIST team participants	
W. Schade	ISI Fraunhofer
M. Krail	ISI Fraunhofer
A. Martino	TRT
F. Fermi	TRT
J. Kiel	NEA
H. Maurer	NEA
J. Monigl	FÖMTERV
A. Szekely	FÖMTERV
S. Kirtzinger	ProgTrans
O. Meyer-Rühle	ProgTrans
T. Dennisen	ProgTrans

Agenda

Time	Topic / Issues
09.30 – 10.00	Welcome (Introduction to ASSIST, EC Perspective, Objectives of workshop)
10.00 – 10.30	Introduction of participants
10.30 – 11.15	1st session – Current status and trends of "Transport policy measures" (TPM)
11.30 – 12.15	2nd session – Introduction & comprehension of relevant impacts
12.30 – 15.15	3rd session – Impact assessment of (IA) of selected TPMs
15.30 – 16.00	Findings & conclusions of all sessions

Key comments (2nd column: addressee)

Introduction & Welcome	
Fuzzy logic sets of other sectors are of interest for the social impact assessment; further sources will be checked / reviewed for information (Recommended source: Becker, H.; Vanclay, F. (2003): The International Handbook of Social Impact Assessment, UK)	ISI
An impact assessment is about finding a comprehensive and reasonable arrangement of impacts (and their interaction) rather than primarily aiming to quantify its effects	

1st session – Current status and trends of transport policy measures	
TPM “Free public transport” (1.3) will not be selected as a convincing TPM with relevance for public funding of transport; instead “optimisation of pricing of public transport” will be assessed	NEA
The “Eurovignette directive” will be assessed in the context of impacts caused by the charging of external costs and not the toll segment	NEA
TPM inclusion ”short seas shipping” into subcategory 1.4 - Other/New financing instruments	PRO
TPM inclusion concerning the taxation of ‘goods vehicles less than 12 t ´ in 2nd category (taxation)	PRO
The participants suggested that the ASSIST WP2 team[4)] introduces/defines criteria. TPM classification and selection: The experts suggested to consider the following criteria for the selection of TPMs Objectives of TPMs	ISI, NEA FÖM PRO

4 here ProgTrans, NEA, FÖMTERV, ISI

Determination of new transport policies in coordination with the European commission Focussing on ‘hot topics’ of the European Transport White Paper The experts mentioned that a criteria should enable a broad and diverse selection of TPMs.	
2nd session – Introduction of relevant segments and impacts	
Figure “II. Approach of impact assessment” on page 6 of the ppt-presentation: The back-loop from social groups to segments shall be considered.	PRO
Request to integrate source references for assessed impacts	ALL
The assessment should cover first and second level impacts	
“The outcome will be positive and negative in many cases” and hence the quantification might not be what one should ultimately look for. But for the understanding of social impacts this contrarity should be addressed.	

3rd session – Presentation and discussion of TPM summaries	
European TEN-T cross border missing links	FÖM
Economic / environmental impacts will also affect social impacts negatively and have to be considered	
Consideration of road safety benefits	
Energy taxation directive (2003/96/EC)	NEA
Directive has been updated; Impact assessment of directive is also available – the revision of the directive (2011) and associated impact assessment will be analysed	
Assessment of decreasing vehicle mileage (positive) is questionable	
Consideration of social behaviour in the context of the amount of usage/reduction of energy	
Consideration of vehicle fleet composition	
Support of electric road vehicle research – E-mobility	PRO
Negative assessment of vehicle mileage is not necessarily the case	

Positive effects on labour markets (unemployment rate) are hardly detectable and therefore questionable (R&D primarily affects high-skilled labour force)	
Consideration of further social aspects (change of income, own electrical charging etc.)	
Decreasing revenues for transport operators & service providers are questionable (cost allocation to consumers)	
Further assessment of a restricted / differentiated analysis: Short term / long term Focussing on a specific electrified vehicle (private cars, public transport modes) Vehicle costs in the context of oil prices/energy prices and the energy supply structure	
Promotion of teleworking	TRT
Need to further constrain / limit the competitiveness indicator of enterprise (productivity, unit costs, overall costs, less investments etc.)	
Consideration of “private investments” (space etc.) is missing	
No differentiation between temporary and permanent teleworking	

Agreements & actions (2nd column: responsibilities)

Conclusions	
The general **approach and terminology** chosen for the present impact assessment is appropriate and should be pursued	
The **level of detail** of the assessment is reasonable. The desire to be broad and at the same time very precise is recognised, but the project is not intended to carry out exhaustive assessments for transport policy measures to the ultimate depth. Instead it has to be considered as a **screening**, which identifies crucial effects and impacts of the most important TPMs.	
The **handbook** to be produced within the ASSIST project is not considered as a 'creative' handbook. It shall be prepared along the current transport policy options as described in the White Paper.	
An approach to select the TPMs based on **criteria** shall be developed and applied to. Reference is the Transport White Paper.	ALL
Overall, the participants acknowledge that a **quantification of social impacts** ('re-economisation' of social issues) is often impossible at the general level of the TPM assessment.	
It is agreed that first and second level impacts are to be identified and described. Third level impacts are of interest as well, but are limited to the most relevant (see figure 1 of D2.1)	ALL
The **'story-telling'** technique (functional/logical chains) within the assessment of social impacts is a methodological option; especially where no information / study is available (2nd level social impacts and its interfaces / interrelations to other areas). In general, story-telling should first of all refer to qualitative empirical evidence and than to expert judgement.	ALL
All TPM impact assessments have to be validated / 'crosschecked' regarding their **consistency and comprehensibility**	ALL
An **exemplary fact-sheet** will be send to all 'external' workshop participants (*.xls)	PRO

Annex 3: Competitiveness definition

Competitiveness is a term with many definitions. Wikipedia defines 'competitiveness' as follows: Competitiveness pertains the ability and performance of a firm, sub-sector or country to sell and supply goods and services in a given market, in relation to the ability and performance of other firms, sub-sectors or countries in the same market (Wikipedia, 2012).

An interesting aspect is that the definition of Wikipedia contains both a spatial and a sector element by distinguishing national competitiveness from competitiveness of firms and sub-sectors.

Concerning the national competitiveness, the World Economic Forum provides another definition: *Competitiveness is the set of institutions, policies, and factors that determine the level of productivity of a country* (WEF, 2012a). As can be seen, the WEF definition has a focus upon countries. The spatial element of competitiveness is mentioned in the context of national competitiveness. From a geographical viewpoint however, any scale can be applied, whether it concerns competitiveness of cities, regions, provinces, countries or even continents. There is not a need to constrain the spatial element to a certain entity such as a nation. Although the definitions above focus upon nations, the definition can be easily transferred to any other geographical level.

Competitiveness between nations or regions is not without criticism. Krugman (1994) argues that competitiveness is a meaningless word when applied to national economies (and thus local or regional economies). Krugman states that defining competitiveness for a nation is more problematic than defining that of a corporation. Corporations who perform badly, will go out of business. But countries do not go out of business whether they are happy or unhappy about their economic performance. Measuring competitiveness for example by looking at the trade balance may give wrong impressions, as a trade surplus, which is usually seen as positive, may be a sign of national weakness instead of strength. Concerning the national competitiveness, Krugman sees three dangers: wasting government funds to enhance competitiveness, protectionism and bad policy.

Blunck (2006) defines competitiveness for a nation as 'the ability of the nation's citizen to achieve a high and rising standard of living. In most nations, the standard of living is determined by the productivity with which the nation's resources are deployed, the output of the economy per unit of labor and/or capital employed.' Thus, continuous improvements in productivity will lead to a higher living standard. According Blunck, competitiveness at national level can be measured by looking at level and growth of living standard, the ability of the nation's firms to increase penetration of world markets through exports or foreign direct investments. In line with Krugman, Blunck states that it should be avoided to look at the trade balance. Blunck concludes that ‘not all nations have to be ‘competitive’ by any single definition. Most nations are not ‘competitive’ by any definition’.

In 2012 Ernst & Young (2012) published a survey on the European attractiveness. In line with Blunck, they investigate the attractiveness of Europe for foreign direct investments. Also, the survey is based upon the ‘perceived’ attractiveness of Europe by a panel of international decision makers. Ernst & Young use the term ‘attractiveness’, but there is a clear link with competitiveness. The report concentrates on just one aspect of competitiveness: foreign direct investments. By using the term attractiveness, Ernst and Young somehow avoid discussion about whether one could use the term competitiveness for a nation.

The European Commission generally defines competitiveness in its impact assessment guidelines as follows: ‘When identifying economic impacts, particular attention should be paid to factors that are widely considered as being important to productivity, and hence to the competitiveness of the EU. Competitiveness is a measure of an economy’s ability to provide its population with high and rising standards of living and high rates of employment on a sustainable basis. Vigorous competition in a supportive business environment is a key driver of productivity growth and competitiveness.’ (EC, 2009). As can be seen this definition is in line with Blunck.

Although competitiveness has not been addressed thoroughly in this annex, one may conclude that defining competitiveness at a national level (or any geographical level) is not a simple task. One could also try to provide an approach. Cambridge Econometrics (2003) discerns some elements for macro-economic competitiveness:

- A successful (economic) performance, in terms of raising living standards or real incomes.
- Open market conditions for goods and services by a nation
- Short term competitiveness should not create an imbalance, thus affecting successful performance.

Some limitations have been quoted as well. Competitiveness is judged by the ability to increase living standards and real income, while social and environmental goals are not taken into account. Also, competitiveness is defined in terms of outcome instead of the factors that determine competitiveness.

Concerning national competitiveness Dunn (1994) makes a remark, that ‘criticising measurement concepts does not imply that the subject of examination itself is meaningless. What methodological and empirical difficulties do call for is the development of better measurement concepts of competitiveness.’ Measurement of competitiveness by looking at different factors is another way of trying to get grip on the concept. The next section will look at the measurement of competitiveness at different geographical levels.

Annex 4: TPM impact assessment

FACT SHEET NO: 01 **CATEGORY: 1.1** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**Infrastructure Charging / Access Restrictions Schemes**
A 3	**Transport policy measure (TPM)**	**Area charging / Cordon pricing**
A 4	**Description of TPM**	Charge motorised vehicles for entering or driving in an area, usually the city centre. Motorised vehicles are charged for their use of road space in a certain area and/or during a particular time period. By increasing the cost of travelling at certain times, in certain areas and/or along certain routes, policy makers attempt to influence the demand for road use.
A 5	**Implementation examples**	The city centre of London (area charging), and the city centres of Oslo and Milan (cordon pricing). In area-based congestion pricing, drivers pay to enter a designated area and/or to drive in that area. They can drive freely within that area for the whole day. The disadvantage of area charging is that it is (in practice) more difficult to implement than cordon-based pricing, especially if the charging area is large. This is because all cars within the pricing area have to be monitored. With cordon-based pricing, only cars entering the cordon have to be checked. The disadvantage of cordon pricing is that vehicles that remain in the area (i.e. polluting vehicles) will never be charged. [5] Both systems (area charging, cordon pricing) result in a reduction of the modal share of the car, in favour of public transport and slow modes. This leads to a reduction of green house gas emissions. Note that urban road transport produces a large part of all emissions that are harmful to the climate. From that point of view, the measure is basically an effort to make drivers pay for the delays/costs/pollution/congestion/etc. they impose. It forces them to reconsider their mode choice [6]. In Rome this had a reverse effect after introducing a congestion charge for cars in the inner city. To avoid charges, people started using motorcycles. This resulted in pollution levels, higher than before the implementation of the charging system. [3]
A 6	**Objectives of TPM**	Congestion reduction in the city centre, creating a change in the mode choice, less pollutant emissions, generate revenues or a combination of these form the objective of this measure. An integrated approach where aims are combined, is generally most preferable [4]. From political point of view, toll systems serve to protect the environment and avoid traffic in city centres. In practice you can distinguish a variety of tolling systems, each with another aim: reduce car traffic and emissions (pollution/noise), finance public transport, create additional revenues, or a mix of these. The congestion charging system (i.e. London) focusses on regulating traffic. It usually covers only a small area. Revenues are used to enable financing additional collective transport systems to/from the city centre. Another type of tolling system (i.e. Oslo) primarily aims at bringing in revenues. To achieve that, they usually cover a wide area. The third type of tolling system (i.e. Milan) aims at changing the behaviour of car drivers, by applying toll charge rates depending on the emission category of the vehicle. [3] [4] In all cases, area charging reduces the modal share of the car, in favour of public transport and slow modes of transport. This results in a reduction of green house gas emissions. Urban road transport produces a large part of all emissions that are harmful to the climate. From that point of view, charging is basically an effort to make drivers pay for the delays/costs/pollution/congestion/etc. they impose. It forces them to reconsider their mode choice. [6] An important aspect op this TPM is, that it may not reduce congestion to the expected level. Due to characteristics such as loading / unloading of lorries in narrow streets, insufficient travel alternatives, congestion may remain. Therefore, before this TPM is introduced, these aspects should be studied, in order to design a well balanced set op TPMs, taking other problems into account as well.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Reduction in the modal share of the car, more travel by public transport and slow modes
A 7.2	Origin and/or destination of trip:	Households tend to move towards the inner side of the toll cordon, while jobs/employment tend to move to the outside
A 7.3	Trip frequency:	Necessary trips (like work trips) show a reduction in car use. Discretionary trips (like shopping) might be redirected to other locations
A 7.4	Choice of route:	When toll cordons do not fully enclose an area, drivers will try to avoid these cordons leading to congestion on other routes. Discretionary car trips (like shopping) might be redirected to other locations.
A 7.5	Timing (day, hour):	No impact, when time windows are not applicable
A 7.6	Occupancy rate / Loading factor:	Probably increased occupancy rate in passenger cars, as vehicles are charged and not their individual occupants
A 7.7	Energy efficiency / Energy usage:	Due to reduction of modal share of the car (in favour of slow modes and public transport), a small reduction in green house gas emissions.
A 8	**Main source**	sorted numerically: [3] [4] [6]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**L**	**R**	**S**	**I**

- The measure may lead to less congestion in the city centre, resulting in reduced pollution. Residents within the charged area will benefit from this.
- The use of public transport and slow modes will increase, car use will reduce.
- The society will benefit (direct or indirect) from the collected revenues.
- Employers show a tendency to move towards the outside of the charged area. Keep in mind that reduction of congestion is not guaranteed, due to potential problems such as frequent loading/unloading of lorries or a lack of good alternatives such as public transport.

B 1.2	**Summary: Income groups**	- High income groups are less sensitive to charges. It is likely the measure does not effect their behaviour.
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘					↘											L		S	I
B 2.2	Risk of congestion	↘					↘											L	R	S	I
B 2.3	Vehicle mileage	↘			↗	↗	→					→						L		S	I
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Road travel times will be reduced due to less congestion. This also results in less pollution. The overall total vehicle mileage will reduce, due to a reduction in car share in favour of public transport and slow modes. - For public transport that does not necessary result in an increase of vehicle mileage, only in the summed up passenger mileage and/or occupancy rate. However, when the public transport network or its frequency increases, the vehicle mileage increases. - Note that toll cordons need to fully enclose an area, to prevent drivers to take "alternative routes" to avoid charging. Such situations might lead to congestion on alternative routes, longer travel/transport times and/or increased vehicle mileage.
B 2.V	**Quantification of impacts**	- The variety of charging aims (i.e. reduce car traffic, reduce emissions, finance public transport, create additional revenues, or a mix of these), the variety of locations (city centres) and the variety in area size, make it impossible to produce elasticities or trade-offs.

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗					↗														
B 3.2	Private income / commercial turn over																↗	L		E	L
B 3.3	Revenues in the transport sector											↗						L	R	S	I
B 3.4	Sectoral competitiveness						↗														
B 3.5	Spatial competitiveness	↗																			
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↗		L	R	S	I
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- There is a variety of charging aims: reduce car traffic, reduce emissions, finance public transport, create additional revenues, or a mix of these. - Depending on the political objective, public transport, society and/or public bodies benefit from the policy measure. - In general when charged, road transport costs will increase, public transport and slow modes become more attractive and competitive. - Spatial competitiveness between restricted and non-restricted areas will increase. For example, discretionary trips (like shopping) might be redirected to other locations. - Due to the charges, sectorial competitiveness between transport operators in restricted and non-restricted areas will in increase.
B 3.V	**Quantification of impacts**	- No elasticities available. The variety of charging aims, the variety of locations and area size, make it not possible to produce elasticities.

B 4 SOCIAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗							
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	↘																			
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets	↘																			
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- High income groups are likely to be less sensitive to charges than low income groups.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Charging an area will result in less air pollution and noise emission, due to the reduction of car use. Residents in such areas will benefit from this (environmental improvement). - The accessibility of charged areas will decline for road traffic, and is likely to improve for slow modes. That does not necessarily have to result in improved safety for road users and slow modes, as their travel speeds are likely to increase. - Employment within charged areas will be negatively affected, and shows a tendency to move away from these areas. - Charging will cause inequalities. Higher income groups are less sensitive to high charges, than low income groups.
B 4.V	**Quantification of impacts**	

B 5 ENVIRONMENTAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↗				L		S	
B 5.2	Noise emissions													↗							
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	- It is not likely that high income groups are sensitive to charges. On the other hand, low income groups are more sensitive to this policy measure.
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Within the charged areas, especially air pollutants and noise emissions will decrease.
B 5.V	**Quantification of impacts**	No elasticities available. The variety of charging systems, locations and area sizes make that impossible.

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Railway infrastructure charges directive (2001/14/EC)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] CAPRICE Final Conference, 2011: Round Table, How To Organise And Finance Sustainable Mobility [2] CAPRICE Final Conference, 2011: Metropolitan Areas, presentation by Michael Cremer (The Greens) [3] CAPRICE Final Conference, 2011: Question And Answers [4] European Commission (2001a): European transport policy for 2010: time to decide - White Paper [5] Takuya Maruyama & Noburu Harata (2005): Difference Between Area Based And Cordon Based Congestion Pricing [6] Press4Transport FP7 (2011): Congestion Charging

FACT SHEET NO: 02 **CATEGORY: 1.1** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**Infrastructure Charging / Access Restrictions Schemes**
A 3	**Transport policy measure (TPM)**	**Railway infrastructure charges directive (2001/14/EC)**
A 4	**Description of TPM**	The European Union (EU) encourages the establishment of fair and efficient charging systems for the use of infrastructure. These charging systems must allow for fair competition between different transport modes. Investment in railway infrastructure is desirable. Infrastructure charging schemes will provide incentives for infrastructure managers to make appropriate investments where economically attractive. Charging schemes send economic signals. It is therefore important that those signals to railway undertakings are consistent and lead to rational decisions [4].
A 5	**Implementation examples**	The Directive 2001/14/EC clearly states [4] that charges must be based on costs directly incurred as a result of operating the train service. This leaves room for interpretation, resulting in great diversity in the implementation of the directive. A wide variety of both structure and level of charges is found. Most countries have implemented a simple charge per train kilometre, differentiated by traction type, weight, speed and axle load of the train. Some countries (i.e.. Switzerland) also charge for train planning and operations, and even add a congestion charge (i.e.. Italy). In addition, Switzerland also has a surcharge for dangerous goods. Added to the basic track access charges, some countries have also charges for supplementary services (i.e.. Sweden) like passenger information, the use of stations, depots, marshalling yards, etc. [6]
A 6	**Objectives of TPM**	Paving the way for optimal use of existing rail infrastructure. Encouragement of investment in railway infrastructure. Provide incentives for infrastructure managers to make appropriate investments. This transport policy measure adopts, as far as possible, the "user pays" principle. Thus allowing private investors to charge the full cost of construction and maintenance. This creates acceptable revenue streams, which in turn will make railway infrastructure investments more attractive to private capital.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Due to higher costs, it seems likely that the modal share of rail will be under pressure from road and inland water transport. However in other transport modes similar measures regarding the "user pays principle" will come in action, making it difficult to provide modality trends. Plans are to adopt the "user/polluter pays principle" in all transport modes [10]. That is beneficial to railways as it generates a relatively small amount of additional costs (like pollution, climate change, health hazards, etc.) compared to other modes. In that situation, railways become more competitive.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	However, when transport costs increase it is likely that operators will try to cut their costs, in order to stay competitive. Due to the variety in the type of national charges (like weight charges, axle load charges, track scarcity, etc.) it is difficult to provide a trend.
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[4] [5] [6] [7]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**		■					■								■	■	L	R	S	I

B 1.1 Summary:
- Charges per train kilometre show a great variety when countries are compared. From less than 1 euro per train kilometre in Scandinavia to charges of up to 11 euros per train kilometre for freight in Eastern Europe [2] [6] [8].
- Some of these differences may be due to genuine differences in cost because of ground conditions, average train weight, age levels, etc. It is likely that much of the difference is due to differences in the degree to which governments are willing and able to bear the costs of infrastructure. Some countries aim at near full cost recovery, simply because of a shortage of government resources.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time		↗					↗										L	R	E	L
B 2.2	Risk of congestion		↗					↗										L	R	E	L
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort							↘										N	I	S	R

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- With respect to travel or transport time and risk of congestion: there is a positive effect. This is because aspects like trip planning is scheduled (with scarcity in mind) and reservations have been made for the use of ancillary services (such as station use, marshalling yards, etc.). - With respect to service and comfort: in the case of fixed charges per passing, there is a tendency to run the longest possible trains to reduce costs. An example is new infrastructure facilities (i.e.. bridges) where an additional charge is levied, like the Oresund Bridge and Store belt Bridge connecting Sweden-Denmark-Germany. Freight trains are charged about 1.500 euro extra [6] for passing these bridges. In this way Denmark and Sweden are recovering the building costs. However, this furnishes a powerful incentive to run the longest possible freight trains, in order to reduce bridges charges. But this is at the expense of a reduced service frequency for freight shippers. By comparison, a simple charge per gross tonne-kilometre would have had no effect on the length of freight trains, and would not affect service levels.
B 2.V	**Quantification of impacts**	Due to the diversity of the Directive's implementation, a quantification of impacts can not be provided.

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs		↗					↗										R	N	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness		↗					↗													
B 3.5	Spatial competitiveness		↗					↗													
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↗		N		S	N
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	In the case of fixed charges per passing, there is a tendency to run the longest possible trains to reduce costs (i.e.. train route between Sweden and Germany over the Oresund Bridge Store belt Bridge). However, this leads to a reduced service frequency. A simple charge per gross tone-kilometre would have been better. The policy measure [4] leaves much room for interpretation. The implementation of the directive show great diversity [2] [6] [8] with results ranging from less then 1 euro per train kilometre (Scandinavia) to charges of up to 11 euros per train kilometre for freight (Eastern Europe). It is likely that some countries simply aim at near full cost recovery. Such differences in charges will continue to feed spatial competitiveness. Applying the "user pays principle" always results in higher transport costs. However, this principle will also be applied in other modes. Changes in costs, will keep competitiveness going. It is important to minimise distortions of competition which may arise from significant differences in charging principles: either between railway infrastructures or between transport modes. To ensure this, the EU made up financial principles [7] on behalf of free access to railway paths and to preclude cross-financing. These principle are: - the principle of transparency - the prohibition of cross financing - the principle of cost bearing - the accountancy separation of passenger and freight transport - the principle of open access to tracks
B 3.V	**Quantification of impacts**	Due to the diversity of the Directive's implementation a qualification of impacts can not be provided.

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety		↗					↗													
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems		↗					↗													
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	Directive 2001/14/EC [4] concerns a charging system for the use of rail infrastructure. It is important to note that charging and capacity allocation schemes permit for equal and non-discriminatory access to all infrastructure users in a fair and non-discriminatory manner. Capacity allocation and planning/allocation of ancillary services (such as marshalling yards), are likely to have a positive effect on safety. However, this is not yet quantified.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↗	R	N	E	I
B 5.2	Noise emissions																↗	L	R	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Inclusion of for example a noise component in rail infrastructure charges, raises some problems. Noise is a non-marketed-good, the monetary value of noise abatement is therefore hard to calculate. Another difficulty is the estimation of the effect on the noise level that one extra train will create. The advantage of such infrastructure charges is that it provides operators with an incentive to reduce their noise emissions, pollutant emissions, etc. [1] [3] [12]
B 5.V	**Quantification of impacts**	- A quantification of impacts can not be provided, because environmental aspects are difficult to formulate as monetary value in a unique and consistent manner. Various studies concerning the transforming of air emissions and noise emissions into monetary values are available. [11] However, such transforming and their results do not show full consistency as they depend on a variety of assumptions and/or situations. - In general it can be stated, that environmental charges will eventually push operators towards reducing negative environmental impacts.

C REFERENCES

C 1	**Other TPMs of this subcategory**	Area charging / cordon pricing (these concern urban road traffic)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	see below

International
[1] Hendik Andersson & Henrik Ogren (2006): Noise Charges in Railway Infrastructure. In Transport Policy, nr 14(3)
[2] Federico Antoniazzi (2010): Infrastructure charging and project financing in the railway sector in France
[3] European Commission (2007e): Calculating Noise Charges in Railway Infrastructures
[4] European Parliament (2001): Directive 2001/14/EC, on the allocation of railway infrastructure
[5] International Transport Forum / OECD (2008): Charges For The Use Of Rail Infrastructure
[6] Chris Nash (2005): Rail Infrastructure Charges in Europe -- in Journal of Transport Economics And Policy, nr 39(3)
[7] Katalin Tánczos & Gyula Farkas (2003): Railway infrastructure charging in Hungary
[8] UNIFE The European Railway Industries (2008): Internalisation of external costs of transport
[9] European Commission (2011m): Roadmap to a Single European Transport Area, SEC(2011)391final
[10] European Commission (2008d): Strategy for the internalisation of external costs, COM(2008)435final
[11] CE Delft (2008): Handbook on estimation of external costs in the transport sector
National
[12] Hendik Andersson & Henrik Ogren (2006): Bulleravgift för järnvägsoperatörer

FACT SHEET NO: 03 **CATEGORY: 1.2** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**External cost charges**
A 3	**Transport policy measure (TPM)**	**Inclusion of air transport into the EU-ETS in 2012**
A 4	**Description of TPM**	The EU Emissions Trading System (EU ETS) is a so-called "cap and trade" scheme. The EU has imposed a cap on the total level of emissions for the aviation sector based on emissions levels during the period of 2004-2006 and will distribute a fixed number of emissions allowances to airlines which can be traded. A proportion of these allowances will be distributed for free and a proportion will be auctioned.
A 5	**Implementation examples**	Europe-wide
A 6	**Objectives of TPM**	The overall objective of the inclusion of aviation in the EU ETS is to tackle the climate impact of aviation: In 2020 CO2 emissions will be 21% lower than in 2005.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Possibly shift to (high speed) rail for shorter inner-European routes; however, there are many other factors to consider such as comparative modal prices,
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	About 1% fuel efficiency improvements per year are expected [2, p.17]
A 8	**Main source**	[2]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	E	

B 1.1	**Summary**	- The impact on airline profitability will vary according to size of operator and business model. The change to airline profits is expected to be minimal compared to other factors affecting the industry at present such as operating costs and stagnant growth due to the economic crisis. - Other modes, such as rail, may benefit.
B 1.2	**Summary: Income groups**	- Mainly affects higher income groups, which are more likely to travel by plane
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage							↗		↗								I	N	E	
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main traffic impacts**	- The impact on the demand in air travel is diverse and varies by alternative cost pass-through assumptions. Some studies estimate aviation activity to grow at an average annual rate of about 2.5% (exceeding 3% until 2015 and less thereafter) and incorporates about 1% fuel efficiency improvements per year. The growth is calculated without the inclusion of the aviation section in the ETS and not a consequence. Other studies assume average yearly growth rate of about 4% (see for example [3]). The lower projected growth rate in aviation activity in the reference scenarios means that, all else equal, aviation emissions and demand for allowances will be smaller if a larger growth rate had been used for aviation activity. [10] - The TPM predicts small reductions in the demand for air travel services.
B 2.V	**Quantification of impacts**	see above.

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs			↗						↗								I	N	E	
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector									↘								I	N	E	
B 3.4	Sectoral competitiveness									↘								I	N	E	
B 3.5	Spatial competitiveness									↘								N	R	E	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↗					
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main traffic impacts**	- It is expected that most airlines will pass on at least some of the administrative and allowance costs to the air passengers via ticket prices, although the impact has so far been minimal. - Impacts on the GDP in the EU are predicted to be between – 0.002% and 0.026% over the 10 year trading period. The decrease in economic activity in the aviation sector was assumed to be offset by increased income and employment generated from substitute activities. By 2020, changes in real GDP (base year 2000) with and without inclusion of air transport as a part of EU ETS might be 0.022% (allowance price of €40), and the medium and low price scenario show no change. [4] - Concerning the competitiveness of European and non-European airlines, network carriers based outside the European Union will most likely gain a significant competitive advantage for long-haul services compared to European network carriers. [7] [8] The impact of the EU-ETS on airline profitability depends on the cost pass-through assumptions. [8] Particular regions will fare better or worse depending on the extent to which their economies are dependent on airline services and the business models of the airlines servicing the area. In particular, nations or regions predominantly served by discount airlines, that serve travellers with greater price sensitivity, may suffer larger impacts. It is argued that including aviation in the EU ETS may have particularly negative consequences for the new EU Member States, slowing down their economic growth and decreasing their welfare. [4]
B 3.V	**Quantification of impacts**	- According to [4], GDP rates are affected slightly more in old Member States than in new ones. This is the opposite result to that in other studies [5]. For example, in 2020 the change in UK GDP will be about - 0.002% compared to Polish GDP which may increase by 0.024% (allowance price of €40) in comparison to no action scenarios. - Related reductions in CO2 emissions will be - 0.193% and -0.001 respectively. These results can be explained by the fact that old Member States have more developed air transport sectors that count for a larger share in their GDP and CO2 emissions (e.g. 6.3% of total UK CO2 emissions in 2005 - [5] . - That imposes extra costs on air transport in these countries may result in larger impact on GDP. Also increasing costs in old Member States may give some advantage to some of the new Member States were for example labour costs are lower. These developments can lead towards carbon leakage inside the EU itself.

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																↘			E	
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																↘			E	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main traffic impacts**	The overall social effect is likely to be very small; a modest negative impact on employment and lower income groups is expected due to reduced profitability of the air-transport sector
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	I	N	E	E
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	- It should be noted that the emissions reductions won't necessarily be made in-sector as operators can choose not to reduce their own emissions but to buy allowances to cover any excess for which they don't have free allowances. At the EU level, including aviation in the emissions trading scheme may result in change of yearly CO2 emissions by 0.09% (allowance price of €5), 0.23% (an allowance price of €20) and – 0.23% (allowance price of €40) in 2020 compared with no action scenarios [2]. [10] even predicts a reduction up to 7,5 % of CO2 by 2020 (allowance price of €40). The aviation sector is likely to be a net buyer of allowances under the EU ETS, and that emission reductions have to be made in other sectors to cover the demand of allowances by the aviation sector. Additionally, these numbers reflect the relatively small share of the air transport industry in the EU ETS. It is expected that the non-aviation sectors reduce their emissions and sell their allowances to the air transport sector. Under all the price scenarios, the power sector will be the major seller of the allowances. [2, p.20]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Internalisation of external costs for specific modes of transport (road, rail, iww, ports, airports) - Environmentally differentiated landing fees - Eurovignette - Airport charges directive (2009/12/EC)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] EU Directive 2008/101/EC, 2009 [2] Anger A., Allen P., Rubin J., and Köhler J. (2008): Air Transport in the European Union Emissions Trading Scheme. www.landecon.cam.ac.uk/research/eeprg/4cmr/pdf/OmegaStudy_finalreport.pdf. [3] CE Delft (2005): R. C. N. Wit, B.H. Boon, A. van Velzen, M. Cames, O. Deuber, D.S. Lee Giving wings to emission trading – Inclusion of aviation under the European emission trading scheme (ETS): design and impacts. A report for the European Commission, DG Environment. [4] Frontier Economics (2006): Economic consideration of extending the EU ETS to include aviation: A Report Prepared for the European Low Fares Airline Association (ELFAA): http://www.elfaa.com/documents/FrontierEconomicsreportforELFAAEconomicconsideration_005.pdf. [6]Eur-lex: Impact assessment on the internalisation of external costs. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2008:2208:FIN:EN:PDF. [7] J. Scheelhaase, W. Grimme, M. Schaefer (2007): The impact of the European Commission's proposal on the integration of air transport into the emissions trading scheme on competition between European and non-European airlines. Proceedings of the European Transport Conference. [8] R. Malina, D. McConnachie, N. Winchester, C. Wollersheim, S. Paltsev, I. Waitz (2012): The impact of the European Union Emissions Trading Scheme on US aviation. Journal of Air Transport Management 19. [9] P. Morrell (2007): An evaluation of possible EU air transport emissions trading scheme allocation methods. In: Energy Policy. [10] A. Anger, P.Allen, J. Rubin, J. Köhler (2008): Air Transport in the European Union Emissions Trading Scheme. http://www.omega.mmu.ac.uk/Events/OmegaStudy_17_finalreport_AAPMA_2-1__240209.pdf. **National:** [5] DfT (2009): UK Air Passenger Demand and CO2 Forecasts. Department for Transport, UK.

FACT SHEET NO: 04 **CATEGORY: 1.2** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**External cost charges**
A 3	**Transport policy measure (TPM)**	**Internalisation of external costs for specific modes of transport (road, rail, iww, ports, airports)**
A 4	**Description of TPM**	Development of a system institutionalizing the "polluter pays" and/or "end user pays the full cost including societal costs" principles, with a view to devising a charging system for application to all modes of transport and their users. In order to define external costs properly it is important to distinguish between: (a) social costs and (b) private costs, sometimes referred to as internal costs. External costs refer to the difference between social costs and private costs. The measure plans to charge this to the consumer. [1] [11] Social costs reflect costs occurring due to provision and use of transport infrastructure. Examples being: capital costs, wear and tear of infrastructure, congestion, accidents (i.e. medical care, economic loss, suffering/grief, etc.), noise (i.e. loss of housing value), air pollution (i.e. affecting health), environmental cost, climate change (i.e. global warming), etc. Private costs are directly borne by the transport user. Examples being: wear and tear of vehicle use, fuel/energy, own time, transport fares, transport taxes/charges, etc.
A 5	**Implementation examples**	Not available, as it is not implemented. Some sectors have communicated their concerns, and say that transport is only one of many industries. Like power generation, construction, chemical production (etc.), this industry generates external costs. All these industries bring benefits to our economy and external costs. There seem to be no justification for singling out transport.
A 6	**Objectives of TPM**	This policy require additional costs to be paid by all transport end-users. For example social costs like accidents, congestion, pollution, etc. These are deemed to be costs imposed on society. The policy aims at "polluter pays" and/or "end-user pays the full cost including social costs". Transport-related accidents, air pollution, noise, climate change impact, congestion, etc. generate high social costs that are usually not covered by users, but have to be borne by the society as a whole. Ignoring these externalities would result in market inefficiencies in favour of more harmful transport modes. Determination of such external costs is thus a prerequisite to develop strategies for their internalization into total costs and for the implementation of sustainable transport policies [11]. The measure will lead to efficient use of the existing infrastructure. Furthermore, as users will pay for the additional costs they generate for society, this will help to ensure fair treatment of both transport users and non-users.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Undetermined. However, it is very likely that transport modes generating a relative low amount of social costs (like rail) will become more competitive as they become more cost attractive. This will lead to a shift in transport mode and/or to changes in the transport chain [12].
A 7.2	Origin and/or destination of trip:	Undetermined.
A 7.3	Trip frequency:	Undetermined.
A 7.4	Choice of route:	Undetermined.
A 7.5	Timing (day, hour):	Undetermined.
A 7.6	Occupancy rate / Loading factor:	Undetermined. However this policy measure will increase user costs. Especially transport modes with a relative high amount of social costs will need to improve their loading factor and/or load size, to remain competitive.
A 7.7	Energy efficiency / Energy usage:	Undetermined. However, the measure will eventually result in more energy efficient and more environmental friendly transport modes, as these will become more cost attractive. This will encourage producers (e.g. car manufacturers, bus operators) to develop more energy efficient and environmental friendly vehicles due to a sharp increase in demand.
A 8	**Main source**	[1] [3] [4] [6] [10] [11] [12] [13]

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	L	R	E	I

B 1.1 Summary

- Some sectors have concerns about internalisation of external costs, some groups are opposed. They have indicated that the policy would apply in full to air transport, but that rail operators would continue to benefit from both cash subsidies and non-payment of full infrastructure costs.
For example the aviation industries [2] have communicated their concerns about the motivation for the proposal, the methodology and the design elements that have been taken into consideration. They have serious doubts regarding the feasibility of arriving at a fair and equitable outcome. In their vision, there is no justification for singling out transport for the application of this measure. In their view, if the initiative is to be adopted, the principles should be applied cross-industry wide. Transport is only one of many industries that generate external costs, and benefit society. Other obvious major examples are power generation, construction and the production of chemicals. All economic activities are intrinsically linked, where serving the interests of one group is inherently detrimental to others [1]. Impact assessment must take into account both the external costs and the benefits which transport brings to the economies. Transport is essential for the economy, for creating jobs and opening up new market opportunities. In their vision [2], the European Commission when applying the "polluter pays principle" has already prejudged who should pay for any externalities. When this measure is applied, society will benefit as the "polluter" is charged. This will eventually lead to more sustainable transport as it will encourage manufacturers (i.e. vehicle manufacturers) to make their product more environmentally friendly and more energy efficient due market demand. On the other hand, an increase in transport costs might result in transport companies cutting costs elsewhere, for example in their number of employees or employee salaries.
Furthermore, it should be noted that introduction of such new taxes or charges to internalise external costs, will lead to revenues. Using revenues forms an integral part of the EU internalisation policy, and can be used in many ways. Research [14] has shown that "the arguments in favour or against earmarking are more or less balanced". This conclusion was reached after studying the relation of earmarking with efficiency, equity and acceptability objectives.
- With respect to efficiency the conclusions are: funds to transport budgets do not necessarily maximise social welfare. For instance, governments at the lower levels may select projects that favour local rather than transit traffic. Therefore detailed investment decisions are sensibly left to national or regional government, to be invested in the Trans European Network.
- With respect to equity the conclusions are that there is no reason to suppose that earmarking, in general, will improve equity. Equity arguments for earmarking often take the form of saying that those who pay should get corresponding benefits for their money. But this would only be fair if, in general, the existing distribution of income were fair.
- With respect to acceptability the conclusions are: the prospect of a pricing reform will be enhanced when enjoying public acceptability. If surplus revenue is used to minimise the number of individuals that will experience a utility reduction due to the transport pricing reform, the acceptability of that reform will increase. Earmarking of surplus revenues to the transport budget will ameliorate the harmful impacts (raised prices) for certain users.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage		↗	↘				↗		↘								N	I	S	I
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Note that it is possible to define a sound methodology to estimate external costs. However, the methodologies and values are most robust for the road sector [10]. Of all transport sectors, rail operators benefit most when this policy measure becomes active. This will make rail transport more competitive. From that point of view, a growth in rail mileage can be expected.
B 2.V	**Quantification of impacts**	- Transport prices will increase. Some sectors (aviation) will be struck harder than others (i.e. rail). This can have an impact on aspects like travel/transport time, congestion, mileage, service/comfort and mode choice. As charges are yet unknown, these effects can not be quantified.

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗	↗	↑	↗		↗	↗	↗	↑	↗	↗						R	N	E	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness		↗	↘				↗		↘								N	I	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- All transport costs will increase, as all costs will be paid by the end user. - Air transport costs will increase most as it bears relatively high social costs (infrastructure costs, noise, air pollution, etc.). - Rail transport, on the other hand, will benefit from the measure as its social costs are relatively small. Rail transport will therefore become more competitive. A shift in transport mode (towards rail) is likely. - Road transport costs will increase, transport operators will look for efficient ways to remain competitive. passengers will have to bear the costs, probably they will look for more efficient vehicles or shift mode. Travel mileage might reduce due to increased costs. The measure aims at generating fair prices for each mode of transport, taking into account external costs. In general, generating fair prices is good. However, some have argued that the benefits to the economy have been overlooked and not have been taken into account. That is for some sectors more disadvantageous than others. Furthermore, some state there is no justification for this measure as it targets the transport industry only. - Other industries (like power generation, construction, chemical production) are not targeted despite the fact that they also result in social costs. - Concerning competitiveness, rail may benefit compared to other modes, as its social costs are small. However, if rail is the only charged mode, it will see a negative impact. This is the case with all modes if charging is not done in a level-playing field. - Public income may increase, but if charges replace other public incomes such as tax on the purchase of cars, then public income will remain neutral. In order to get charges introduced, this will be an option at least for passenger transport.
B 3.V	**Quantification of impacts**	- All transport costs will increase, as external costs will be paid by the end user. Air transport costs will increase most.

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)												→	↗			↗	L	R	E	I
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																↗	N	I	E	I
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- This measure deals with charging for external costs (like congestion, pollution). Negative environmental aspects will be reduced when this policy measure becomes active. - Health and well-being are likely to improve as the use of environmental friendly transport modes will increase. Travel mileage might reduce due to increased costs. The measure aims at generating fair prices for each mode of transport, taking into account external costs. In general, generating fair prices is good. However, some have argued that the benefits to the economy have been overlooked and not have been taken into account. That is for some sectors more disadvantageous than others. Furthermore, some state there is no justification for this measure as it targets the transport industry only. - Other industries (like power generation, construction, chemical production) are not targeted despite the fact that they also result in social costs.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↗	L	R	E	I
B 5.2	Noise emissions																↗	L	R	E	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↗	N	I	E	I
B 5.6	Renewable or non-renewable resources																↗	N	I	E	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Dependency on scarce and expensive fossil fuels will be reduced. The global warming process will be slowed down. - Negative environmental aspects will be reduced when this policy measure becomes active.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Inclusion of air transport into the EU-ETS in 2012. - Environmentally differentiated landing fees - Eurovignette - Airport charges directive (2009/12/EC)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] CE Delft (2008): Handbook on estimation of external costs in the transport sector [2] European Aviation Industry (2008): Joint Statement [3] European Parliament (1999): Directive 1999/62/EC, on the charging of heavy goods vehicles [4] Press release of European Commission (2008): External Cost In Transport [5]Commission Legislative and Work Programme (2008): Roadmap, list of initiatives [6] Stakeholder Conference (2008): External Costs and Air Transport. [7] Stakeholder Conference (2008): External Costs and Maritime / Inland Waterways transport [8] Stakeholder Conference (2008): External Costs and Rail Transport [9] Stakeholder Conference (2008): External Costs and Road Transport Pricing [10] Stakeholder Conference (2008): Handbook on external cost estimation in the transport sector [11] Council of European Union (2008): Greening Transport [12] UNIFE The European Railway Industries (2008): Internalisation of external costs of transport - revision of eurovignette directive [13] Progtrans (2010): Internalisation of external costs [14] CE Delft (2007b): Methodologies For External Cost Estimates And Internalisation Scenarios

FACT SHEET NO: 05 **CATEGORY: 1.2** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**External cost charges**
A 3	**Transport policy measure (TPM)**	**Environmentally differentiated landing fees**
A 4	**Description of TPM**	International air transport involves considerable adverse effects on the environment at both a national and an international level, which, particularly against the background of high rates of growth in the volume of air transport in recent years. While at a global level discussion focuses on the impact on climate change, at a local level the focus is on noise emissions. Particularly due to growing traffic volume, increasing efforts are being directed at problems of noise mitigation, and economic instruments are becoming even more important. One promising option is the creation of economic incentives for the use of environmentally sound technologies (with less noise and lower emissions) by airlines. To stimulate the use of silent or less noisy aircraft and to discourage the use of noisy aircrafts, many airports apply a pricing differentiation over and above the base landing and take-off charge.
A 5	**Implementation examples**	- Currently, there are landing charges in Sweden and Switzerland concerning NOx. - Moreover, noise based differentiation of landing fees (night fees, noise categories) are implemented in the UK (e.g. Heathrow), the Netherlands (e.g. Schiphol), Germany (e.g. Frankfurt).
A 6	**Objectives of TPM**	Main objectives are: - promote environmentally responsible behaviours by encouraging airlines to use aircraft with lower noise and air quality impacts - to stimulate airlines to take into account as one factor among many, the emission fees when choosing new engines for their new aircraft - If all EU airports introduce emission charges, the incentive to adopt cleaner engines would be stronger - Orientation towards the polluter-pays principle through the separate treatment of take-off and landing, (higher pricing at night) as well as greater differentiation of noise categories. [1] [2] [3]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	Night fees simulate airlines to operate less flights at night
A 7.6	Occupancy rate / Loading factor:	Environmental fees could incentive airlines to increase occupancy rate.
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[4]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 1.1	**Summary**																	**L**		**S**	**L**
		- Air transport becomes more expensive, so the competitiveness and the mileage probably decreases. The reason of the measure is rather social and environmental, which two fields really benefit from that (people working on airports and residents near airports are affected (positively).																			
B 1.2	**Summary: Income groups**	- Possible negative impact on lower income groups due to higher costs of aviation																			
B 1.3	**Summary: Age groups**																				
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage			↘						↘								**L**		**S**	**N**
B 2.4	Service and comfort																				
B 2.I	**Overall impacts on social groups**																				
B 2.II	**Implementation phase**																				
B 2.III	**Operation phase**																				
B 2.IV	**Summary / comments concerning the main**	- Due to higher transport costs, demand, and vehicle mileage will possibly decrease [not mentioned in sources]																			
B 2.V	**Quantification of impacts**																				

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 3.1	Transport costs			↗						↗								**L**		**S**	**N**
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness			↘						↘								**L**		**S**	**N**
B 3.5	Spatial competitiveness			↘						↘								**L**		**S**	**N**
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				
B 3.I	**Overall impacts on social groups**																				
B 3.II	**Implementation phase**																				
B 3.III	**Operation phase**																				
B 3.IV	**Summary / comments concerning the main impacts**	- The measure inspires airlines to buy low noise level and less pollutant emitting aircrafts, however the costs are definitely higher than conventional ones. - Sectoral competitiveness decreases for airline transport (due to increased transport costs), spatial competitiveness increases between airport with and without limits (and thus differentiated landing fees).																			
B 3.V	**Quantification of impacts**																				

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)			↗						↗			↗	↗			↗	L		S	N
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- By inspiring airlines to change the aircraft fleet to less noisy and less pollutant ones, noise and air pollution levels decrease strongly in the area (near airports). [1] [4] - Workers on airports will definitely benefit from the measure (due to lower pollutants).
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	L		S	N
B 5.2	Noise emissions													↘			↘	L		S	N
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	L		S	N
B 5.6	Renewable or non-renewable resources																↘	L		S	N

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main**	- Reduction of air pollutants climate and noise level, due to more environmental friendly engines
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Inclusion of air transport into the EU-ETS in 2012. - Internalisation of external costs for specific modes of transport (road, rail, iww, ports, airports) - Eurovignette - Airport charges directive (2009/12/EC)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**National** [1] Kalle Keldusild (2006): Aviation Working Group. NOx–differentiated landing charges in Sweden. [2] Civil Aviation Authority Netherlands (2003): Airport charges of Amsterdam Airport Schiphol Transport and Water Management Inspectorate, Division Aircraft, Technical and Airworthiness Standards Department [3] Heathrow Airport Limited (2010): Heathrow Airport Structure of Aeronautical Charges Proposals [4] Öko-Institut e. V (2004): Economic measures for the reduction of the environmental impact of air transport: noise-related landing charges [5] European Commission (2002): Conference on good pratice in integration of environment into transport policy, DG Environment

FACT SHEET NO: 06 **CATEGORY: 1.2** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**External cost charges**
A 3	**Transport policy measure (TPM)**	**Eurovignette**
A 4	**Description of TPM**	Problem: To ensure cost transparency regarding road usage and external costs of road freight transport. The Eurovignette Directive sets out the common rules by which Member States can charge heavy goods vehicles for the use of the road network by distance, time and location. **The 99/62 and 2006/38 directives** recommend the introduction of tolls in all EU countries, requiring hauliers to pay when travelling in the interurban high capacity roads and main roads. The original framework prevented governments from charging trucks for their impact on the environment. It concerned transport by lorries above 12 tonnes on the TEN-T road network. **The revision of the "Eurovignette" directive in 2011** introduces the internalisation of external effects. Hence, member states may charge road freight transportation which implements respectively calculates the costs of air and noise pollution and road congestion. Furthermore the rule extends to vehicles above 3,5 tonnes on all TEN-T roads and roads which carry a significant amount of international cargo. To this end, member states may apply an "external cost charge" on lorries, complementing the already existing infrastructure charge designed to recover the costs of construction, operation, maintenance and development of infrastructure.
A 5	**Implementation examples**	Example Germany: - Modification (increase) of the toll rates per Jan 2011 - Increase in infrastructure investments (especially for arterial roads/highways) - Incentive for carriers to refit their fleet by more environmentally friendly vehicles (Euro-5 lorries are exempt from air pollution charges until 2014 and Euro-6 until 2018): subsidies of ca 100 million EUR/year by Germany government
A 6	**Objectives of TPM**	By laying down common rules on how EU states may charge heavy goods vehicles for using the road network, the 'Eurovignette' directive aims to: - to ensure national toll systems reflect the 'external costs' of transport, including environmental damage, congestion, and accidents (user pays" and a "polluter pays" principle) - to finance alternative modes of transport (cross-financing) to operate a 'modal shift' of freight away from roads (rail, inland waterways) - reduce pollution from road freight transport and making traffic flow smoother by levying tolls that factor in the cost of air and noise pollution due to traffic and help avoid road congestion.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Increasing costs for road transport may possibly make rail and IWW more attractive. Likely increase of multimodal transport usage / chains
A 7.2	Origin and/or destination of trip:	The directive is not likely to influence the location choice for production or consumption
A 7.3	Trip frequency:	Reduction of trip frequencies e.g. through more efficient organisation of freight transport
A 7.4	Choice of route:	The directive can lead to traffic detour and diversion (e.g. avoiding more expensive routes such as Alpine area where a toll mark-up of 25% is allowed)
A 7.5	Timing (day, hour):	Reduction of peak travels due to higher charges (maximum variation rate of 175 % during peak periods limited to five hours per day).
A 7.6	Occupancy rate / Loading factor:	Increase in loading factor
A 7.7	Energy efficiency / Energy usage:	Reduction of fuel consumption. The higher transport costs create an incentive to optimize logistics and reduce empty running. This indirectly reduces the fuel consumption. [16]
A 8	**Main source**	[1], [8], [9], [15], [16]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**N**	**I**	**S**	**I**

B 1.1	**Summary**	The Eurovignette directive concerns freight transport on mainly inter-urban links. Therefore the main group which is affected are transport operators (shippers, carriers) who have to bear the additional cost, especially when they cannot switch to other modes.
B 1.2	**Summary: Income groups**	- Low-income classes are likely to benefit the most since they tend to inhabit the areas where externalities (congestion, air pollution, noise) are more severe. [17] Equity implications depend on the implementation of the scheme. Furthermore the location of workplaces and residential areas, car ownership, and travel patterns have to be taken into account. The impact on income groups can therefore differ from groups in other areas. [20]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						↘											**N**	**R**	**E**	
B 2.2	Risk of congestion						↘											**N**	**R**	**E**	
B 2.3	Vehicle mileage						↘	↗	↗									**N**	**R**	**S**	**N**
B 2.4	Service and comfort						↗											**N**	**R**	**E**	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	- Impact as soon as directive comes into effect.
B 2.IV	**Summary / comments concerning the main traffic impacts**	- Decrease of HGV mileage, travel and transport time. - Decrease of congestion by optimising logistics behaviour and empty returns. [16] - Improvement of road service/comfort and freight transport on other modes: the funds raised by the Eurovignette are used to finance the maintenance of the road infrastructure but also to cross-finance rail and IWW.
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↗											**N**		**S**	**I**
B 3.2	Private income / commercial turn over												↘					**L**	**R**	**E**	**I**
B 3.3	Revenues in the transport sector						↘											**L**	**R**	**S**	**I**
B 3.4	Sectoral competitiveness						↘	↗	→						↘			**L**	**R**	**E**	
B 3.5	Spatial competitiveness						↘											**N**		**E**	**I**
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses						↗						↗			↗		**L**	**R**	**E**	
B 3.10	Public income (e.g.: taxes, charges)															↑		**N**	**R**	**S**	**N**
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- High costs for implementation: A projection for the EU 27 results in equipment costs of EUR 33 bn.
B 3.III	**Operation phase**	- High operation costs: Annual operating costs of EUR 22 bn are estimated. London Congestion Charging has also shown that this is an expensive solution. Around 60% of the charging revenues are spent on operating and administration. High costs arise for the public for the charging technology alone; there is no material improvement of transport infrastructure.
B 3.IV	**Summary / comments concerning the main traffic impacts**	- The increase in transport costs leads to a negative evolution of exports and consumption (households have to face increased costs of transport) unless the revenues from road charges are used for direct tax reductions. [17] - Negative contribution to spatial competitiveness on a national level: the more central countries have a geographical location advantage as the net distributional effect of the charges on the national income is higher in the peripheral countries. [15, p. 33]
B 3.V	**Quantification of impacts**	See [15] for a quantification of the impact on each EU Member State.

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	N	L	E	
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																↗	I		S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main traffic impacts**	- The reduction of air pollutants provides a positive contribution to health and reduces health costs, including medical care. This is especially the case in densely populated areas and in alpine and other populated mountain valleys. - Charges are used to maintain or build infrastructure, which has a positive impact on employment - The evolution of employment is affected by the negative trends of the economy (reduction in export and consumption) [17]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	N	R	E	I
B 5.2	Noise emissions																↘	N	R	E	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I		E	I
B 5.6	Renewable or non-renewable resources																↘	I		E	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	- Reduction of noise levels and air pollution (especially NOx (the main source), VOC and PM2.5) from freight transport. Society as a whole benefits from lower noise levels and pollutant emissions; the charge further helps to combate climate change. Optimal charging would lead to a reduction of air pollution and CO2 by 54% in United Kingdom, 50% in France and 42% in Finland. [17] The external-cost charging contributes to the reduction of external costs (air pollution, crop losses and other loss of production). [16] - Within the modes there is a likely shift from road to rail (also in terms of pollution); the additional negative environmental effects due to more IWW transport are negligible.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Inclusion of air transport into the EU-ETS in 2012. - Internalisation of external costs for specific modes of transport (road, rail, iww, ports, airports) - Environmentally differentiated landing fees - Airport charges directive (2009/12/EC)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Eur-lex (2006): Directive 2006/38/EC amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures [2] OECD Observer (2002): Road pricing: what's the deal? [3] European Conference of Ministers of Transport - ECMT 2002): Tolls on Interurban Road Infrastructure. An Economic Evaluation (Report of the Round Table on Transport Economics 118 [4] Council of European Municipalities and Regions -CEMR (2004): Eurovignette directive : European Parliament and CEMR speak with one voice [5] European Automobile Manufacturers Association - ACEA (2008): ACEA position on Eurovignette Revision [6] European Automobile Manufacturers Association - ACEA (2008): ACEA position on the internalisation of external costs [15] Progtrans (2010): Internalisation of external costs. Direct impact on the economies of the individual EU member states and the consequences on the European road haulage industry. [16] Eur-lex (2011): DIRECTIVE 2011/76/EU amending Directive 1999/62/EC on the charging of heavy goods vehicles for the use of certain infrastructures. [17] Eur-lex (2012): Impact assessment on the internalisation of external costs. [18] Eur-lex: Summary of the Impact assessment on the internalisation of external costs. [19] CE Delft (2008): Internalisation Measures and Policies for all external Costs of Transport (IMPACT). Handbook on estimation of external costs in the transport sector. [20] CEDR (2009): The socio-economic impacts of road-pricing. **National** [7] UK-Department for Transport (1998): White Paper: A New Deal for Transport - Better for Everyone [8] Germany - Ministry of Transport (2011): Lkw-Maut – Inkrafttreten des neuen Bundesfernstraßenmautgesetzes -BFStrMG. http://www.bmvbs.de/SharedDocs/DE/Artikel/UI/lkw-maut-inkrafttreten-neues-bundesfernstrassenmautgesetz.html [9] Germany - Ministry of Transport (2007): Aktualisierung der Wegekostenrechnung 31-10-2011für die Bundesfernstraßen in Deutschland [10] Netherlands - Belastingdienst (2010): Belasting zware motorrijtuigen (bzm).http://download.belastingdienst.nl/belastingdienst/docs/mededeling_bzm_ev0061z12pl.pdf [11] Joint industry position paper (2009): Eurovignette III - Charging of Heavy Goods Vehicles Proposal **Regional / Local** [12] Institute for Transport Economics at the University of Cologne (2008): External Costs in the Transport Sector - A Critical Review of the EC-Internalisation Policy. [13] MORPACE International (2002): Study on UK congestion charges and satellite-based road pricing (news release, October 2002) [14] Institute for Transport Studies, Leeds University -ITS (1998): UK Surface Transport Costs and Charges

FACT SHEET NO: 07 **CATEGORY: 1.2** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**External cost charges**
A 3	**Transport policy measure (TPM)**	**Airport charges directive (2009/12/EC)**
A 4	**Description of TPM**	This Directive sets common principles for the levying of airport charges at Community airports. Airports offer a number of facilities and services related to the operation of aircraft, from landing to take-off, and the processing of passengers and cargo, the cost of which they generally recover through airport charges. The charges may include: - Runway landing and take-off charges - Aircraft parking charges - Charges for the use of an air bridge - Passenger processing charges Airport charges are paid by the airports users, namely, airlines transporting passengers and/or freight. Indirectly these charges are paid by passengers and freight customers via the ticket price or freight forwarding fee. The directive applies to EU airports above a minimum size, handling more than five million passengers per year. [1]
A 5	**Implementation examples**	UK: one of the few cases where legislation is in place to regulate airport charges. In 2011 nine airports and in 2012 ten airports had to comply with these regulations due to them having over 5mppa in 2009. Three of these airports (Heathrow, Gatwick and Stansted) are already regulated for price control. [5] Germany: before the introduction of the ACD, in each of the Bundesländer a regional airport authority was responsible to supervise the airport regulation. This led to huge differences in implementing the federal law. [4, 7] Italy: the expected increase from 140 million (2010) to 240 million passengers (2020) and 266 million passengers (2030) at Italian airports requires a modernisation and expansion of the airports to meet passenger demand. Studies also identified the need for a simplified regulatory set-up to help improve competitiveness. The Italian civil aviation authority (ENAC) will be in charge of the implementation of the ACD in Italy. [6]
A 6	**Objectives of TPM**	- Greater transparency on the costs which charges are to cover. Airports have to provide a detailed breakdown of costs in order to justify the calculation of airport charges. - Non-discrimination: the airport charges directive establishes minimum standards for the calculation of the charges airlines to ensure fair competition between airlines. Airlines should be charged the same for receiving the same service in an airport. However, airports can differentiate their services as long as the criteria for doing so are clear and transparent. Airports can also vary charges for environmental reasons (e.g. lower charges for more environmentally-friendly aircraft). - Systems of consultation on charges between airports and airlines (which are already in place at many EU airports) will become mandatory at all airports covered by the Directive. - Member States will designate an independent supervisory authority to help settle disputes over charges between airports and airlines. [3]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Minor impact: intra-modal competition with rail transport is possible in the range up to 400-650 km
A 7.2	Origin and/or destination of trip:	Possibly airports with just under five million passenger a year will become more attractive
A 7.3	Trip frequency:	Small impact (i.e. fewer trips)
A 7.4	Choice of route:	No impact (to a certain extent related to destination)
A 7.5	Timing (day, hour):	No impact
A 7.6	Occupancy rate / Loading factor:	No impact
A 7.7	Energy efficiency / Energy usage:	No impact
A 8	**Main source**	[1], [3], [4], [5], [6], [7]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

	AFFECTED SEGMENTS																Geographi-cal level		Source	
	Passengers					Transport operators														
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1 Summary																	N	I		

- 14 of the 25 most expensive airports are located in the EU. Since 2001, airport costs per passenger had risen on average by 13%; at some airports by more than 20%. Apart from some exceptions (e.g. UK) most Member States do not have adequate legislation for regulating airport charges.
- The Directive closes this gap by providing a greater transparency between airport operators and airlines regarding the calculation of airport charges. This is especially welcomed by the air carriers who had to reduce operating costs while facing increasing airport costs. On the other hand, the airports emphasize the need for airport capacity extensions. They also state that the airport charges do not cover the full costs of airport infrastructure. [2] [5]

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	No impacts. The Disability Discrimination Act (DDA) 1995 now gives rights to disabled people in the area of access to goods, facilities and services. The charges levied for the funding of assistance to disabled passengers and passengers with reduced mobility are governed by Regulation (EC) No 1107/2006 of the European Parliament and of the Council of 5 July 2006 concerning the rights of disabled persons and persons with reduced mobility when travelling by air. The airport charges directive (ACD) does not impact on any of these rights. [5]
B 1.5	**Summary: Gender groups**	No impacts. This objective relates to all passengers. Therefore, the ACD is not likely to bring about different consequences according to people's gender or discriminate directly or indirectly against genders: - Different consequences according to people's gender - People being affected differently according to their gender in terms of access to a service, or the ability to take advantage of proposed opportunities - Discrimination unlawfully, directly or indirectly, against genders; or - Different expectations of the policy from between genders. [5]
B 1.6	**Summary: Ethnic groups**	No impacts. The ACD is not likely to bring about different consequences according to people's ethnic group or discriminate directly or indirectly against people from some ethnic groups. [5]

B 2 TRAFFIC IMPACTS

	AFFECTED SEGMENTS																Geographi-cal level		Source	
	Passengers					Transport operators														
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1 Travel or transport time																				
B 2.2 Risk of congestion																				
B 2.3 Vehicle mileage			↘						↘								L	R	E	N
B 2.4 Service and comfort									↗								L	R	E	N

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The Directive encourages adequate quality level of services. The airports users and managing bodies have the possibility to conclude an agreement on the quality level of services in relation to the airport charges. [6] - Decrease of vehicle mileage expected due to higher transport costs
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs			↗						↗								L	N	S	N
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector									→								L	N	E	N
B 3.4	Sectoral competitiveness									↘								N	I	E	I
B 3.5	Spatial competitiveness			→						→								L	R	E	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		N		E	N
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	The Directive is not likely to have significant impacts on competition: - Due to the already substantial investment costs the additional costs of the ACD do not create extra barriers to market entry. The Directive might reduce the incentives to compete because it obliges the airports and airlines to reveal financial information. [5] - The sectoral competitiveness (especially in relation to high-speed rail) is reduced due to the cost increases. - Administrative burdens increase (relating to the point that Member States will designate an independent supervisory authority to help settle disputes over charges between airports and airlines.) The supervisory body is responsible for conducting reviews and consultation, publishing annual reports of its activities and ensuring a correct application of the ACD. In the case of the UK annual costs of £36k - £39k are estimated [5] - (Spatial) competitiveness between airport with over 5 million passengers and airport transporting less than 5 million passengers will increase - Changes concerning the revenues of airports and airport users: the Commission defines a cap for a period of four or more years on the total revenues per passenger that the airport may collect. If the airport can successfully reduce its costs below the level of the cap, the airport operator and users share the benefits of any cost savings that the airport is able to realise until the cap is reset.
B 3.V	**Quantification of impacts**	- Distribution of annual cost by organisational size (example UK): Micro: <1%; Small: 5%; Medium: 10%; Large: 85% [5] - In order to promote territorial cohesion, Member States have the possibility to apply a common charging system to cover an airport network. Economic transfers between airports in such networks are possible. [1] - Increased airline ticket prices as a consequence of airport charges: Airport charges for operating airlines at the Spanish airports Barajas in Madrid and El Prat in Barcelona have been increased by 50%, which has led to an increase in airline ticket prices of up to nearly € 12 for long-haul flights and up to € 9 for European flights.

B 4 SOCIAL IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Any health and well-being impacts of the Directive would be closely correlated with changes in local emissions and noise around airports. In addition, there will be no impact on wider determinants such as income, crime, housing, education, employment, agriculture or social cohesion. [5] - There is no evidence of an increase in safety due to greater transparency.
B 4.V	**Quantification of impacts**	

B 5 ENVIRONMENTAL IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants													↘				L	R	E	I
B 5.2	Noise emissions													↘				L	R	E	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Overall a positive impact on the environment is possible: The Directive on airport charges allows differentiated charging on the basis of environmental damage. The ACD is only supposed to have an impact on noise and greenhouse gas emissions where there is an impact on the costs of airport use and hence change in airport use.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Inclusion of air transport into the EU-ETS in 2012. - Internalisation of external costs for specific modes of transport (road, rail, iww, ports, airports) - Environmentally differentiated landing fees - Eurovignette
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2009): DIRECTIVE 2009/12/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 March 2009 on airport charges. [2] European Commission (2007): Accompanying document to the Proposal for a Directive of the European Parliament and of the Council on airport charges. Summary of the Impact Assessment. Commission Staff Working Document. http://ec.europa.eu/governance/impact/ia_carried_out/docs/ia_2007/sec_2006_1689_en.pdf [3] European Commission (2012): Airport charges. http://ec.europa.eu/transport/air/airports/airport_charges_en.htm [4] G. Wolszczak (2009): Airport Charges Regulation: The Impact of the Institutional Structure on the Regulatory Process. Working Paper of the German Airport Performance Project (GAP). http://userpage.fu-berlin.de/~jmueller/gapprojekt/web/papers.html **National** [5] Department for Transport (2011): Airport charges directive. Impact Assessment. http://www.ialibrary.bis.gov.uk/uploaded/uksifia_20112491_Airport%20Charges%20Directive1.pdf [6] A. Laconi (2012): The Italian implementation of Airport Charges Directive: Decree Law No. 1 of 24th January 2012. The Aviation and Space Journal. January/March 2012 Year XI no. 1 [7] J. Müller, H.M. Niemeier (2012): Reform der ökonomischen Regulierung von Flughäfen in Deutschland, Frankreich und Österreich - Eine Bestandsaufnahme. www.gap-online.de

FACT SHEET NO: 08 **CATEGORY: 1.4** **PERFORMED BY: LET**

A GENERAL INFORMATION

A 1	**Category**	**Pricing**
A 2	**Subcategory**	**Other / new financing instruments**
A 3	**Transport policy measure (TPM)**	**PPP promotion/support: PPP systems e.g. build-operate-transfer (BOT)**
A 4	**Description of TPM**	Public-Private Partnerships (PPP) arrangements are the partnership of private and public cooperation which aims to reduce the investment of public funds and take the advantage of the participation of private sector. In a PPP arrangement, the public and private sectors collaborate in the construction and/or maintenance of public infrastructure projects. The Commission has identified four principal roles for PPPs [1] [2]: - Provide additional capital - Provide alternative management and implementation skills - Provide value added to the consumer and the public at large - Provide better identification of needs and optimal use of resources.
A 5	**Implementation examples**	- European PPP in the first half of 2012 with 41 deals. [4] - The aggregate volume of PPP transactions that reached financial close on the European market in the first half of 2012 totalled 6 billion euros. [8]
A 6	**Objectives of TPM**	The PPP arrangements aim to [1]: - Acceleration of infrastructure provision - Faster implementation - Reduced whole life costs - Better risk allocation and better incentives to perform - Improved quality of service - Generation of additional revenues - Enhanced public management
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[1] [4]

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

The implementation of PPPs in the investment of transport infrastructure projects will have positive impacts on the economy, financial health of the public sector and the success of the projects. It concerns transport investments of all transport modes and service.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	↘		↘		↘	↘	↘			↘						L	R	E	
B 2.2	Risk of congestion	↘	↘		↘		↘	↘	↘			↘						L	R	E	
B 2.3	Vehicle mileage	→	→		→		→	→	→			→									
B 2.4	Service and comfort	↗	↗		↗		↗	↗	↗			↗						L	R	E	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	
B 2.V	**Quantification of impacts**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 3	**ECONOMIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs																				
B 3.2	Private income / commercial turn over														↗			L	R	E	
B 3.3	Revenues in the transport sector														↗			L	R	E	
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↘		L	R	E	
B 3.10	Public income (e.g.: taxes, charges)															↗		L	R	E	
B 3.11	Third countries and international relations															↗	↗	I			

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The PPP arrangement is a long contract between public authority and private sector for financing, designing, construction and operations of infrastructure projects. Its impacts on economy concern the reduction of transport cost for users/business and increasing the income of public authority and private sectors.
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	L	R	E	
B 4.2	Safety																↗	L	R	E	
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																↗	L	R	E	
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																↗	L	R	E	
B 4.8	Cultural heritage / culture																				
B 4.I	**Overall impacts on social groups**																				
B 4.II	**Implementation phase**																				
B 4.III	**Operation phase**																				
B 4.IV	**Summary / comments concerning the main impacts**	- The success of PPP can generally help authorities / administration to achieve invested project goals and improve the service quality of transportation system.																			
B 4.V	**Quantification of impacts**																				

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													→							
B 5.2	Noise emissions													→							
B 5.3	Visual quality of the landscape													→							
B 5.4	Land use													→							
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				
B 5.I	**Overall impacts on social groups**																				
B 5.II	**Implementation phase**																				
B 5.III	**Operation phase**																				
B 5.IV	**Summary / comments concerning the main impacts**	- The environmental impact of PPPs depends on the propriety of projects.																			
B 5.V	**Quantification of impacts**																				

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	[1] European Commission (2003c): Guidelines for successful public – private partnerships. [2] European Commission (2009r): Mobilising private and public investment for recovery and long term structural change: developing Public Private Partnerships. [3] European Investment Bank - EIB (2011a): The European PPP Expertise Centre - EPEC. Using EU Funds in PPPs - explaining the how and starting the discussion on the future. [4] European Investment Bank - EIB (2012a): The European PPP Expertise Centre - EPEC. http://www.eib.org/epec/ [5] European Investment Bank - EIB (2012b):The European PPP Expertise Centre - EPEC. Broadband - Delivering next generation access through PPP. [6] European Investment Bank - EIB (2010): The European PPP Expertise Centre - EPEC. Eurostat Treatment of Public-Private Partnerships. [7] European Investment Bank - EIB (2011b): The European PPP Expertise Centre - EPEC. The Guide to Guidance: How to Prepare, Procure and Deliver PPP Projects. [8] European Investment Bank - EIB (2012c): The European PPP Expertise Centre - EPEC. Market Update - Review of the European PPP Market First half of 2012.

FACT SHEET NO: 09 **CATEGORY: 2.1** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Taxation**
A 2	**Subcategory**	**Fuel taxation**
A 3	**Transport policy measure (TPM)**	**Energy Taxation Directive' (2003/96/EC)**
A 4	**Description of TPM**	The existing Energy Tax Directive 2003/96/EC represents the Community framework for the taxation of energy products and electricity. The highest minimum tax rates were introduced for oil fuels (excluding international aviation and shipping). Coal and electricity minimum tax rates were introduced but at extremely low levels.
A 5	**Implementation examples**	Europe-wide implementation
A 6	**Objectives of TPM**	To reduce emissions and influence consumer behaviour, encourage the industry to select low-energy products and to give a big push to the use of renewable energy sources (RES).
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Within road transport intramodal shifts to biofuelled vehicles.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Fuel efficiency improvements are expected.
A 8	**Main source**	European Commission (2003): COUNCIL DIRECTIVE 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity. Brussels, European Commission

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	E	E

B 1.1 Summary:
- Residents of more rural areas are more affected due to lack of alternatives (less public transport)
- Public transport and slow modes will benefit from reduced traffic, less emissions and will become more attractive (compared to road and rail transport)
- Rail transport is negatively affected due to higher costs.
- Society will benefit due to reduced emission and increased safety.

B 1.2	**Summary: Income groups**	- Higher road transport prices have negative impacts on all income groups.
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage	↘	↘		↗		↘	↘										N	I	E	E
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main**	- Decrease in vehicle mileage for road and rail transport; increase of public transport. Road and rail decrease due to higher transport costs.
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗	↗				↗	↗										N	I	E	E
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector						↘	↘										N	I	E	E
B 3.4	Sectoral competitiveness						↘	↘										N	I	E	E
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)	↗	↗				↗	↗								↗		N	I	E	E
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- An increase in transport cost for road and rail can be expected due to higher fuel costs. - In terms of overall welfare, the policy measure is slightly positive, mostly in the New Member States. The positive impact goes mainly through an increased private consumption.[2, p.15] - At sectoral level, the energy intensive sectors and especially those using coal, are the most affected by the policy both in terms of production and exports, though the impact remains small. In some sectors and countries, the prices can even decrease through the interactions of demand and supply in the labour and good market and their impact on production factors cost. [2, p. 16] - Public income will rise if only taxation increases. This could be used to (cross) finance improvements in other parts of the transport system.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	L	R	E	E
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets						→	→				→	→	→	→	→	→	L	R	E	E
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The taxation on energy may increase energy prices. This has some impact upon road and rail transport, a small reduction is expected. - For society a decrease of traffic leads to an improvement of health and well-being. This will be especially the case for residents living near motorways and coal power plants. - The taxation might have an impact on employment in transport / transport operators, though there has not been found any written evidence.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	I	N	E	E
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I	N	E	E
B 5.6	Renewable or non-renewable resources																↗	I	N	E	E

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The impact is greater in the new Member States as the level of energy taxation remain lower there than in most EU15 countries, even with the implementation of the minimum tax. The reduction in CO2 emissions in the New Member States varies between 4 and 12%, compared to an average of 2% in EU15. [2, p.15]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International:** [1] EU Directive 2003/96/EC (2003): http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:283:0051:0070:EN:PDF [2] Kouvaritakis, N., Stroblos, N.,Paroussos, L., Revesz, T., Zalai, E., Van Regemorter, D. (2005): Impacts of energy taxation in the enlarged European Union, evaluation with GEM-E3 Europe. Study for the European Commission DG TAXUD [3] European Commission (2003): COUNCIL DIRECTIVE 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity. Brussels. [4] European Commission (2011i): Proposal for a Council Directive amending Directive 2003/96/EC restructuring the Community framework for the taxation of energy products and electricity. COM(2011)169, Brussels.

FACT SHEET NO: 10 **CATEGORY: 2.2** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Taxation**
A 2	**Subcategory**	**Transport Taxation**
A 3	**Transport policy measure (TPM)**	**Vehicle taxation (circulation & registration taxes)**
A 4	**Description of TPM**	Vehicle taxes are imposed in numerous countries around the world. They can be levied annual (known as vehicle circulation tax), on the new vehicles' first registration, or on the changes of the vehicles' ownership as well. In many cases the revenue is earmarked and must be spent on transport infrastructure. Tax rates are usually depend on the vehicle's environmental or engine performance, weight, age, or value. In the area of passenger cars the proper functioning of the Internal Market faces important problems. Disproportionate RT levels contribute considerably to pre-tax price differentials among Member State markets and keep car retail prices high. Concerning RT the tax bases and tax levels currently applied are very diverse and tax levels range, in extreme cases, between zero and 180% of pre-tax car price. Concerning the Annual Circulation Taxes (ACT) the tax bases used are equally very diversified and in absolute terms the average paid in 1999 ranged from 30 EUR/vehicle, to 463 EUR/vehicle. Road transport alone represents about 84% of all transport related CO2 emissions of which more than half is accounted for by EN 3 EN passenger cars. The genuine use of fiscal measures to meet Community's target of 120 g CO2 per Km is fundamental to the Community strategy. Fiscal measures provide a strong incentive value, for example, by encouraging the rapid renewal of the car fleet and influencing consumer's behaviour towards more fuel-efficient passenger cars. [5]
A 5	**Implementation examples**	In all the 27 states of the European Commission
A 6	**Objectives of TPM**	- To improve the functioning of the Internal Market - To implement the Community's strategy to reduce CO2 emissions from passenger cars - Ensures funding for road maintenance and development, discourages using of polluting vehicles or modes of transport. '
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Makes road transport less competitive (by rising the costs).
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	Low, but increasing impact (car pooling).
A 7.7	Energy efficiency / Energy usage:	Favourable tax rates on low-energy vehicles can decrease fossil fuel consumption.
A 8	**Main source**	[1] [4] [5]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	I	N	S	I

B 1.1	**Summary**	- The overall impacts include lower vehicle mileage and risk of congestion known as traffic impacts. IN economical terms, transport costs for private car users increases as well as public income. - In social terms, increasing safety and health level are identified. Environmental impacts include reduced pollutants (air, noise), climate effects, and possible increase for alternative energy sources.
B 1.2	**Summary: Income groups**	For low income citizens the replacement of their old cars becomes more difficult (e.g. registration tax).
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion	↘																I	N	S	I
B 2.3	Vehicle mileage	↘			↗	↗	↘					↗						I	N	S	I
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main traffic impacts**	Vehicle taxation can be an effective tool against excessive motorization in overpopulated cities where congestion is a serious problem. However, in most countries this tax is imposed in order to raise revenues or deter motorists from buying polluting vehicles rather than manage traffic problems. The well identified impact is the reduction of vehicle mileage for private cars, and as a secondary effect public transport and slow modes mileage increases. [1] [2] [5]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	↗																I	N	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↘																I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		I	N	S	I
B 3.10	Public income (e.g.: taxes, charges)															↑		I	N	S	I
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main traffic impacts**	Costs for private car usage significantly increases. While public income increases, the administrative burdens also increase. [1] [2] [5]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	I	N	S	I
B 4.2	Safety	↗				↗												I	N	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	↘																I	N	S	I
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main traffic impacts**	Due to decreased vehicle mileage, safety and health level increases for inhabitants and the society. [1] [2] [5]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	I	N	S	I
B 5.2	Noise emissions													↘			↘	I	N	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I	N	S	I
B 5.6	Renewable or non-renewable resources																↗	I	N	S	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	Vehicle taxes decelerate motorization, which connote lower emission of air pollutant and greenhouse gases. If tax rates depend on the vehicles' environmental performance, this effect can be more powerful due to more efficient or alternative energy consumption engines in cars. [1] [5]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Company car taxation - CO2 based annual vehicle circulation tax (CO2 taxation)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Goldman, T., Wachs, M. (2003): A Quiet Revolution in Transportation Finance: The Rise of Local Option Transportation Taxes. University of California Transportation Centre [2] Shimizu, T., Tuan V. A. (2005): Modelling of Household Motorcycle Ownership Behaviour in Hanoi City, in: Journal of the Eastern Asia Society for Transportation Studies, Vol. 6, pp. 1751 - 1765 [3] Arianto A. Patunru, Kiyoyuki Minato, Masahiko Hori, Keiko Hirota (Eds.) (2009): Sustainable Automobile Society in East Asia. ERIA Research Project Report 2008-7, Appendix 2-1: Database Results [4] European Automobile Manufacturers' Association -ACEA (2012): Overview of CO2 based motor vehicle taxes in the EU [5] European Commission (2005f): COUNCIL DIRECTIVE on passenger car related taxes, SEC(2005) 809.

FACT SHEET NO: 11 **CATEGORY: 2.2** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Taxation**
A 2	**Subcategory**	**Transport Taxation**
A 3	**Transport policy measure (TPM)**	**Company car taxation**
A 4	**Description of TPM**	Providing cars for private use is usually a low-tax way of employee remuneration. (The reason is that a car is only a cost item in the company accounting, not a salary with taxes, insurance etc.) As a result, nowadays approx. 50% of new cars are bought or leased by companies, although the majority (e.g. 70-80% in Belgium and the Netherlands) of company car mileage is non-business use. Besides the large losses in state revenues, this "subsidy" leads to undesirable environmental and traffic effects, therefore taxation of company cars would be socially beneficial.
A 5	**Implementation examples**	Already implemented in most European countries (including Hungary)
A 6	**Objectives of TPM**	Reduce the tax burden gap between free private use of company cars and other ways of employee remuneration, in order to moderate undesirable environmental and traffic effects and state revenue losses.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No mode choice impact mentioned, however experts estimation says increase might be expected due to less car usage
A 7.2	Origin and/or destination of trip:	shorter commuting distances
A 7.3	Trip frequency:	no impact mentioned but is it possible that the company car taxation will decrease the possibility of non-business car usage and the trip frequency
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	no impact (possibly affecting the occupancy rate due to an increase of fellow passengers due fewer company cars
A 7.7	Energy efficiency / Energy usage:	decrease in fuel consumption
A 8	**Main source**	Næss-Schmidt, S., Winiarczyk M.: Taxation papers: Company Car Taxation. Working paper no. 22. Copenhagen Economics, 2010.

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

Smaller (or no) gap between free car usage and other ways of employee remuneration will reduce excessive car usage and average car size as well. Total mileage, fuel consumption, air pollution and congestions will be reduced, besides increasing state revenues. A decrease in mobility of labour would be a side effect.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion	↘																N		S	N
B 2.3	Vehicle mileage	↘																N		S	N
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main traffic impacts**	- When employees face low-cost (or free) commuting by their company car, the average distance between their home and workplace is getting longer. It causes congestions on main roads from the suburbs. In some cases even free fuel can be provided for private routes without paying additional (or higher) fuel taxes, which also leads to excessive car use. [1]
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗																N		S	N
B 3.2	Private income / commercial turn over																↘	N		S	N
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness														↘			N		S	N
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↑		N		S	N
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main traffic impacts**	- At the moment EU governments lose tax revenues in average 0,5% of GDP due to unequal taxation of company cars and other ways of remuneration. [1] Hence, a taxation will significantly increase the public income and lower the private income.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets	↘															↘	N		S	N
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main traffic impacts**	- Lower mobility of labour, as workers face higher commuting costs. [1] - Lower labour mobility will negatively affect the employment and labour markets and the attractiveness of the overall economy.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	N		S	N
B 5.2	Noise emissions													↘				N		S	N
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	N		S	N
B 5.6	Renewable or non-renewable resources																↘	N		S	N

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	- The average value of company cars are significantly higher than private ones. While there is a strong correlation between a car's value and its GHG emissions (as well as fuel consumption), high company car taxes may reduce average car size, pollution and consumption. (the more high tech engine the lower consumption and higher prize) - Lower car usage and traffic loads will have positive effects for residents at heavy loaded arterial roads concerning air pollutants and noise emissions. - 3rd level impact: Lower demand regarding car usage affects the land usage positively due to a decreasing demand of roads.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Vehicle taxation (circulation & registration taxes) - CO2 based annual vehicle circulation tax (CO2 taxation)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Næss-Schmidt, S., Winiarczyk M.: Taxation papers(2010): Company Car Taxation. Working paper no. 22. Copenhagen Economics **National** [2] HM Treasury and HM Revenue & Customs (2007): Modernising tax relief for business expenditure on cars: a consultation update. [3] John Healey (2004): Report on the evaluation of the company car tax reform. In: Inland Revenue

FACT SHEET NO: 12 **CATEGORY: 2.2** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Taxation**
A 2	**Subcategory**	**Transport Taxation**
A 3	**Transport policy measure (TPM)**	**CO2 based annual vehicle circulation tax (CO2 taxation)**
A 4	**Description of TPM**	Car taxation is a powerful instrument to influence the purchase decisions of consumers. Taxes can be differentiated to support the market introduction of fuel efficient and low CO2 emitting cars. This could greatly facilitate the efforts of car manufacturers to meet their obligations by bringing such vehicles to the market. Of the various taxation instruments available to the policy maker, the present assessment focused on the use of taxes to encourage the purchase and use of low emission vehicles, i.e. taxes on registration and annual circulation Some countries modernized their circulation tax system with CO2 base in order to reduce GHG emission. The European Community's objective is to reduce CO2 emission to 120 g/km on average of the new car fleet. [3]
A 5	**Implementation examples**	Germany: Vehicles first registered before June 30, 2009 are taxed according to engine displacement and national/European emission class, whereas vehicles which were registered after that date are taxed solely based on CO2 emission in grams per km (g CO2/km) France: Since 2006 the tax is levied according to CO2 emissions ranging from 2 euros per gramme to 19 euros per gramme. Belgium: Passenger cars pay a registration fee based on the cylinder content and KW output (degressive towards 2014 (66% in 2012, 33% in 2013, 0% in 2014) and environmental criteria such as CO2 gr/km output (increasingly towards 2014). The more CO2 gr/km the car produces, the higher the fee will be.
A 6	**Objectives of TPM**	Vehicle taxes can significantly determine the composition of the car fleet [2], therefore CO2 based circulation taxes could effectively raise the market share of low-carbon vehicles. IN addition to this: - Providing for a high level of environmental protection in the European Union - Reducing local air pollution emission - Reducing the climate change impacts and improving the fuel efficiency of light-duty road vehicles
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Lower CO2 emission usually imply lower fuel consumption, due to more efficient engines
A 8	**Main source**	[3]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	N		S	N

B 1.1 Summary: -Some impacts expected on slow modes and public transport mileage, due to more expensive private car ownership. Therefore the environmental impacts consider less air pollutants, better air quality, and lower noise. Public bodies income may increase, however the impact can differ if car ownership decreases under a limit..
- Results highly depend on changes in user behaviour. [3]

B 1.2	**Summary: Income groups**	- Car use will become more expensive which is a clear downside for low-income groups (especially those in rural areas, where public transport is not an option).
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage	↘			↗	↗												N		S	N
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main**	- Higher costs of car ownership could lead to decreased vehicle mileage, while slow modes and public transport increases. [3]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗																N		S	N
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↘																N		S	N
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↗		N		S	N
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main**	- Impact depends on the residents behaviour, but in principal, transport costs for car users increase, while public bodies benefit. [3]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)				↗	↗								↗				**N**		**S**	**N**
B 4.2	Safety	↗																**N**		**S**	**N**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main traffic impacts**	- Residents will benefit from decreased air pollutants (meaning residents within urban areas or near motorways). - Health benefits for slow modes and public transport users (less air pollutants). [3]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	**I**		**S**	**N**
B 5.2	Noise emissions													↘			↘	**I**		**S**	**N**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**I**		**S**	**N**
B 5.6	Renewable or non-renewable resources																↘	**I**		**S**	**N**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	- GHG emission can be reduced significantly. Replacing high-performance cars with low-emission ones reduces fuel consumption. Residents within urban areas and near motorways will benefit most from the reduced air pollutants (maybe noise emissions if more electric vehicles will be used). However, electric vehicles and other chargeable passengers cars will only lead to reduced GHG on a global scale if there are charged with renewable resources (wind, solar, etc.). Otherwise, lifetime emissions will stay the same and GHG sources will be replaced from cars to power plants. [3]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Company car taxation - CO2 based annual vehicle circulation tax (CO2 taxation)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Hill, N. et al (2012): EU Transport GHG: Routes to 2050 II [2] Vance, C., Mehlin, M. (2009): Tax Policy and CO2 Emissions - An Econometric Analysis of the German Automobile Market. Ruhr Economic Papers #89, Feb. 2009 [3] European Commission (2007j): Results of the review of the Community Strategy to reduce CO2 emissions from passenger cars and light-commercial vehicles Impact Assessment. Brussels.

FACT SHEET NO: 13 **CATEGORY: 3.1** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**European TEN-T core network - cross border missing links**
A 3	**Transport policy measure (TPM)**	**Reduction of TEN-T network missing links**
A 4	**Description of TPM**	The Trans-European Transport Networks are a planned set of road, rail, air and water transport networks in Europe. The TEN-T networks are part of a wider system of Trans-European Networks, including a telecommunications network and a proposed energy network. The European Commission adopted the first action plans on trans-European networks in 1990. TEN-T envisages coordinated improvements to primary roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems, providing integrated and intermodal long-distance, high-speed routes. A decision to adopt TEN-T was made by the European Parliament and Council in July 1996. The EU works to promote the networks by a combination of leadership, coordination, issuance of guidelines and funding aspects of development. The TEN-T policy has helped to complete a large number of projects of common interest, interconnecting national networks and overcoming technological barriers across national borders. Amongst the success stories is the high-speed railway line linking Paris, Brussels, Cologne/Frankfurt, Amsterdam and London. It has not only interconnected national networks and marked a breakthrough of a new generation of railway traffic across borders, but it has also provided citizens and business travellers with a competitive travel option within Europe. The wide consultation process, the external expertise, the ex-post assessments conducted and the internal analysis used over the last two years have shown that the European Union does not dispose yet of a complete trans-European infrastructure network, and especially not for rail and inland waterways, where essential parts are still missing and constitute important bottlenecks. The infrastructure network in the EU today is indeed fragmented, both from a geographical and a multi-modal perspective. It is also not sufficiently integrated in the international trade flows that feed the European internal market. Despite important efforts towards improvement, European rail and inland waterway networks are still lacking capacity and efficiency. [2]
A 5	**Implementation examples**	- Construction of the trans-European transport network (TEN-T)- Facilitating the implementation of certain multi-country rail projects - Accelerated implementation of priority TEN (financed by fuel tax or by SMCP tolls) - Fast TEN-T implementation funded by additional fuel tax revenues - TEN-T and the Marco Polo programme
A 6	**Objectives of TPM**	- Reduction of GHG emissions - Drastic decrease in the oil dependency ratio - Limit the growth of congestion The overall aim of the TPM is to provide by 2030 for the establishment of a complete and integrated TEN-T that would maximise the value added for Europe of the network. This optimal network would cover and link all EU Member States in an intermodal and interoperable manner. This network would also provide links to neighbouring and third countries, as well as all transport modes and systems that would support the move towards a competitive and resource-efficient transport system by 2050. This aim is consistent with the 'Inclusion Growth' initiative of Europe 2020, the Single Market Act and with the general goal of the TEN-T policy; to improve the competitiveness of the EU economy as a whole, to support the completion of the internal market, and to contribute to a balanced territorial development of the Union. [2]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Significant improvement in choice of transport mode due to complete, competitive networks for all modes (rail, iww, road)
A 7.2	Origin and/or destination of trip:	No impact
A 7.3	Trip frequency:	No impact.
A 7.4	Choice of route:	Traffic attracted on the network
A 7.5	Timing (day, hour):	No impact
A 7.6	Occupancy rate / Loading factor:	No impact
A 7.7	Energy efficiency / Energy usage:	Significant improvement of energy efficiency and usage due to smart administrative processes and complete network
A 8	**Main source**	

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1 Summary:
- Effects of the TPM is very similar to reducing bottlenecks. In fact cross border missing links are bottlenecks located at borders which makes the situation a bit more complicated.
- Overall effect is seamless traffic flow for all modes, therefore reduced transport times and costs, reduced risk of congestion, increased comfort.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	↘				↘	↘	↘									I	N	S	I
B 2.2	Risk of congestion	↘	↘				↘	↘	↘									I	N	S	I
B 2.3	Vehicle mileage	↗	↗				↗	↗	↗												
B 2.4	Service and comfort	↗	↗				↗	↗	↗									I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	-Eliminating cross border missing links will provide seamless traffic flows (both for passenger and freight) on the TEN-T network, the result will be reduced transport times, decreased vehicle mileage, risk of congestion and better service. [3]
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↘	↘	↘									I	N	S	I
B 3.2	Private income / commercial turn over														↗			I	N	S	I
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↗	↗				↗	↗	↗									I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations	↗	↗				↗	↗	↗									I	N	S	I

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The measures support regional development and economic growth as well as sectoral competitiveness for rail, iwiw, and road sector as well, see description and traffic impacts. Due to reduced congestion and time savings, transport costs decrease significantly. Also provides better accessibility to third countries (like Hungary used to be, now Croatia). [4]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	↗	↗				↗	↗	↗									I	N	S	I
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗	↗	↗			I	N	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The measure definitely improves the accessibility to services, especially for freight companies, and supports employment along the corridor, because industrial or commercial investors tend to settle at well accessible networks. [4]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	I	N	S	I
B 5.2	Noise emissions													↘			↘	I	N	S	I
B 5.3	Visual quality of the landscape																↘	I	N	S	I
B 5.4	Land use																↗	I	N	S	I
B 5.5	Climate																↘	I	N	S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The measure is reducing GHG emissions and noise emissions, while the reduction of carbon dioxide emission makes it possible to realize significant improvement in climate change effects.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Construction of the trans-European transport network (TEN-T) - Facilitating the implementation of certain multi-country rail projects
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Emory's (2007): Ex ante evaluation of the TEN-T Multi Annual Programme 2007-2013, Framework Contract for Ex-ante evaluations and Impact Assessments (TREN/A1/46-2005) FINAL REPORT- 2. [2] European Commission (2011m): SUMMARY OF THE IMPACT ASSESSMENT Accompanying document to the WHITE PAPER Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system SEC(2011) 358 final, SEC(2011) 391 final, COM(2011) 144 final [3] European Commission (2011h): Impact Assessment, Accompanying the document Proposal for a regulation of the European Parliament and of the council on Union Guidelines for the development of the Trans-European Transport Network COM(2011) 650 final, SEC(2011) 1213 final [4] European Investment Bank (2006): Evaluation of Cross-border TEN Projects, European Investment Bank.

FACT SHEET NO: 14 **CATEGORY: 3.2** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**European TEN-T core network - key bottlenecks (freight and passenger)**
A 3	**Transport policy measure (TPM)**	**Eliminating TEN-T network bottlenecks**
A 4	**Description of TPM**	The Trans-European Transport Networks are a planned set of road, rail, air and water transport networks in Europe. The TEN-T networks are part of a wider system of Trans-European Networks, including a telecommunications network and a proposed energy network. The European Commission adopted the first action plans on trans-European networks in 1990. TEN-T envisages coordinated improvements to primary roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems, providing integrated and intermodal long-distance, high-speed routes. A decision to adopt TEN-T was made by the European Parliament and Council in July 1996. The EU works to promote the networks by a combination of leadership, coordination, issuance of guidelines and funding aspects of development. The TEN-T policy has helped to complete a large number of projects of common interest, interconnecting national networks and overcoming technological barriers across national borders. Amongst the success stories is the high-speed railway line linking Paris, Brussels, Cologne/Frankfurt, Amsterdam and London. It has not only interconnected national networks and marked a breakthrough of a new generation of railway traffic across borders, but it has also provided citizens and business travellers with a competitive travel option within Europe. The wide consultation process, the external expertise, the ex-post assessments conducted and the internal analysis used over the last two years have shown that the European Union does not dispose yet of a complete trans-European infrastructure network, and especially not for rail and inland waterways, where essential parts are still missing and constitute important bottlenecks. The infrastructure network in the EU today is indeed fragmented, both from a geographical and a multi-modal perspective. It is also not sufficiently integrated in the international trade flows that feed the European internal market. Despite important efforts towards improvement, European rail and inland waterway networks are still lacking capacity and efficiency. [2]
A 5	**Implementation examples**	- High capacity railway route through the Pyrenees for freight - East-European high speed train/combined transport Paris-Stuttgart-Vienna - Improvement of the navigability of the Danube between Straubing and Vilshofen - Verona-Naples rail link, including the Bologna-Milan branch
A 6	**Objectives of TPM**	- Reduction of GHG emissions - Drastic decrease in the oil dependency ratio - Limit the growth of congestion The overall aim of the TPM is to provide by 2030 for the establishment of a complete and integrated TEN-T that would maximise the value added for Europe of the network. This optimal network would cover and link all EU Member States in an intermodal and interoperable manner. This network would also provide links to neighbouring and third countries, as well as all transport modes and systems that would support the move towards a competitive and resource-efficient transport system by 2050. This aim is consistent with the 'Inclusion Growth' initiative of Europe 2020, the Single Market Act and with the general goal of the TEN-T policy; to improve the competitiveness of the EU economy as a whole, to support the completion of the internal market, and to contribute to a balanced territorial development of the Union. [2]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Significant improvement in choice of transport mode due to complete, competitive networks for all modes (rail, iww, road)
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	The network of TEN-T corridors will become more attractive.
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Significant improvement of energy efficiency and usage due to smart administrative processes and complete network
A 8	**Main source**	

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

- The measure provides barrier free transport for road, rail and iww. Due to this, transport costs and time reduces, as well as risk of congestion.
- Environmental and social impacts are limited, but positive terms for both is an evidence.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	↘				↘	↘	↘									I	N	S	I
B 2.2	Risk of congestion	↘	↘				↘	↘	↘												
B 2.3	Vehicle mileage	↗	↗				↗	↗	↗									I	N	S	I
B 2.4	Service and comfort	↗	↗				↗	↗	↗									I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Eliminating bottlenecks on the TEN-T network will provide seamless traffic flows (both for passenger and freight), the result will be reduced transport times, decreased risk of congestion and better service. In addition due to better conditions, vehicle mileage increases [3]
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																	**Geographical level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**		1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↘	↘	↘										I	N	S	I
B 3.2	Private income / commercial turn over														↗				I	N	S	I
B 3.3	Revenues in the transport sector																					
B 3.4	Sectoral competitiveness	↗	↗				↗	↗	↗										I	N	S	I
B 3.5	Spatial competitiveness																					
B 3.6	Housing expenditures																					
B 3.7	Insurance costs																					
B 3.8	Health service costs																					
B 3.9	Public authorities & adm. burdens on businesses															↘			I	N	S	I
B 3.10	Public income (e.g.: taxes, charges)																					
B 3.11	Third countries and international relations	↗	↗				↗	↗	↗										I	N	S	I

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The measures support regional development and economic growth as well as sectoral competitiveness (due to making better conditions for all modes). - Due to reduced congestion and time savings, transport costs decrease significantly. - Also provides better accessibility to third countries (like Croatia). - Smoother traffic flow on international corridors reduced the administrative burdens for border crossing traffic [4]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographical level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**		1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																					
B 4.2	Safety																					
B 4.3	Crime, terrorism and security																					
B 4.4	Accessibility of transport systems	↗	↗				↗	↗	↗													
B 4.5	Social inclusion, equality & opportunities																		I	N	S	I
B 4.6	Standards and rights (related to job quality)																					
B 4.7	Employment and labour markets												↗	↗	↗				I	N	S	I
B 4.8	Cultural heritage / culture																					

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The measure definitely improves the accessibility to services, especially for freight companies, and supports employment along the corridor. [4] The reason for this is that a smart flow network attracts industrial or commercial companies.
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographical level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**		1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘		I	N	S	I
B 5.2	Noise emissions																↘		I	N	S	I
B 5.3	Visual quality of the landscape																					
B 5.4	Land use																↗		I	N	S	I
B 5.5	Climate																↘		I	N	S	I
B 5.6	Renewable or non-renewable resources																					

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The measure is aiming at reducing GHG emission and noise level, while the reduction of carbon dioxide emission makes possible to realize significant improvement in climate change effects. Emissions will mainly decrease along busy / congested motorways or railway lines. This means that the environmental impact will decrease for residents near motorways or railway lines which currently are indicated as bottlenecks[2]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- High capacity railway route through the Pyrenees for freight - Improvement of the navigability of the Danube between Straubing and Vilshofen - East-European high speed train/combined transport Paris-Stuttgart-Vienna
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Emory's Research & Consulting (2007): Ex ante evaluation of the TEN-T Multi Annual Programme 2007-2013, Framework Contract for Ex-ante evaluations and Impact Assessments (TREN/A1/46-2005) FINAL REPORT-2. [2] European Commission (2011c): SUMMARY OF THE IMPACT ASSESSMENT Accompanying document to the WHITE PAPER Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system SEC(2011) 358 final, SEC(2011) 391 final, COM(2011) 144 final. [3] European Commission (2011h): Impact Assessment, Accompanying the document PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Union Guidelines for the development of the Trans-European Transport Network {COM(2011) 650 final}, {SEC(2011) 1213 final}. [4] European Investment Bank (2006): Evaluation of Cross-border TEN Projects.

FACT SHEET NO: 15 **CATEGORY: 3.3** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**European TEN-T core network - multimodal freight corridor structures**
A 3	**Transport policy measure (TPM)**	**Railway infrastructure improvement towards multimodal freight (combined transport)**
A 4	**Description of TPM**	The Trans-European Transport Networks are a planned set of road, rail, air and water transport networks in Europe. The TEN-T networks are part of a wider system of Trans-European Networks, including a telecommunications network and a proposed energy network. The European Commission adopted the first action plans on trans-European networks in 1990. TEN-T envisages coordinated improvements to primary roads, railways, inland waterways, airports, seaports, inland ports and traffic management systems, providing integrated and intermodal long-distance, high-speed routes. A decision to adopt TEN-T was made by the European Parliament and Council in July 1996. The EU works to promote the networks by a combination of leadership, coordination, issuance of guidelines and funding aspects of development. The infrastructure network in the EU today is indeed fragmented, both from a geographical and a multi-modal perspective. It is also not sufficiently integrated in the international trade flows that feed the European internal market. Despite important efforts towards improvement, European rail and inland waterway networks are still lacking capacity and efficiency. Within the framework of the promotion of the environmental friendly modes, the European Commission has launched a number of research projects aiming at evaluating technical and organisational innovations that can improve the performance of the freight transport operations in the rail sector. Creation of a European intermodal transport network is a high-priority objective of the European Community and one to which the European Commission has dedicated studies, specific legislation and very considerable funds. Freight rail improvements include strategies that make infrastructure more efficient and encourage freight to move by rail. These include: - Freight rail relocation or infrastructure improvements □ Intermodal transportation centres □ Rail crossing detection and warning Investment in freight rail relocation/ improvements or the construction of new intermodal centres can consolidate freight movement to rail corridors while removing some long-distance truck traffic from congested corridors.
A 5	**Implementation examples**	- V0, the southern freight railway link, Budapest - Freight rail line between Antwerp in Belgium to Ruhrgebiet and Chongqing, China
A 6	**Objectives of TPM**	- Fighting climate change - Reduce emissions - Increase efficiency and safety through stimulate the mode shift from road - Strengthening multimodality
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Influences mode choice, by becoming rail transport smoother.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Significant improvement of energy efficiency and usage due to increased use of rail. [4]
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

-Traffic impact include moving to multimodality, therefore improved performance of rail transport, increase of mileage, service and comfort, and reduction of transport times.
- In economical terms this means lower transport costs, and stronger sectoral competitiveness.
- Limited social impacts affect accessibility and employment.
- Environmentally, naturally the improvement of the volume transported on an efficient mode (in this case rail), helps fighting climate change, and means reduced air and noise pollution.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	↘				↘	↘										I	N	S	I
B 2.2	Risk of congestion	↘	↘				↘	↘										I	N	S	I
B 2.3	Vehicle mileage		↗					↗										I	N	S	I
B 2.4	Service and comfort	↗	↗				↗	↗										I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Freight railway infrastructure improvement will provide seamless flows for goods on the European network, the result will be reduced transport times, decreased risk of congestion and better service. Rail transport performance growth ends in increased vehicle mileage on tracks. [3]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						→	↘										I	N	S	I
B 3.2	Private income / commercial turn over														↗			I	N	S	I
B 3.3	Revenues in the transport sector							↗													
B 3.4	Sectoral competitiveness	→	↗				→	↗										I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations	↗	↗				↗	↗										I	N	S	I

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The measures support regional development and economic growth. Due to reduced congestion and time savings, transport costs decrease significantly. Also provides better accessibility to third countries. [4]
B 3.V	**Quantification of impacts**	

B 4 SOCIAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	→	↗				→	↗										I	N	S	I
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗	↗	↗			I	N	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main**	- The measure definitely improves the accessibility to services, especially for freight companies, and supports employment along the corridor. [4]
B 4.V	**Quantification of impacts**	

B 5 ENVIRONMENTAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	I	N	S	I
B 5.2	Noise emissions																↘	I	N	S	I
B 5.3	Visual quality of the landscape																↘	I	N	S	I
B 5.4	Land use																↗	I	N	S	I
B 5.5	Climate																↘	I	N	S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The measure is aiming at reducing GHG emission and noise level, while the reduction of carbon dioxide emission makes possible to realize significant improvement in climate change effects.[2] [3] [4]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Construction of the trans-European transport network (TEN-T)- Facilitating the implementation of certain multi-country rail projects
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] EEcorys Research & Consulting (2007): Ex ante evaluation of the TEN-T Multi Annual Programme 2007-2013, Framework Contract for Ex-ante evaluations and Impact Assessments (TREN/A1/46-2005) FINAL REPORT-2. [2] European Commission (2011c): SUMMARY OF THE IMPACT ASSESSMENT Accompanying document to the WHITE PAPER Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system SEC(2011) 358 final, SEC(2011) 391 final, COM(2011) 144 final [3] European Commission (2011h): Impact Assessment, Accompanying the document PROPOSAL FOR A REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Union Guidelines for the development of the Trans-European Transport Network {COM(2011) 650 final}, {SEC(2011) 1213 final}. [4] European Investment Bank (2006): Evaluation of Cross-border TEN Projects [5] European Court of Auditors (2010): Improving transport performance on trans-European rail axes, Issn 1831-0834 **National** [6] Cambridge Systematics Inc (2006): National Rail Freight Infrastructure Capacity and Investment Study.

FACT SHEET NO: 16 **CATEGORY: 3.4** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**EU transport infrastructure in view of energy efficiency needs and climate change challenges**
A 3	**Transport policy measure (TPM)**	**Support of "On shore Power Supply" (OPS) in ports**
A 4	**Description of TPM**	Ships generate a significant amount of air pollutants when they are travelling, but also when they are at berth in a port. When berthed, ships require power to support activities like loading / unloading, heating/cooling, lighting and other on board activities. Nowadays, this power is generally produced by auxiliary engines (mainly diesel generators on board) that produce severe amounts of carbon dioxide (CO2), air pollutants and noise nuisance [1] [7]. As an alternative to current on board power generation (mostly by diesel engines), vessels can be linked up to an onshore power supply, i.e. connected to the local electricity grid. This way, ships' operations at berth can proceed uninterrupted and negative effects can be reduced significantly. Currently, most ports are neither equipped with OPS to supply vessels with electricity from the dockside, nor are vessels equipped to receive power from OPS systems [7].
A 5	**Implementation examples**	- There are several ports already using OPS, mainly in Europe (i.e.. Antwerp, Goteborg, Stockholm, Oulu, Lübeck), but also in Canada (Vancouver) and the U.S. (i.e.. Los Angeles, Long Beach, Seattle). A full list is available at www.wpci.com - The "Environmental Ship Index" (ESI) is a voluntary system designed to improve the environmental performance of sea going vessels. It offers an instrument to visualize the environmental performance of ships regarding air pollutants and CO2 [3]. - "On Shore Power Supply - an integrated North Sea network" (Part of Priority Project 21). The project objective is to establish OPS at three freight ferry terminals for three kind of freight ferries (ro-ro vessels) that frequently call the terminals [5]. - In 2005 the European Commission decided to restrain sulphur levels in fuel used by ships at berth (Directive 2005/33/EC) to 0,1 % (sulphur limits of the fuels used by ships operating in European sea areas are 1.5%). This Directive should be seen as the first step in an ongoing process to reduce marine emissions [6].
A 6	**Objectives of TPM**	Main objective of OPS is to reduce the environmental impact of seagoing vessels in ports and increase well-being of workers and residents near ports.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No key changes
A 7.2	Origin and/or destination of trip:	Ports with a OPS will have an advantage compared to those who have not. Vessels and maritime transport operators which adjusted their ships to link to OPS will prefer ports with OPS, although existing transport patterns are not likely to change due to OPS.
A 7.3	Trip frequency:	No key changes
A 7.4	Choice of route:	No key changes , although changes in origin / destination can influence the choice of routes.
A 7.5	Timing (day, hour):	Electricity is less expensive at night, so ships can change some activities from daytime to night. Still, travel times and most activities will not change because of working hours of harbour employees.
A 7.6	Occupancy rate / Loading factor:	No key changes
A 7.7	Energy efficiency / Energy usage:	Energy efficiency usage will depend on the energy source being used for OPS. Renewable energy is able to eliminate air pollutants and greenhouse gas emissions almost completely, but when energy is being used from coal power plants OPS will emissions from ports to power plants.
A 8	**Main source**	[1] [7]

B IMPACTS

B 1	OVERVIEW ON IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	L	N	S	I/N

- Although the facts will point out the high implementation costs (and minor possible savings during operation) for maritime transport operators, there are already several maritime operators investing in OPS systems. Main reason for this encouragement under maritime transport operators are the environmental benefits and the improved working conditions. [7]
- The fostering of shore-side electricity supply will strengthen cooperation between ports because these are encouraged to exchange best practices concerning shore-side electricity supply. [1]
- The environmental impacts will largely depend on the energy source being used for OPS. Renewable sources (wind, solar, water, etc.) will decrease air pollutants significantly, but energy used from e.g. coal power plants will only re-locate air pollutants from ports to power plants.
- Public bodies (when stakeholder or owner of ports) or ports will have to invest in OPS systems. These costs increase significantly when an electricity converter is needed. [10]
- No traffic impact are expected as OPS clearly focuses on ships at berth.

B 1.2	**Summary: Income groups**	- Residents and port workers will benefit significantly from the reduced noise emissions and air pollutants. [1] [8]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	TRAFFIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time										→							L		S	I
B 2.2	Risk of congestion										→							L		S	I
B 2.3	Vehicle mileage										→							L		S	I
B 2.4	Service and comfort										→							L		S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The use of OPS focuses entirely on vessels at berth, hence not during their journey. Therefore, no traffic impacts can be expected. Even service and comfort will not change significantly as it was not indicated as an argument to use or install OPS in a questionnaire on "current status and future plans regarding Onshore Power Supply 2009" from 53 worldwide ports. Also traffic or travel time arguments are not mentioned as reasons to install OPS. [4]
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs										↗										
B 3.2	Private income / commercial turn over															↗		N	I	S	I
B 3.3	Revenues in the transport sector										↘										
B 3.4	Sectoral competitiveness										↗							L	R	E	
B 3.5	Spatial competitiveness										↗							N	I	S	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		L	N	E	
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- High installation costs of OPS for ports (marked by the red arrow for public bodies!), because ports are sometimes semi-public or at least owned by public shareholders (local and national governments). [1] - Member states will have to offer economic incentives to operators and ports to use shore-side electricity which will lead to higher administrative burdens and higher expenses of local and national authorities. [1] - Electricity supply in Europe generally has a frequency of 50 Hz. A ship designed for 60 Hz electricity can use 50 Hz electricity for some activities, such as domestic lighting and heating. However, it will not be able to use 50 Hz for motor driven activities such as pumps, winches and cranes. Therefore, a ship using 60 Hz electricity will require 50 Hz electricity to be converted to 60 Hz by an quayside electricity converter. The installation of a converter increases the costs during implementation phase considerably. [8] - It has been calculated that a converter will increase the installation costs with about 50 %. [10]
B 3.III	**Operation phase**	- The crucial operating costs for ships concern the costs of fuel. Calculations made on savings of fuel costs of ships show that costs for electricity will replace costs for fuel entirely (depending on ship size and fuel prices). When compared (fuel to electricity), for all ship sizes the operating costs for shore-side electricity are higher than the operating costs with diesel (0.1% Sulphur level) at low fuel prices. An increase of (diesel) fuel prices by 20 to 30% will lead to equal operating costs between shore-side electricity and diesel powered engines. As a consequence, transport costs will rise and revenues will decrease. [8] - Ports will charge ships for using OPS in order to compensate their investments (installation costs / investments), as a consequence transport costs will increase. [1]
B 3.IV	**Summary / comments concerning the main impacts**	- The annualised total OPS system costs depend on three factors: size of ships' engines, installed technology (ship age dependent (retrofitting)) and on electricity and marine fuel costs [1]. - Transport costs will increase and revenues will decline. This will be caused by higher port costs (OPS will be charged by ports in order to compensate their expenses) and in some cases electricity can be more expensive compared to diesel (depends on the three above mentioned factors). [1] [7] [8] - Spatial competitiveness will increase between ports providing and not providing ODS systems. The main reasons for ports to invest in OPS is image (I) and reputation/goodwill (II). By installing OPS, ports hope to increase their attractiveness (III) in comparison to other ports [4]. - Public bodies will have to invest in power grids to deliver the needed power to ports (in some cases power grids are already nearly overloaded). 3 level impact: - Competitiveness between ports increases. Selected ports (those installing OPS) will become more expensive which will increase the attractiveness of nearby ports without OPS. - Some power grids near ports will have to be extended in order to handle the additional demand for electricity. This will lead to more costs for public bodies which means that they will not be able to invest in other parts of the power grid (or in general will have to cut expenses on other measures).
B 3.V	**Quantification of impacts**	- The programme Clean Air for Europe (CAFE) examined that reducing ship emissions is increasingly cost-effective compared to further measures in other sectors. The annual monetised benefits of reducing air pollutants at 500 berths are estimated between EUR 103 and 284 million (assuming 0,1 % sulphur fuel is being used). [1] There are two types of costs for instalment of OPS: quayside and shipside investments. **1. Quayside investments** have been studied for several times with results between US $ 300,000 to 4 million investment costs per berth, depending on port location, power demand, voltage and frequency and vessel type. A feasibility study for the Port of Rotterdam calculated € 4 million per berth, while at the Port of Gothenburg the figure was only a fraction of this (€ 255,000 for 2 berths), because of the already available high-voltage power supply, the lack of a need for a frequency converter and the limited power requirements of RoRo vessels. The Port of Long Beach estimated costs per berth vary significantly, depending on power requirements and berth location, ranging from US $ 1 to 4 million. Studies by the Port of Amsterdam and by the European Commission indicate that investments for cruise ships are likely to be around € 6 million per berth.[7] **2. Shipside investments** can range from US $ 300,000 to 1-2 million, depending on vessel type and size and the need for an on-board transformer. Furthermore, retrofitting will be far more expensive compared to instalment in new ships. [7]

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)										↗		↗	↑			↗	**L**	**N**	**S**	**I**
B 4.2	Safety										↘		↘					**L**		**S**	**I**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Despite the high costs, some shipowners already partly invested in OPS technology. These include NYK Line, Evergreen, Princess Cruise and Holland America Line, China Shipping, Evergreen, MOL, Stena Line, Wagenborg, TransAtlantic, SOL, TransLumni, ICL, and Cobelfret. Main reasons are the benefits for the environment and the improved working conditions for workers at ports and ships. [7] - Well-being of workers in ports or at ships at berth will increase because of reduced air pollutants and noise emissions. [1] [4] - Safety has to be considered when port workers have to work with high voltage cables. [9]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↓			↘	**L**	**N**	**S**	**I**
B 5.2	Noise emissions													↘				**L**		**S**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**N**		**S**	**I**
B 5.6	Renewable or non-renewable resources																↘	**N**		**S**	**I**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- If renewable energy sources are used, OPS can nearly neutralize CO2 and other air pollutants (depends on energy source). Still, this effect will considerably depend on the energy source being used. If electricity being used is produced by coal power plants than the net effect of air pollution will be marginal. [8]. - Mainly residents near harbours will benefit from reduced air pollutants and noise emissions (Ship noise and vibration can come from several sources, including auxiliary engine exhausts, engine room, etc.). [1] [7] [8]
B 5.V	**Quantification of impacts**	Estimated reductions (per vessel) in local emissions calculated on the basis of the average EU-25 production mix are [8]: - NOx will decrease with 97% - SO2 will stay the same 0% - PM will decrease with 89% - VOC will decrease with 94%. [8] - CO2 will decrease with 13% [11]

C REFERENCES

C 1	**Other TPMs of this subcategory**	Green transport corridors
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2006d): Commission recommendation on the promotion of shore-side electricity for use by ships at berth in Community ports (2006/339/EC), Brussels: Official Journal of the European Union [3] World Ports Climate Initiative (2009): Environmental Ship Index - An instrument to measure a ships air emission performance. [4] Dutt, S. (2009): Results from the questionnaire on current status and future plans regarding Onshore Power Supply 2009, Port of Gothenburg: World Ports Climate Initiative [5] European Commission (2011p): On Shore Power Supply - an integrated North Sea network, 2011-EU-21002-P, Part of Priority Project 21, Brussels: T-TEN Executive Agency [6] European Commission (2005b): Regards the sulphur content of marine fuels, Directive 2005/33/EC, Brussels: Official Journal of the European Union [7] World Ports Climate Initiative (2012): Onshore power supply, available at www.wpci.iaphworldports.org [8] European Commission (2005c): Service Contract on Ship Emissions: Assignment, Abatement and Market-based Instruments, Task 2a: Shore-Side Electricity, Entec UK Limited [9] World Ports Climate Initiative (2008): Guidance document – Onshore Power Supply, C40 World ports climate conference Rotterdam 2008 [11] Schade W. et. al. (2011): Bottom-up quantifications of selected measures to reduce GHG emissions of transport for the time horizons 2020 and 2050: Cost assessment of GHG mitigation measures of transport. Deliverable D3.1 of GHG-TransPoRD. Project cofunded by European Commission 7th RTD Programme. Fraunhofer-ISI, Karlsruhe, Germany. **National** [2] Roels, P. (2009): Onshore Power Systems (OPS) - SIHARBOR / SIPLINK, Brussels: Siemens NV, Energy Transmission and Distribution [10] Ericsson, P., Fazlagic, I. (2008): Shore-side power supply: A feasibility study and a technical solution for an on-shore electrical infrastructure to supply vessels with electricity while in port, Göteborg: Chalmers University of Technology, Department of Energy and Environment

FACT SHEET NO: 17 **CATEGORY: 3.4** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**EU transport infrastructure in view of energy efficiency needs and climate change challenges**
A 3	**Transport policy measure (TPM)**	**Green transport corridors**
A 4	**Description of TPM**	The concept of transport corridors is marked by a concentration of freight traffic between major hubs and by relatively long distances of transport. Along these corridors industry will be encouraged to rely on co-modality and on advanced technology in order to accommodate rising traffic volumes while promoting environmental sustainability and energy efficiency. Green transport corridors will reflect an integrated transport concept where short sea shipping, rail, inland waterways and road complement each other to enable the choice of environmentally friendly transport. They will be equipped with adequate transhipment facilities at strategic locations (such as seaports, inland ports, marshalling yards and other relevant logistics terminals and installations) and with supply points initially for biofuels and, later, for other forms of green propulsion. Green corridors could be used to experiment with environmentally-friendly, innovative transport units, and with advanced ITS applications. [1]
A 5	**Implementation examples**	- NAIADES programme for inland waterway transport - Motorways of the Sea - Freight-oriented rail network - TEN-T and the Marco Polo programme
A 6	**Objectives of TPM**	- Support energy efficiency and sustainability. - Reduction of carbon dioxide emission. - Mobilise unexploited logistic reserves. - Efficient use of transport infrastructure. - Better integration of transport modes. [1] [3]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Significant improvement in multimodality, more emphasis on rail and iww freight transport
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Possible impact on route choice (freight) through logistic centres, concentrated flows.
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	Increase in efficiency of loading units.
A 7.7	Energy efficiency / Energy usage:	Significant improvement of energy efficiency and usage.
A 8	**Main source**	

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	- The primary impact is that the traffic flows change to environmental friendly modes like train and iww. Therefore positive environmental impacts are definite. Besides road transport also benefit due to less congestion (less traffic) and seamless flows.
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						↘	↘	↘									I	N	S	I
B 2.2	Risk of congestion	↘					↘	↘	↘												
B 2.3	Vehicle mileage						↘	↗	↗									I	N	S	I
B 2.4	Service and comfort							↗	↗									I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- 'The green corridors will reduce road freight transport volumes while increase rail and iww performances. This leads to a more efficient, reliable and, cost-efficient freight transport system. These effects also result in a reduced risk of congestion for passengers on road.[1]
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↘	↘	↘									I	N	S	I
B 3.2	Private income / commercial turn over												↗		↗						
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness						↘	↗	↗									I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																	I	N	S	I
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The measures grouped under the heading "Sustainable quality and efficiency" should positively impact logistics cost components by improving logistics training, allowing shippers to apply quality criteria in the selection of transport operators and helping transhipment platforms improve their performance and efficiency by comparing themselves with other such operators. - Simplification of logistics chains will bring major savings due to a reduction in the administrative burden and a mitigation of the costs incurred through legal uncertainty as regards liability in multi-modal transport chains. - The impacts of vehicles dimensions need to be studied closely before conclusions are drawn on their economic repercussions. As regards the definition of standards for intermodal freight transport units, it can be assumed that they will render loading, unloading and transhipment of freight less costly and improve terminal productivity. Furthermore, they will reduce transport costs by substantially improving loading factors over ISO-containers and certain swap bodies. [1]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 4.1	Health (incl. well-being)												↗				↗	I	N	S	I
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems						↗	↗	↗												
B 4.5	Social inclusion, equality & opportunities												↗					I	N	S	I
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗					I	N	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The measure will improve training levels and create new career perspectives for logistic employees. The introduction of new technologies, particularly in the field of IT will increase the logistics sector's need for specialists and add value to the competencies of staff. - Accessibility of transport systems will increase (to hubs, logistic centres etc.), while employees in transport regarding health, employment and opportunities will benefit. [1]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 5.1	Air pollutants													↘			↘	I	N	S	I
B 5.2	Noise emissions													↘			↘	I	N	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘				
B 5.6	Renewable or non-renewable resources																↘				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The action will help address the CO2 emission, greenhouse effect, noise, and several related issues by helping to reduce unnecessary transport activity, improving the integration of transport modes and the attractiveness of those which are more environmentally friendly and by facilitating the consideration of qualitative criteria – including environmental impacts – in customer choice. The notion of "green transport" and the priority area urban transport will help apply new, environmentally friendly technologies to where their impact will be greatest. - Residents near motorways will benefit from improved integration of transport modes (which will to less road freight transport, and thus less emissions near motorways). Moreover, terminals, ports and stations are needed to accommodate these multimodal transportation (increased land use). - Climate change will decrease (greener and more sustainable transport) and the need for non-renewable sources will decline.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	Support of "On shore Power Supply" (OPS) in ports
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2007): Summary of the Impact Assessment of an Action Plan for Freight Transport Logistics, Brussels. [2] Freight Transport Logistics Action Plan {SEC(2007) 1320} {SEC(2007) 1321} [3] Freight Transport Logistics Action Plan IMPACT ASSESSMENT {COM(2007) 607 final} {SEC(2007) 1321}

FACT SHEET NO: 18 **CATEGORY: 3.6** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**Capacity and quality of transport systems**
A 3	**Transport policy measure (TPM)**	**Bus priority lane**
A 4	**Description of TPM**	Problem definition: Congested roads badly affect public transport services especially buses. During peak hours thousands of passengers travelling by bus get stuck in traffic jams. Priority lanes for buses prioritize buses when they are stuck in traffic. The measure includes segregation, traffic management, traffic signal control and bus stop improvements. Moreover an innovative bus system operates with a reliability of trams in congested areas, and the flexibility of buses, where it is needed. - Dedicated or segregated lanes for buses - Priority for buses at intersections (traffic light management) - High quality buses and stops - Additional corridor improvements, accompanying the bus service [2,3]
A 5	**Implementation examples**	Example UK: - Bus Priority Measures 'Greenways' Edinburgh Example France: - Bus way system, Lorient and Nantes Example Hungary - Bus Priority Scheme, Budapest
A 6	**Objectives of TPM**	- Facilitating the provision of a faster, more frequent and more reliable bus service - Creating better conditions for cyclists - to reduce travel times for public transport - to improve public perceptions of the quality of the public transport service - to increase public transport usage - Improving crossing facilities for pedestrians, including disabled people and people with reduced mobility providing adequate loading and parking facilities for businesses - Improving safety for all classes of road users including pedestrians [2,3]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Improving public transport service and worsening traffic conditions for car traffic may influence car drivers to choose public transport instead.
A 7.2	Origin and/or destination of trip:	The measure basically does not influence the origin and destination of the trips however an advanced system may cause limited (or stronger) influence on trip choice. (Destinations along prioritized corridors will become more attractive and other areas (far away from these corridors) will be negatively influenced.)
A 7.3	Trip frequency:	The measure does not influence trip frequency.
A 7.4	Choice of route:	Car drivers often choose alternative route to avoid the bus corridors, and public transport will switch to priority lanes
A 7.5	Timing (day, hour):	One main advantage of the system is the ability to ignore peak-hour congestion. Therefore high level of service can be offered during the whole day.
A 7.6	Occupancy rate / Loading factor:	Often high capacity buses are used, with higher occupancy than conventional bus services.
A 7.7	Energy efficiency / Energy usage:	In most of the cases clean engine buses are used, which influence the energy efficiency significantly.
A 8	**Main source**	[1]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	L		S	L
		- Public transport bus services becomes more reliable. - Transport time will significantly decrease, passenger satisfaction and accessibility to public transport increases. Private cars may benefit from the measure, due to reduced space on road. - The measure positively affects society and residence, due to less noise, and pollutants.																			
B 1.2	**Summary: Income groups**																				
B 1.3	**Summary: Age groups**																				
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↗			↓													L		S	L
B 2.2	Risk of congestion	↗			↓													L		S	L
B 2.3	Vehicle mileage	↗																L		S	L
B 2.4	Service and comfort				↑													L		S	L
B 2.I	**Overall impacts on social groups**																				
B 2.II	**Implementation phase**	- Inconveniences during implementation phase, due to traffic restrictions.																			
B 2.III	**Operation phase**	- Benefits are definitely delivered as soon as the system starts operating																			
B 2.IV	**Summary / comments concerning the main impacts**	- Bus service becomes more reliable, travel speed increases, travel time reduces, delays become unlikely, while private car traffic may be affected badly due to possible reduced numbers of lanes. [2]																			
B 2.V	**Quantification of impacts**																				

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	➚										➔						L		S	L
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector											➚						L		S	L
B 3.4	Sectoral competitiveness											➚						L		S	L
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Implementation costs depends on the volume and complexity of the system. A totally segregated (tram-like) system may cost very high, but generally it is a cheap and cost effective solution.
B 3.III	**Operation phase**	- Operation is similar to a conventional bus service, while cheaper than a tram system.
B 3.IV	**Summary / comments concerning the main impacts**	- The measure offers the benefits of a tram-like system. Reliability on congested reads, and flexibility where needed, while the costs are definitely lower, about one third, comparing to a tramline. [2]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety				➚	➚						➚		➚				L		S	L
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems				➚																
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												➚								
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Reduction of car traffic along the corridor improves the safety of all the social groups (road users / traffic participants). - Accessibility of public transport (bus services) improves due to new bus lanes and more bus services will ask for more bus drivers which increases employment. [3],[4]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													➘			➘	L		S	L
B 5.2	Noise emissions													➘			➘	L		S	L
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																➘				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Reduction of air pollutants and noise emissions along bus lanes (which used to be open for traffic and now are only available for buses), due to decrease in car traffic [1].
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] ASSET Assessing Sensitiveness to transport, Analysing Policy Instruments [2]Guidelines for implementers for innovative bus systems **Regional / Local:** [3] Worcestershire County Council (2007): Bus Priority Measures Best Practice Report [4] City of Worcester IMPLEMENTATION SCENARIO for Key Corridor of Improvement Schemes, incorporating the BHLS (Buses with a High Level of Service) Concept

FACT SHEET NO: 19 **CATEGORY: 3.7** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**Intelligent Transport System (ITS)**
A 3	**Transport policy measure (TPM)**	**Deployment of roadside-based ITS infrastructure for information services (provision of warnings and dynamic speed harmonisation)**
A 4	**Description of TPM**	The increasing demand for mobility (both people and goods), the environmental problems and road safety require a high performance road transport system where drivers, vehicles and infrastructure are integrated into one reliable, efficient and smart transport system. These objectives can be realised by services and systems supported by an integrated approach of intelligent vehicles and intelligent infrastructure supporting the driver. These intelligent systems and the interaction between vehicles and roadside are today enabled by advanced information and communication technologies. These services/systems are dealing with: - Up-to-date traffic information, traffic management, congestion reduction, improved mobility - Increased road safety and security, - Reduction of environmental problems, - Development of sustainability. The intelligent infrastructure is the key component in the support, management and interaction between the drivers/vehicles and the network operator. [1] [2] [4]
A 5	**Implementation examples**	- SMART highway R&D project, launched in 2008, Korea - Harbin, China: autonomous road side infrastructure based system
A 6	**Objectives of TPM**	- Reduce congestion - Avoid accidents - Increase road safety and security - Reduce environmental problems [2] [4]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Increase in energy efficiency due to traffic management and increased free flow of road vehicles.
A 8	**Main source**	[1] [4]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

AFFECTED SEGMENTS: Passengers (Road, Rail, Air, Public transport, Slow modes); Transport operators (Road, Rail, IWW, Air, Maritime, Public transport); Employees in transport; Residents; Economy; Public bodies; Society. Geographical level (1st level, 2nd level); Source (Source of assessment, Spatial level of source).

		P: Road	P: Rail	P: Air	P: Public transport	P: Slow modes	TO: Road	TO: Rail	TO: IWW	TO: Air	TO: Maritime	TO: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

-Primary traffic impacts of the measure are reduced transport time and significantly reduced risk of congestion on the road both for passenger and transport operator. Therefore transport, health service and insurance costs also decrease due to higher safety level. Besides the measure means a definite cost for public bodies at the implementation and also continuously at operational phase.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		P: Road	P: Rail	P: Air	P: Public transport	P: Slow modes	TO: Road	TO: Rail	TO: IWW	TO: Air	TO: Maritime	TO: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘					↘											N	I	S	I
B 2.2	Risk of congestion	↓					↓														
B 2.3	Vehicle mileage																	N	I	S	I
B 2.4	Service and comfort	↗					↗											N	I	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	- The works during the implementation may affect traffic badly up to a very limited level.
B 2.III	**Operation phase**	See below
B 2.IV	**Summary / comments concerning the main impacts**	- The measure mainly influences traffic addressing the following elements through the management of traffic: reduction of congestion (also reduction of transport time), avoiding accidents (improvement of safety, improvement of mobility). [4]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		P: Road	P: Rail	P: Air	P: Public transport	P: Slow modes	TO: Road	TO: Rail	TO: IWW	TO: Air	TO: Maritime	TO: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↘					↘											N	I	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↗					↗											N	I	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs	↘																N	I	S	I
B 3.8	Health service costs	↘																N	I	S	I
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↗		N	I	S	I
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Implementation costs for public bodies is an issue.
B 3.III	**Operation phase**	- Operation costs for public bodies should also be considered.
B 3.IV	**Summary / comments concerning the main impacts**	- The measure has very limited economic impacts, however the system definitely reduces transport costs, accident related costs (health and insurance, because of reduction of accidents) and makes road transport much more competitive. [3]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗							
B 4.2	Safety	↗					↗											N	I	S	I
B 4.3	Crime, terrorism and security	↗																N	I	S	I
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The measure has very limited social impacts, but due to reduction of accidents and conflicts, it provides significant positive impacts on the field of safety and security. Increase of well-being for residents in urban areas or near highly polluted roads ([3]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	N	I	S	I
B 5.2	Noise emissions													↘			↘	N	I	S	I
B 5.3	Visual quality of the landscape																↘	N	I	S	I
B 5.4	Land use																				
B 5.5	Climate																↘	N	I	S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Roadside based ITS infrastructure helps traffic avoiding extreme situations, congestions, accidents, and other anomalies. These effects make possible to reduce air pollution, noise emission, and climate change, (especially for residents living nearby) while the built infrastructure affects visual quality badly. [3]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Promotion of intermodality via provision of dedicated information and guidance to hubs
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] OECD (2003): Road Safety - Impact of new technologies. [2] Jinsun Lee, Fred Mannering (2000): Impact of roadside features on the frequency and severity of run-off-roadway accidents: an empirical analysis. [3] Paper: eSafety Forum "Intelligent Infrastructure Working Group" **National** [4] Safer Roads Thanks to ITS, Public Roads May/June 2002 Vol. 65· No. 6 [5] CVIS: AN INTEGRATED COMMUNICATION SYSTEM SOLUTION FOR 'ITS' APPLICATIONS, V. Nebehaj, L. Nagy and P. Lukács [6] Smart Roadside System for Driver Assistance and Safety Warnings: Framework and Applications, Jeong Ah Jang , Hyun Suk Kim and Han Byeog Cho, 2011

FACT SHEET NO: 20 **CATEGORY: 3.7** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Infrastructure**
A 2	**Subcategory**	**Intelligent Transport System (ITS)**
A 3	**Transport policy measure (TPM)**	**Promotion of intermodality via provision of dedicated information and guidance to hubs**
A 4	**Description of TPM**	The policy measure aims to improve traffic management and the interconnection of transport modes, in order to optimise the use of the existing infrastructure and to better balance traffic demand over the networks. Dynamic information and personalised routing support will result in enhanced interaction between individual and collective transport modes, including public transport for passengers, while connections to rail and inland waterways for freight and city logistics are optimised. Road users will benefit from predictable journey times, less congestion and smoother traffic conditions. Dedicated measures include: support for wider deployment of (roadside-based) ITS infrastructure for information services, provision of warnings and dynamic speed harmonisation; the development and roll-out of interoperable road pricing and city access control mechanisms and the promotion of intermodality via provision of dedicated information and guidance to hubs. [1],[2]
A 5	**Implementation examples**	WAYflow project, Frankfurt, Rehin-Main Region, Germany and a couple of national or regional ITS services, which has not the same objective or aim, but operates with very similar function (e.g.. MAESTRO, Hungary)
A 6	**Objectives of TPM**	Main objectives are: - Optimisation of use of infrastructure (more efficient use) - Higher proportion for intermodality in freight and passenger transport [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Improvement in multimodal transport
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Influences route choice through using intermodal hubs
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[1] [2]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

B 1.1	**Summary**	- The most significant impacts are in the field of traffic impacts: the use of intermodal hubs makes transport chain more effective, giving higher proportion for rail and iww, calling intermodality to life. Economic impacts include mainly sectoral competitiveness transport costs and private income for employees in transport sector, however means additional costs in regard of administrative burdens. Social impacts are limited, affects mainly safety and employment. Environmentally, decrease of noise, air pollution, and climate change are mentioned, regarding the sources available.
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time	↘	→		→		↘	→	→									I	N	S	I
B 2.2	Risk of congestion	↘	↗		↗		↘	↗	↗									I	N	S	I
B 2.3	Vehicle mileage	↘	↗		↗		↘	↗	↗									I	N	S	I
B 2.4	Service and comfort	↗	→		→		↗	→	→									I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main traffic impacts**	- Dedicated information inspires transport companies to use intermodal hubs, therefore making the transport chain more effective, and higher proportion of rail and iww, therefore strengthening intermodality [1]. - Passenger transport is also affected by the measure as seen above, but the primary aim is to regulate flows of goods.
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	→																I	N	S	I
B 3.2	Private income / commercial turn over												↗								
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↘	↗		↗		↘	↗	↗									I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		I	N	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main traffic impacts**	- Promoting intermodality helps to make optimal distribution of performance between different transport modes, therefore improve cost efficiency. All affected transport modes can benefit from co-, inter-, and multimodality. [1] [3]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety	↗					↗							↗				I	N	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets				↗			↗	↗									I	N	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main traffic impacts**	- Several studies, consultations and workshops prove that reduced use of passenger vehicles, because of increase attractiveness of intermodal transport, will decrease accidents, therefore improve safety for passengers, workers in the transport sector and residents. [1] [2] [4]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	I	N	S	I
B 5.2	Noise emissions													↘			↘	I	N	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I	N	S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	- Less road vehicle mileage and increased use of more energy efficient modes (rail, iww) results in positive environmental impacts like decrease of air pollution, noise and climate change. [1] [4]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Deployment of roadside-based ITS infrastructure for information services (provision of warnings and dynamic speed harmonisation)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2008c): Impact Assessment: Action Plan for the Deployment of Intelligent Transport Systems in Europe, EC, 2008, [2] ILS NRW (2004): Action Plan for the Deployment of Intelligent Transport Systems in Europe. [3] European Commission (2001): Freight intermodality: Results from the transport research programme, EXTRA project for DG Research. **Regional / Local** [4] Boltze, Manfred (2004):Intermodality and ITS in Frankfurt Rehin-Main.

FACT SHEET NO: 21 **CATEGORY: 4.1** **PERFORMED BY: TRT**

A GENERAL INFORMATION

A 1	**Category**	**Internal markets**
A 2	**Subcategory**	**Internal Market (intramodal) - road**
A 3	**Transport policy measure (TPM)**	**EU-wide common job quality and working conditions for truck drivers SEC(2008)2632**
A 4	**Description of TPM**	Regulation of job quality and working conditions for truck drivers applies to road transport services, establishing common rules on access to the profession and to the market, setting minimal standards for working time, driving time and rest periods (including enforcement and the use of tachograph) for professional road transport [1] [2] TPM applies also to self-employed drivers.
A 5	**Implementation examples**	- EU27 countries: EC directive applies in all Member States, which provide reporting data on implementation and checks to the Commission - US: since 2011 changes in the regulation of hours of services for truck drivers have been analysed and applied by the US Department of Transportation
A 6	**Objectives of TPM**	The TPM is introduced to ensure minimum harmonized social rules throughout the EU. In addition, other objectives are related to create fair conditions for competition, to promote and harmonise safer technical standards and conditions, to guarantee that road transport rules are applied effectively and without discrimination.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Possible (minor) change (shift from road to rail if cost and time for road haulage become less competitive) [3][7]
A 7.2	Origin and/or destination of trip:	No major change
A 7.3	Trip frequency:	Possible change (more trucks might be needed to haul the same amount of freight) [6]
A 7.4	Choice of route:	No major change
A 7.5	Timing (day, hour):	Possible change (some deliveries might be shifted during the day to comply with the working / rest time rules) [6]
A 7.6	Occupancy rate / Loading factor:	Possible change (increased load factor to contrast increased cost) [5]
A 7.7	Energy efficiency / Energy usage:	Possible change (related to changes in trip frequency and load factors) [5]
A 8	**Main source**	[1] [3] [4] [5] [6] [7]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**I**	**N**	**S**	**I**

B 1.1 Summary:

- The regulation has positive effect for drivers (employees in transport) e.g. concerning health and safety. [1] [3] [5] [8]
- The impact of the TPM (i.e. in terms of working time rules) on road transport operators might be negative in terms of transport cost (and therefore revenues)[3][4][5][6][7], and with reference to transport time. [6]
- Nevertheless, distortion in competition is avoided, thanks to the application of common rules. [1] [3] [5] Enforcement plays a key role for the effectiveness of the TPM. [5]
- Road safety is generally increased. [1] [4] [5] [6] [7]
- In order to face an increase of costs and time, transport operators might try to optimise loading factors: as a result, energy usage might be affected as well. [5] Otherwise, additional trucks might be needed to haul the same amount of freight. [6]
- Administrative burden of implementation and enforcement for public bodies might increase [5]. The Tachograph Regulation might reduce the administrative burden and provide more effective enforcement.
- The existing problem of truck driver shortage might be affected negatively by the TPM (requiring even more drivers). [5] Nevertheless, better working conditions might make this job more appealing. [3]

B 1.2	**Summary: Income groups**	No specific change
B 1.3	**Summary: Age groups**	No specific change
B 1.4	**Summary: Disabled people**	No specific change
B 1.5	**Summary: Gender groups**	No specific change
B 1.6	**Summary: Ethnic groups**	No specific change

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						↗											**I**	**N**	**S**	**N**
B 2.2	Risk of congestion						→											**L**	**R**	**S**	**I**
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Transport time might increase, i.e. due to rules on working time / rest time for drivers [6] - Transport companies might decide to use smaller truck types below the current 3.5 tonnes limit, e.g. vans, that have to comply with less strict regulations. In this case more trucks would be required for the haulage (also to comply with possible changes in delivery time), and congestion might be affected [5] [6]. Nevertheless, the impact might be compensated in case of load factors optimisation or mode shift.
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↗											**I**	**N**	**S**	**I**
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector						→											**I**	**N**	**S**	**I**
B 3.4	Sectoral competitiveness						→											**I**	**N**	**E**	
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs												→								
B 3.9	Public authorities & adm. burdens on businesses															→		**I**	**N**	**S**	**I**
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Distortion in terms of competition is avoided [1][3][5], but the overall competitiveness of road sector might be affected negatively. - The TPM (in terms of regulation of working time) has had a direct impact on pay: employers complain since working hours are reduced but pay has remained the same, thus increasing costs. [3][4][5][6][7] - As a result of the increased transport cost, revenues for transport operators might decrease [3][5][6][7]. Another consequence might affect consumer prices, which might be increased. [3] - Administrative burden of implementation and enforcement for public bodies might increase [3][5]. Enforcement undoubtedly plays a crucial role because it ensures fair competition in the transport market, road safety and adequate working conditions for professional drivers [5] The Tachograph Regulation might reduce the administrative burden and provide more effective enforcement. Currently there is a lack of public enforcement in the EU Member States, often due to the reduction of public budgets or to a very narrow interpretation of the Directive. - A minor impact might be expected on health service costs, which might decrease because of improved job quality (better working conditions).
B 3.V	**Quantification of impacts**	- In some cases, as a result of increased employment in transport companies their operating costs would increase and the overall EU-27 cost of transport would increase by 1.1%. The consequent increase in the final consumer prices is not possible to estimate. [3] - With new rules in US, additional cost are estimated to be from 0.25% to 1 % of revenues. [6]

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)												→					I	N	S	I
B 4.2	Safety						↗						↗					I	N	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)												→					I	N	S	I
B 4.7	Employment and labour markets						→						→					I	N	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Road safety is generally improved, thanks to a reduction of accident risk related to drivers fatigue [1][4][5][6][7] - Safety and health of drivers is improved [1][3][5][8] Nevertheless, with reference to working time rules, the breaks are not always a quality form of rest (e.g. unsuitable times and places) [4] and often (due to distance travelled) drivers have to take more weekly rests away from home [5] - The debate on the problem of the limited number of professional drivers arise in several countries (e.g. CZ, UK, LT, NO, FI) , perceived as negatively affected by the TPM (i.e. in terms of working time rules) [4][5] In addition, over-regulation may contribute to worsen the problem of driver shortage, imposing a series of complications; transport companies will face additional costs, due to providing driver training. From another perspective, there would be more demand for truck drivers, with better working conditions. [3]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																				
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- No major impacts, depending on reorganisation of road haulage in terms of load factors and number of trucks required [3] According to the US case study: - A minor increase of pollutant emissions might be observed. [8] - GHG emissions should be almost unchanged or with a minor increase. [8] - In case of mode shift of freight from long-haul truck to rail there might be a slight reduction in energy consumption. [8]
B 5.V	**Quantification of impacts**	Not available (depending on reorganisation of road haulage)

C REFERENCES

C 1	**Other TPMs of this subcategory**	Elimination of restrictions on cabotage
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2002): DIRECTIVE 2002/15/EC on the organisation of the working time of persons performing mobile road transport activities [2] European Commission (2002): Regulation (EC) 561/2006 on the harmonisation of certain social legislation relating to road transport [3] European Commission (2008): COMMISSION STAFF WORKING DOCUMENT - IMPACT ASSESSMENT accompanying the proposal for a directive of the European Parliament and of the Council amending Directive 2002/15/EC of the European Parliament and of the Council of 11 March 2002 on the organisation of the working time of persons performing mobile road transport activities [4] Institute for Employment Studies (2007): Impact of the working time directive on collective bargaining in the road transport sector [5] European Parliament DG Internal Policies (2009): Shortage of qualified personnel in road freight transport. **National** [6] American Trucking Associations (2011): Changes in Truck Driver Hours-of-Service Rules White Paper: Potential Impact on Shippers/Receivers [7] US Analysis Division - Federal Motor Carrier Safety Administration (2011): 2010-2011 Hours of Service Rule Regulatory Impact Analysis [8] US Department of transportation - Federal Motor Carrier Safety Administration (2011): Final environmental assessment for the 2011 final Hours-of-Service (HOS) of drivers rule

FACT SHEET NO: 22 **CATEGORY: 4.1** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Internal markets**
A 2	**Subcategory**	**Internal Market (intramodal) - road**
A 3	**Transport policy measure (TPM)**	**Elimination of restrictions on cabotage**
A 4	**Description of TPM**	Cabotage concerns the transport of passengers and goods within one country by a haulier / carrier from another country. At the moment there are restrictions in the EU concerning these transports. [1] [4] [10] [13] Hauliers who carry out cabotage operations must hold a Community authorisation. This means that they must be established in an EEA state, and that they must fulfil the requirements for access to the profession. For hauliers from Bulgaria and Romania prohibition of cabotage applies until 1 January 2012. [13] Road freight cabotage transport can be performed by hauliers which hold a community licence, whose driver holds a driver attestation if non-EU national and the cabotage transport is subsequent to an international delivery. With this prerequisites, the hauliers can undertake up to three cabotage operations in seven days, these three cabotage operations may also be carried out in EU countries that the haulier passes in transit (transit-cabotage). In this case the delivery must be carried out within three days after entering the transit country. "National road haulage services undertaken in the host EU country by a non-resident haulier will only be subject to this regulation, if the haulier can produce proof of the incoming international carriage and of each consecutive cabotage operation undertaken." [5] The tonne-km generated by EU haulier in cabotage operations increased by 17% in 2010 compared to 2009 and accounts now, after the liberalisation of the cabotage legislation in 2009 [1], for 1.2% of the total road freight activities in the EU. [2] For road passenger transport a Community licence is needed as well. [4] Cabotage in a host EU country is authorised, if national road passenger services are carried out on a temporary basis, and the picking up and setting down of passengers within the same EU country in the course of a regular international service is not the principle purpose of the service. [6]
A 5	**Implementation examples**	Benelux: Cabotage is allowed without restrictions in Belgium, Luxemburg and the Netherlands for the hauliers of the respective countries. France: 4.3 billion tkm are performed by foreign vehicles while French operators perform only 570 million tkm. [8, p.58] Germany: the ratio of foreign vs. German operators is 3.2 vs. 2.3 billion tkm. [8, p.58] [10]
A 6	**Objectives of TPM**	The TPM aims to establish a single European road transport market by eliminating the restrictions on cabotage, and thus full liberalization.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Likely affected due to price competition / profitability within road transport services also affecting other transport modes.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	If the cabotage restrictions are abolished it is likely that the trip frequency will decrease. [14]
A 7.4	Choice of route:	No direct (key) changes (due to) consideration of the same demand for transport services
A 7.5	Timing (day, hour):	No direct (key) changes (due to) consideration of the same demand for transport services
A 7.6	Occupancy rate / Loading factor:	More efficient use of resources. [3] There are sometimes incredible inefficiencies, due to the cabotage rules, currently almost a quarter of all vehicle-km of heavy goods vehicles in the EU involve an empty vehicle. By eliminating the cabotage rules the loading factor improves because of the option of transit-cabotage. [16]
A 7.7	Energy efficiency / Energy usage:	Less energy usage and higher energy efficiency due to higher occupancy rate and loading factor.
A 8	**Main source**	[8]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

- The reduced mileage has positive effects for all road users e.g. concerning health and safety.
- The liberalization of cabotage fell in a period of economic weakness. Already in the course of the 2nd half of 2008, new orders have declined markedly in the haulage market. As a result of the cyclical decline in demand in the market, an increasing cargo space capacity shows that there are signs of renewed intensification of price and service competition. Example Germany. It is likely that the level of competition on the German domestic market will increase. It can be expected that companies from new EU Member States strive increasingly to domestic carriage in Germany. Consequently they will increase national regional- and long-distance traffic triggering price competition.[17]
- The impact of the measure on transport operators and service providers mainly depends on the country they are located, so does the impact on the workers in the transport sector and the public bodies.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion						↘											L		S	I
B 2.3	Vehicle mileage						↘											I	N	S / EE	I
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	- Less vehicle-kilometres without load (empty runnings) [3] and accordingly total vehicle kilometres. [8]
B 2.IV	**Summary / comments concerning the main impacts**	- Reduction of vehicle mileage and thus of congestion risk. [8] - The elimination of restrictions on cabotage only helps to reduce vehicle mileage, if the cabotage trips are performed on the return trip of an international delivery. [EE]
B 2.V	**Quantification of impacts**	- The 2010 cabotage performance of 1.2 billion vkm avoids 2.5% of empty running corresponding to 0.6% of total (laden and empty) mileage in the EU-27 and roughly 1% of domestic (national) traffic performance. [8, p. 57] [see B 5.V]

B 3	**ECONOMIC IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↘					↘						I	N	S	N
B 3.2	Private income / commercial turn over												↘				↗	N	I	S	I
B 3.3	Revenues in the transport sector						↘					↘						N	I	S	N
B 3.4	Sectoral competitiveness						↗											N		S	N
B 3.5	Spatial competitiveness						↘					↘						I	N	S	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↘		N	I	E	
B 3.10	Public income (e.g.: taxes, charges)															→		N	I	E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Cabotage may encourage the operators from low labour costs countries to participate, thus reducing the overall income of the workers in the transport sector by increased competition among operators and within the road freight market. This competition which mainly stem from companies based in low-wage countries, can lead to distortions due to large variations in national social and fiscal conditions. This could also lead to market disturbances in individual countries, in particular in high-wage transit countries. [8]. - The location of the transport operator and service provider affects the public income in the different countries concerning taxes. Depending on the country, the tax income rises or is reduced, depending on origin of operating companies. - The elimination of restrictions have a positive effect on the administrative burdens. - Apart from the labour costs, distortions arise because of differences in tax regimes, including the different taxation of fuel. [9] - In terms of spatial competitiveness, countries at the periphery of Europe are disadvantaged. [8] However, while France has seen the level of cabotage (mio. tkm) increase since 2004, Germany and the UK have seen falls. The general tendency has been for cabotage to increase, with substantial rises since 2004 for Finland, the Czech Republic, Greece, Sweden and Denmark. Even the newer Member States saw rises in cabotage performed in their country. Overall, this is a healthy sign of growing competition in an important and newly opened market area [15]. - In some countries (e.g. the UK), domestic operators have reduced revenues due to the increased competition. [9] Reduced unit transport costs lead to smaller profit margins of road transport hauliers. [8] - Consumers benefit from reduced costs / prices. This also be caused by lower price expectations of the buyers of transport services (passenger & freight transport). [9] - In Germany cabotage has not led to a significant increase in competition. No negative impacts for operators are expected. [10, p. 21/22] 3rd level impact: It should be noted that the shift towards low labour cost countries also has a secondary effect, as the wages of these lorry drivers are expected to rise over time. As a consequence, a road freight transporter will need to operate from other low income countries that are located even further away. This may lead to extra costs and additional empty vehicle mileage. [EE]
B 3.V	**Quantification of impacts**	

B 4 SOCIAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety	↗					↗					↗						I	N	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↘					I	N	S	N
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Increased numbers of insolvencies of road hauliers and unemployment among lorry drivers, example Austria [12, p.27-36] - Reduced vehicle mileages and thus less road accidents. [8]
B 4.V	**Quantification of impacts**	- Estimation: The reduction of 3.6 billion truck kilometres in 2050 corresponds to a reduction of about 60 fatalities. [8]

B 5 ENVIRONMENTAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	R	I	S / EE	I
B 5.2	Noise emissions																↘	L		E	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I		S / EE	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The reduction of vehicle mileage results in a reduction of air pollutants and has therefore a positive effect on the climate [8, p.58] [EE]. Although the effect of cabotage on the CO_2-Emissions is small compared to domestic and bilateral transports, it is still has significant influence.[7]
B 5.V	**Quantification of impacts**	Assumed change in EU, reference year 2008 - Situation 1: Some liberation of cabotage, but still restrictions (current situation [1]): Estimated increase of cabotage: from 1,2% up to 2,4%. Upper limit: cabotage increase: 2,4%, potential decrease of empty vehicle kilometres: 0,7%, reduction of CO2- emissions up to 0,5% of total road transport. (Taking international road transport as a reference, this reduction amounts to 2,5% in vehicle kilometres and to 2,0% in CO2-emissions.) - Situation 2: Further liberalisation of cabotage (as an add-on to an international trip): increase from 1,2% to a maximum of 4,8%, (comparable with the share of cabotage in Belgium) Upper limit: cabotage increase: 4,8%;potential decrease of vehicle kilometres: up to 1,9%; reduction of CO2 – emissions up to 1,6%. (Taking international road transport as a reference, these figures amount to 7,8% and 6,2%,respectively.) [7] Estimation: The reduction of 3.6 billion vkm per year in 2050 corresponds to a reduction of CO2 in the order of 2.8 million tonnes (without upstream emissions). [8]

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2009e): REGULATION (EC) No 1072/2009 of the European Parliament an the Council of 21 October 2009 on common rules for access to the international road haulage market (recast). Brussels. [2] European Commission (2011d): Road Freight Transport Vademecum - 2010 Report, Market trends and structure of the road haulage sector in the EU in 2010. Brussels. [3] Innovation Processes in Surface Transport -InnoSuTra (2010): Preliminary Innovation Report (PIR), Deliverable D 2.1 [4] European Commission (2009f): REGULATION (EC) No 1073/2009 of the European Parliament and of the Council of 21 October 2009 on common rules for access to the international market for coach and bus services, and amending Regulation (EC) No 561/2006 (recast) [5] European Commission (2010): Summaries of EU legislation, Common rules for access to the international road haulage market. [6] European Commission (2010): Summaries of EU legislation, Common rules for access to the international market for coach and bus services. [8] Vellay, C. Volny, M. Winder, A. (2010): Several scenarios of long distance freight transport by 2050 and their impact on environmental emissions, dependence on fossil fuels, congestions and accidents. Deliverable 6.1 of FREIGHTVISION. [15] Eurostat (2012): Road Cabotage [16] European Transport Forum (2012): Why Europe Wants to Ease Road Haulage Rules. **National** [7] Kennisinstituut voor Mobiliteitsbeleid (2010): Cabotage en CO2-reductie, Notitie met een eerste verkenning naar de potentiële reductie van CO2 door cabotage. Netherlands [9] Department for Transport (2010): Impact Assessment of the EC's Three Regulations on International Road Transport, IA No: DFT-2010-39; UK [10] Bundesamt für Güterverkehr (2012). Marktbeobachtung Güterverkehr. EU-Osterweiterung. Mögliche Auswirkungen der Kabotagefreigabe für Bulgarien und Rumänien zum 01.Januar 2012 auf den deutschen Güterkraftverkehrsmarkt. [11] Bundesministerium für Verkehr, Innovation und Technologie (2010). Informationsblatt zur Kabotage in Österreich. [12] Institut für Transportwirtschaft und Logistik. Wirtschaftsuniversität Wien (2009). „Untersuchung der Bedeutung der Ausflaggung von Fahrzeugen und Darstellung der Auswirkungen auf die österreichische Volkswirtschaft". [13] Anne-Lise Junge-Jensen (2011) Circular concerning cabotage in goods transport by road, 1-2. [14] European Commission - DG TREN (2006): Study on Road Cabotage in the freight transport market, Final report Framework Contract TREN/A1/56-2004 Lot 2: Economic assistance activities 10. [17] Bundesamt für Güterverkehr (2009): BAG – Marktbeobachtung: Bericht zur bevorstehenden Freigabe der Kabotage für sieben EU-Mitgliedstaaten.

FACT SHEET NO: 23 **CATEGORY: 4.2** **PERFORMED BY: LET**

A GENERAL INFORMATION

A 1	**Category**	**Internal markets**
A 2	**Subcategory**	**Internal Market (intramodal) - rail**
A 3	**Transport policy measure (TPM)**	**Opening of the domestic rail passenger market; Community railway liberalisation SEC(2004)236, COM(2004)139**
A 4	**Description of TPM**	Opening national market for freight and passenger transport have been widely support by EU legislation since 1991. Open Europe-wide passenger market encourage greater competition for different railway companies in order to increase the service quality and a dramatically shift of passenger transport to European high-speed rail network. The European Railway Agency have invested millions of euro to promote the interoperability and harmonise technical standards of railway systems.
A 5	**Implementation examples**	
A 6	**Objectives of TPM**	It aims to 1. Promote the use of environmental friendly railway transport and improve the attractiveness and competitiveness of passenger railway transportation 2. Improve railway passenger transportation service quality by liberalisation of national and international markets 3. Reduce the financial burdens of public service and enhance the integration of Europe-wide railway system management and operations
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Significant modal shift to rail for medium-distance passenger transportation by 2050 after completing a European high-speed rail network [2].
A 7.2	Origin and/or destination of trip:	Origin and/or destination changes due to a more competitive railway transport service
A 7.3	Trip frequency:	Reduce vehicle-kilometres and trip frequency due to a more accessible and fast railway transport service
A 7.4	Choice of route:	Possible changes in a enlarged railway network
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	Increase the occupancy rate of railway vehicle
A 7.7	Energy efficiency / Energy usage:	Improve energy efficiency when larger shift to railway transport due to the opening markets and competition of railway operators
A 8	**Main source**	[2] [3]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	- Opening national and international market and integrated Europe-wide railway network may reduce travel time and cost of passenger transport and have positive effects on environment and health. However, the competition between different operators for long IC and High Speed services can reduce the supply of regional services (this happened in Italy) eventually increasing the travel cost for passengers (time is actually reduced). - Negative impact on airline industries due to the competition of integrated railway system.
B 1.2	**Summary: Income groups**	- More attractive price due to opening market may increase system accessibility for lower income group . However it may also increase trip price of certain region due to the modification of service network and competitions between different operators.
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	↘		↘	↘		↘													
B 2.2	Risk of congestion	↘	↘	↘	↘	↘		→													
B 2.3	Vehicle mileage	→	↑					↗		↘											
B 2.4	Service and comfort		↗		↗			↗		↘											

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Shift to railway transport reduces road and air traffic congestion. Rail congestion may be reduced for certain lines but it is possible that for other main axes rail congestion situation may be worse during peak hours. - Itindirectly promotes the multimodal passenger transportation system development. - Improve the occupation rate of existing railway infrastructure capacity.
B 2.V	**Quantification of impacts**	- By 2050 the majority of medium-distance passenger transport should be carried out in a integrated European high-speed rail network.[2]

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	→	↘				↘	↘		↗							↘	I	N	E	
B 3.2	Private income / commercial turn over		↗							↘								I	N	E	
B 3.3	Revenues in the transport sector		↗					↗		↘								N	R	E	
B 3.4	Sectoral competitiveness							↗		↘					↗			I	N	E	
B 3.5	Spatial competitiveness							↗						↗				L	R	E	
B 3.6	Housing expenditures		↗					↗										L	R	E	
B 3.7	Insurance costs																				
B 3.8	Health service costs																↘	L	R	E	
B 3.9	Public authorities & adm. burdens on businesses															↘		I	N	S	
B 3.10	Public income (e.g.: taxes, charges)							↘								↘		N	R		
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Shift to railway transport reduces risk of road and air traffic congestion. - It indirectly promotes multimodal passenger transportation system development. - Improvement of ccupancy rate of existing railway infrastructure capacity. [2] - Better accessibility to railway connected stations improves the competitiveness of these areas. It is the reason for higher housing expenditure. - Concerning the downwarding arrow on transport costs (row B 3.1 above), please see comments above.
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)		↗					↗										**L**	**R**	**E**	
B 4.2	Safety		↗				↗	↗										**L**	**R**	**E**	
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems		↗	↘	↗													**L**	**R**	**E**	
B 4.5	Social inclusion, equality & opportunities		↗															**L**	**R**	**E**	
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets							↗		↘								**I**	**N**	**E**	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Market opening may induce labour and skill shortages for transport in the future [2]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	**L**	**R**	**E**	
B 5.2	Noise emissions																↘	**L**	**R**	**E**	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**I**	**N**		
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	
B 5.V	**Quantification of impacts**	- The White Paper sets a transport-related greenhouse gases emissions (GHG) reduction target of 60% by 2050 compared to their 1990 level. [2] [7]

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	[1] European Commission (1996): A strategy for revitalising the community's railways. [2] European Commission (2011): White paper “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system” [3] European Commission (2004): Further integration of the European rail system: third railway package. [4] European Commission (2007): Survey of competitiveness of the EU rail supply industry, final report ITLR-T17297-003. [5] European Commission (2008): Towards an integrated European railway area [6] European Commission (2009): Proposal for a Directive of the European Parliament and of the Council Amending, Council Directive 91/440/EEC on the development of the Community's railways [7] The European rail industry (2011): UNIFE Annual Report 2011

FACT SHEET NO: 24 **CATEGORY: 4.3** **PERFORMED BY: LET**

A GENERAL INFORMATION

A 1	**Category**	**Internal Markets**
A 2	**Subcategory**	**Internal Market (intramodal) - inland waterway transport**
A 3	**Transport policy measure (TPM)**	**Remove administrative and regulatory barriers (mutual recognition of boatmasters' certificates, local / port authorities with harmonised port dues, canal fees, opening times)**
A 4	**Description of TPM**	Inland waterway transport (IWW) is a less pollution, low energy consumption and low transport cost mode for good and passenger transportation. It is promoted by EU for sustainable and efficient transport. Studies on the administrative and regulatory barriers in the field of IWW [1] revealed that current rules and regulations of member states hinder fluent operations of IWT. To promote the IWW, the European Commission reviewed existing administrative and regulation barriers and proposed the NAIADES Action Programme to harmonize them. The revision of the NAIADES programme (NAIADES II) is currently being prepared and expected to be adopted in 2013. The concrete actions involve: infrastructure (accessibility improvement of inland ports and promotion of inland waterway friendly seaport designs and operations), market (integrating inland waterways into the multimodal logistic chains), fleet (measures to reduce emissions), jobs and skills (harmonisation of standards for professional training and certification) and information exchange and sharing.
A 5	**Implementation examples**	Implementation of the NAIADES Action Programme (2006-2013)
A 6	**Objectives of TPM**	The objectives of the TPM are: - Remove regulations and administrative barriers between Member State for promoting Inland Waterway Transport - Improve the efficiency of Inland Waterway Transport and reduce the transport cost related to regulations and administrative barriers
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	The modal share of inland waterway transport increases.
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	No change.
A 7.4	Choice of route:	No change.
A 7.5	Timing (day, hour):	No change.
A 7.6	Occupancy rate / Loading factor:	No change.
A 7.7	Energy efficiency / Energy usage:	No change.
A 8	**Main source**	[1] [2] [4]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	- The reduction of administrative and regulatory barriers can reduce administrative cost, transport cost, travel time, raise the competitiveness and efficiency of IWW. [1]
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time								↘									I		S	I
B 2.2	Risk of congestion								↘									I		S	I
B 2.3	Vehicle mileage								↗												
B 2.4	Service and comfort																	I		S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Reduce the transport time of IWW due to harmonization and simplification of administrative. [1]
B 2.V	**Quantification of impacts**	- The White Paper anticipates that the modal share of inland waterway transport can improve by 2050 by more than 20%. [4]

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs								↘						↘			R	L	S/E	I
B 3.2	Private income / commercial turn over								↘									R	L	S/E	I
B 3.3	Revenues in the transport sector								↗									R	L	S/E	I
B 3.4	Sectoral competitiveness								↗									R	L	S/E	I
B 3.5	Spatial competitiveness								↗									R	L	S/E	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs								↘					↘			↘	R	L	S/E	I
B 3.9	Public authorities & adm. burdens on businesses								↘							↘		R	L	S/E	I
B 3.10	Public income (e.g.: taxes, charges)															→		R	L	S/E	I
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Reduce the operation cost of Inland Waterway Transport for operators. [1] - Reduce transport cost in business because it is a part of the supply chain. [1] - Reduce public authorities and administration burdens due to removal of the regulation barriers. [1] - Shift of good transportation from road to inland waterway may reduce road traffic congestion in urban area.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)								↗								↗	I	N	S/E	
B 4.2	Safety								↗								↗	I	N	S/E	
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems								↗									I	N	S/E	
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)								↗									I	N	S/E	
B 4.7	Employment and labour markets								↗									I	N	S/E	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Solve non-compliance with existing working and resting time regulations of a number of enterprises can improve significantly safety conditions of operations. [1]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	I	N	S	I
B 5.2	Noise emissions													↘			↘	I	N	S/E	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I	N	S/E	I
B 5.6	Renewable or non-renewable resources																↘	I	N	S/E	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Inland waterway transport remains the most energy-efficient and climate friendly of all modes of transport [4]
B 5.V	**Quantification of impacts**	- Achieving by 2020 an overall performance regarding emissions levels for inland waterway transport that is better or at least comparable to the performance of road transport.[4]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Stimulate the integration of inland waterways into the transport system (RIS integrated with eFreight and eCustoms)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2008p): Final Report for the "Study on Administrative and Regulatory Barriers in the field of Inland Waterway Transport" – Part A [2] European Commission (2008q):Commission Staff working document. Report on the impact assessment of proposals aiming to modernise and reinforce the organisational framework for inland waterway transport in Europe. [3] European Commission (2008r): Accompanying document to the Report on the impact assessment of proposals aiming to modernise and reinforce the organisational framework for inland waterway transport in Europe. [4] European Commission (2012g): Commission Staff working document. Towards "NAIADES II" Promoting, greening and integrating inland waterway transport in the single EU transport area.

FACT SHEET NO: 25 **CATEGORY: 4.3** **PERFORMED BY: LET**

A GENERAL INFORMATION

A 1	**Category**	**Internal markets**
A 2	**Subcategory**	**Internal Market (intramodal) - inland waterway transport**
A 3	**Transport policy measure (TPM)**	**Stimulate the integration of inland waterways into the transport system (RIS integrated with eFreight and eCustoms)**
A 4	**Description of TPM**	Inland navigation represents an environmental friendly, secure and reliable mode of transport. On the other hand, a certain lack of reliability and flexibility provide a challenge for the seamless integration of this mode into intermodal transport chains. The objective of the River Information Services (RIS), which represents the European standard Intelligent Transport System (ITS) implementation in inland shipping, is to support this integration. RIS are regulated under Directive 2005/44/EC. [5] RIS provide harmonized information services, such as vessel positions, status of fairways, missing administrative reports, to improve traffic and transport management in inland navigation. RIS further includes interfaces to other transport modes, e.g. port and terminal management by providing estimated time of arrival (ETA) updates for planning and monitoring of shipment operations. [3] The development of the harmonized RIS improves the safety and efficiency of freight transport by inland waterway [3]. The harmonised RIS on inland waterways is a related EU policy in EU e-Freight Policy context. It puts in practice the concept of 'single window' and allows the tracing of goods in real time, to ensure intermodal liability and to promote clean freight transport. [2]
A 5	**Implementation examples**	1. The Netherlands: The Scheldt Radar Network provides vessel traffic services in a mixed traffic area including sea-going vessels and inland barges. [4] 2. Belgium/the Netherlands: Management Information System Container IWT (MIS-Cobiva). MIS-Cobiva provides the barge operator, vessel and terminal with the same reliable information on the arrival time of a ship. [6]
A 6	**Objectives of TPM**	The objectives of a greater integration of inland navigation in transport systems are to: 1. develop a seamless and efficient multimodal European freight transport and optimize multimodal transportation system resource 2. promote information exchange for administrations, operators for freight transport in EU and international levels in order to improve the overall efficiency of inland navigation. This concerns for example the information exchange between vessels, lock and bridges, terminals and ports.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Increase the interoperability of different modes for freight transport.
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	No change.
A 7.4	Choice of route:	No change.
A 7.5	Timing (day, hour):	Reduce the time consumption of administrative procedure and information exchange for freight transport.
A 7.6	Occupancy rate / Loading factor:	Increase the loading factor by optimizing the management of freight transport between all stakeholders.
A 7.7	Energy efficiency / Energy usage:	Reduce energy consumption by developing paperless information exchange and decrease business processes burdens; the energy efficiency increases further due to better voyage planning and more reliable scheduling. [4]
A 8	**Main source**	[1] European Commission (2011): European e-Freight Capabilities for Co-modal Transport project, EU Seventh Framework Programme [2] T. Cane, T. Katsoulakos (2011): The e-Freight 'Next Generation Single Window' for Trade and Transport. Paper for the e-Freight 11 Conference, Munchen, Germany [3] O. Klein, F. Arendt, A. Gehlhaar (2012). RISING.Enhanced RIS and IT Services supporting multimodal Transports involving Inland Waterways. e-Freight 2012 conference - 9 / 10 May in Delft, the Netherlands [4] European Commission/The Transport Research Knowledge Centre (2010): River Information Services. Modernising inland shipping through advanced information technologies. Online: http://www.binnenvaart.be/nl/downloads/documents/RISbrochure2010.pdf; retrieved: 08 Feb 2013 [5] European Parliament (2005): Council, Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the Community.

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I

B 1.1 Summary:
- Support the management of vessel traffic and improve the efficiency and safety of navigation [3]
- Support inland waterway administration to provide a safety and efficient inland waterway navigation [3]
- IWW users and suppliers benefit from simplified administration process and fast information exchange, resulting in an increasing modal shift in transportation of cargo from road to IWW [5].
- The integration of harmonised RIS in e-Freight policy context enhances the intermodal liability with other transport modes, creating positive impacts of freight transport on road, rail and maritime. [2]

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						↘		↘									L	R	S	I
B 2.2	Risk of congestion						↘		↘									L	R	S	I
B 2.3	Vehicle mileage						→											L	R	S	I
B 2.4	Service and comfort						↗		↗									L	R	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs								→						↘		↘	L	R	S	I
B 3.2	Private income / commercial turn over								↗						↗			L	R	S	I
B 3.3	Revenues in the transport sector								↗									L	R	S	I
B 3.4	Sectoral competitiveness								↗									L	R	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses								↘							↘		L	R	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Improve the competitiveness of enterprise by reducing transport cost and times in the supply chain. - Construction of EU multimodal TEN-T 'core network' increase the efficiency and reduce travel cost of freight transport in EU.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety								↗				↗	↗			↗	L	R	S/E	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Safety of navigation is improved due to a better monitoring of dangerous goods in ports and rivers via RIS. - The authorities benefit from electronically available information which allows them to streamline administrative processes. - The enhanced safety communication with the vessels in the event of accidents leads to less injuries/fatalities and improved environmental calamity abatement.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	L	R	S	I
B 5.2	Noise emissions																↘	L	R	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	L	R	S/E	I
B 5.6	Renewable or non-renewable resources																↘	L	R	S/E	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Increase the monitoring of pollution in port terminals, accident prevention and maritime safety. [2] - Environmental protection via the calamity abatement support. [3] - Contribution to a modal shift of cargo from road to waterway, leading to a reduction of fuel consumption and pollutants such as CO2 and NOx and also of noise, and reduce the use of non-renewable resources (fuel). [4]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	Remove administrative and regulatory barriers (mutual recognition of boatmasters' certificates, local / port authorities with harmonised port dues, canal fees, opening times).
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	International [1] European Commission (2011): European e-Freight Capabilities for Co-modal Transport project, EU Seventh Framework Programme [2] T. Cane, T. Katsoulakos (2011): The e-Freight 'Next Generation Single Window' for Trade and Transport. Paper for the e-Freight 11 Conference, Munchen, Germany [3] O. Klein, F. Arendt, A. Gehlhaar (2012). RISING.Enhanced RIS and IT Services supporting multimodal Transports involving Inland Waterways. e-Freight 2012 conference - 9 / 10 May in Delft, the Netherlands [4] European Commission/The Transport Research Knowledge Centre (2010): River Information Services. Modernising inland shipping through advanced information technologies. Online: http://www.binnenvaart.be/nl/downloads/documents/RISbrochure2010.pdf; retrieved: 08 Feb 2013 [5] European Parliament (2005): Council, Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005 on harmonised river information services (RIS) on inland waterways in the Community, EU-lex. [6] http://www.naiades.info/good-practices/; retrieved: 11 Feb 2013ce

FACT SHEET NO: 26 **CATEGORY: 4.4** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Internal Markets**
A 2	**Subcategory**	**Internal Market (intramodal) - maritime**
A 3	**Transport policy measure (TPM)**	**Simplification of formalities for ships travelling between EU ports ("Blue Belt")**
A 4	**Description of TPM**	The 'Blue Belt' is a concept for European maritime transport without barriers. Nowadays, administrative formalities (mainly documentary controls and customs) concerning maritime transport between EU ports is still considered equal as going beyond EU borders. As a consequence, it is requiring extensive administrative procedures (e.g. veterinary and plant protection controls, customs, port formalities). These administrative procedures were identified as one of the key bottlenecks for further expansion of maritime transport. In order to improve the competitiveness of maritime transport it is necessary to remove administrative procedures for intra-European sea transportation. The TPM 'Blue Belt' aims to fully use the potential of European maritime transport. [1] [3] [5]
A 5	**Implementation examples**	- Commission regulation (EU) No 177/2010: customs procedures will be facilitated for certain companies. [6] - Directive 2010/65/EU: on reporting formalities for ships arriving in and/or departing from ports within the EU. [7]
A 6	**Objectives of TPM**	- The main objective is to reduce administrative procedures for sea transport (cargo and passengers) between European ports. In a 'Blue Belt', intra-European maritime transport can follow fast-tracks procedures in order to increase the competitiveness of maritime transport compared to road, rail and air transport. Second level objectives are: - Establish a framework and strengthened cooperation between EU Ports - Increase the transparency on ports' financing [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	- It is the TPMs' objective to develop maritime transport. EU Policy documents do not state whether this should or could lead to a different choice of transport. Most likely only air transport can suffer from this TPM while air transportation still requires extensive administrative procedures. IWW, road and rail transport can benefit from increasing demands for hinterland transportation. [4]
A 7.2	Origin and/or destination of trip:	- All EU Ports are involved so there will be no difference between EU ports. [1] - Short distance maritime transport will benefit most from reduced administrative procedures, because time consuming procedures have a higher impact on short journeys. [5]
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

- Competition between different modes of transport will be affected when the TPM 'Blue Belt' will be initiated. Maritime transport and also IWW transport will benefit from the decreasing administrative burdens and will become more attractive for transportation. It is uncertain and not mentioned clearly in EU policy documents, whether the introduction of the Blue Belt policy will lead to a modal shift from road, rail and air transport towards maritime transport.
- It is most likely that air transportation, which still requires several administrative procedures, will lose attraction compared to sea transportation. This counts only for specific products, as water and air transport do not directly compete for all products. Road and rail transportation can benefit from increasing needs for hinterland transport.
- The current decline of jobs in the sea transport sector can be reversed by increasing the sectors' attractiveness. More sea transportation asks for more jobs in the sea transportation industry. [4]
- Due to less administrative procedures it will be possible to increase the efficiency for sea transportation. Sea transportation becomes less time consuming and more transparent. Mainly, maritime transport operators will benefit from this development and can increase their turnover. [4]
- Residents near ports or coastal areas will be negatively affected through higher air pollutants. [4]
- There are no specific social groups influenced by this TPM.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						➔	➔	➔	➔	↘							I	N	S	I
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage						➔	➔	➔	➔	↗							I	N	S	I
B 2.4	Service and comfort						➔	➔	➔	➔	↗							I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Faster processing of goods leads to shorter transport time for maritime transport between EU ports. [1] - The 'Blue Belt' policy increases the attractiveness of maritime transport and will lead to an increase of maritime shipping between EU Ports. [4] - The EU assumes that transport demand will continue to grow until 2020 compared to 2000 levels. In order to handle this growth, all modes of transport should be used at their optimum (used to their full extent). This means that other transport operators (rail, road, air and IWW) will not be affected by the 'Blue Belt' policy. Only combined forces can assure that the future demand for transport will be fulfilled. [4]
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs										↘							N	I	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness										↗							N	I	S	I
B 3.5	Spatial competitiveness										↗							N	I	E	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses										↘							N	I	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The administrative procedures at ports cause high costs and delays which makes maritime transport less attractive for the transport of goods in the EU. The 'Blue Belt' policy will lead to a reduction of such costs as well as a simplification of administrative procedures. [1] - The entire maritime transport sector will benefit and the 'Blue Belt' will boost the attractiveness of maritime transport. [4] - Spatial competitiveness will level out due to equal administrative procedures for all EU Ports. Compared to non EU ports, the spatial competitiveness of EU ports will increase. - Customs, transport operators, shipping companies and other port authorities will all benefit from the fast-track procedures and EU-wide legislation. It improves transparency and contributes to a seamless logistic chain within the EU. [3]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)													↘			↘	L	R	S	I
B 4.2	Safety										↗										
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems										↗							I		S	I
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)										↗							I		S	I
B 4.7	Employment and labour markets										↗		↗					L	N	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Increasing environmental impacts (mainly air pollutants) have a negative impact on the well-being of society (mainly residents near ports or maritime transport routes, like coastal areas). [4] - This TPM will require strengthened cooperation between different EU ports. Corporation will not only lead to mainstream legislation, but will also lead to transparency and more similar standards and rights for workers (related to job quality). [3] - The growing shortage of seafarers will become a major issue when maritime transport will increase. New jobs require well trained seafarers and port workers to assist the increasing maritime transport. The rise of employment is positive, but training and recruiting will be necessary to fulfil the need for employees. [3] - Authorities save time when transport between EU ports will require less administrative procedures. This allows authorities to focus on higher risk areas like terrorism and human trafficking. [1]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants																↗	L	R	S	I
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↗	N	I	S	I
B 5.6	Renewable or non-renewable resources																↗	N	I	S	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The environmental impacts are determined by the possible change of transport mode and the rise of transportation. Assuming that transport on all modes will continue to grow and maritime transport will have an additional increase due to the 'Blue Belt' policy, it will lead to increasing environmental impacts. Maritime transport may be more energy efficient than road transport but it still produces air pollutants, C02 emissions and requires fuel for the engine. [4]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Single electronic environment for all port/maritime transport related information exchanges and management - e-Maritime - Job quality and working conditions for crew members
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2012d): Evaluation of the Blue Belt pilot project, Luxembourg: Publications Office of the European Union [2] European Maritime Safety Agency (2011): Annual Report 2010, Lisbon: European Maritime Safety Agency [3] European Commission (2011c): Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, Luxembourg: Publications Office of the European Union [4] European Commission (2007f): An Integrated Maritime Policy for the European Union, Luxembourg: Publications Office of the European Union [5] European Commission (2007h): The EU's freight transport agenda - Boosting the efficiency, integration and sustainability of freight transport in Europe, Luxembourg: Publications Office of the European Union [6] European Commission (2010g): Commission Regulation (EU) No 177/2010, Brussels. In: Official Journal of the European Union [7] European Parliament (2010b): Directive 2010/65/EU, Brussels: In: Official Journal of the European Union [8] European Parliament (2004): Regulation (EC) No 789/2004, Brussels: In: Official Journal of the European Union

FACT SHEET NO: 27 **CATEGORY: 4.4** **PERFORMED BY: LET**

A GENERAL INFORMATION

A 1	**Category**	**Internal markets**
A 2	**Subcategory**	**Internal markets (Intramodal) - Maritime**
A 3	**Transport policy measure (TPM)**	**Single electronic environment for all port/maritime transport related information exchanges and management – e-Maritime**
A 4	**Description of TPM**	Maritime transport is a major economical contributor in the EU as well as a necessary component for the facilitation of international and interregional trade on which the European economy is strongly dependent. The EU e-Maritime initiative [1] is seen as a cornerstone for the achievement of the strategic goals of the EU Maritime Transport Strategy 2018. EU e-maritime initiative recognizes the critical role of ICT for improving maritime transport administration efficiency. The EU e-maritime initiative anticipates a new era of e-business solutions, based on integrated ICT systems and tools. e-Maritime related port application areas include [2]: - integration of Port Community Systems (PCS) or Port Single Window (PSW) with national and international web portals - managing quality of data collection and automation of statistics reports - coordination of inspections - resource management, optimized movements of cargo, containers, passengers, equipment - integrated port security management
A 5	**Implementation examples**	A recent study by EMSA on metadata for ship movements in 40 EU ports and terminals indicates that 26 out of the 40 ports use some kind of PCS or PSW. Port Community Systems (PCS) supporting exchange of commercial and logistic messages in a port environment, B2B (Business to Business) services; similar applications include Cargo Community System (CCS) [2] Port Single Windows (PSW) providing information about the vessel to the authorities on a port level, B2A (Business to Administration); similar applications include Single Point of Contact (SPC) and National Single Window (NSW). [2]
A 6	**Objectives of TPM**	The ultimate goal for the EU e-Maritime initiative is to make maritime transport safer, more secure, more environmentally friendly and more competitive by improving knowledge, facilitating business networking and dealing with externalities. PCS and PSW aim to improve information exchange, both between port associated companies and between the public and private sector thus providing a one stop shopping system. Improvement of port operations is a key issue according to the fact that ports are the main bottleneck within the maritime transport sector.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	The e-Maritime initiative improves the efficiency of maritime transport administration and makes an increasing modal shift to maritime transport and creates a seamless multimodal freight transport environment. [1] [2]
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	No change.
A 7.4	Choice of route:	No change.
A 7.5	Timing (day, hour):	No change.
A 7.6	Occupancy rate / Loading factor:	The occupation rate of maritime transport may be increased due to more efficient management. [4]
A 7.7	Energy efficiency / Energy usage:	Good transport on waterway is much more efficient than other transport modes. A seamless maritime transport environment may improve its transport capacity and increase the utilization of maritime transport. [1]
A 8	**Main source**	[1] G. Lynch (2010): SKEMA Coordination Action, Maritime and logistics co-ordination platform, “Sustainable Knowledge Platform for the European Maritime and Logistics Industry”. [2] http://www.efreightproject.eu/knowledge/defaultinfo.aspx?topicid=159&index=2. retrieved on 11 February 2013.

B IMPACTS

		AFFECTED SEGMENTS																Geographi-cal level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	- Reduce administration burden and facilitate data exchange of different agents, e.g. users, operators and administrators. [1][2] - Stimulating the utilization of maritime transport for good transport improves the energy efficiency and reduces air and noise pollutions of good transport on road [2]. - Ship operators and agents benefit from the support of information exchanges and from the tools for interoperability in intermodal network. [1] - Allow a better use of maritime transport for shippers and operators in planning and completing freight transport operations; transport cost and time can be reduced due to more fluent data exchange and more efficient administration [2].
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

		AFFECTED SEGMENTS																Geographi-cal level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time										↘							I	N	S	I
B 2.2	Risk of congestion										↘							I	N	S	I
B 2.3	Vehicle mileage										↗							I	N	S	I
B 2.4	Service and comfort										↗							I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Positive impacts on modal shift to the use of maritime transport. [4]
B 2.V	**Quantification of impacts**	

		AFFECTED SEGMENTS																Geographi-cal level		Source	
B 3	**ECONOMIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs										↘							I	N	E	
B 3.2	Private income / commercial turn over										↘							I	N	S	I
B 3.3	Revenues in the transport sector										↗							I	N	S	I
B 3.4	Sectoral competitiveness										↗							I	N	S	I
B 3.5	Spatial competitiveness										↗							I	N	S	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses										↘					↘		I	N	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Transport users benefit from the support of information exchange service between administrators and maritime operators. [1] - Increasing the reliability of data exchange is valuable for safety and business processes [4] - Harmonised standards and processes support the development of the maritime transport related ICT sector. [4] - Positive impacts on administrative burden. [4]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)										↗							**I**	**N**	**S**	**I**
B 4.2	Safety										↗					↗		**I**	**N**	**S**	**I**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems										↗							**I**	**N**	**S**	**I**
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)										↗							**I**	**N**	**S**	**I**
B 4.7	Employment and labour markets										↗							**I**	**N**	**S**	**I**
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Improve job skills by introducing new ICT measures and reduce time consuming administrative procedures. [1] - Improve working conditions on-board and habitability at sea. [1] - Positive impact on job quality in terms of improved access for the workforce to professional development on e-training services and improved information, education and entertainment services; more comprehensive base to deliver training services. [4] - Increase safety of maritime transport. [4] - Positive impacts in terms of reducing accidents. [4]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	**I**	**N**	**S**	**I**
B 5.2	Noise emissions																↘	**I**	**N**	**S**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**I**	**N**	**S/E**	**I**
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Increase the efficiency of maritime transport and the use of renewable resources. [1] - Positive impacts regarding noiase and air pollutants; reducing the impacts on climate change and accidents relevant for the environment. [4]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Simplification of formalities for ships travelling between EU ports ("Blue Belt") - Job quality and working conditions for crew members
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] G. Lynch (2010): SKEMA Coordination Action, Maritime and logistics co-ordination platform, "Sustainable Knowledge Platform for the European Maritime and Logistics Industry". [2] H McLaughlin (2009) : SST–2007–TREN–1 - SST.2007.2.2.4. Maritime and logistics co-ordination platform SKEMA Coordination Action "Sustainable Knowledge Platform for the European Maritime and Logistics Industry" [3] http://www.efreightproject.eu/knowledge/defaultinfo.aspx?topicid=159&index=2. February 11, 2013 [4] European commission (2010): Directorate C - Maritime transport C.2 - Maritime transport policy: Ports & Inland waterways "Summary report of the contributions received to the e-Maritime public online consultation".

FACT SHEET NO: 28 **CATEGORY: 4.4** **PERFORMED BY: LET**

A GENERAL INFORMATION

A 1	**Category**	**Internal markets**
A 2	**Subcategory**	**Internal markets (Intramodal) - Maritime**
A 3	**Transport policy measure (TPM)**	**Job quality and working conditions for crew members**
A 4	**Description of TPM**	Maritime transport is probably the most globalized type of transport but not the less regulated. The main regulation does not come from EU; it derives from the SOLAS Convention, generally regarded as the most important of all international treaties concerning the safety and the management of merchant ships. The first version was adopted in 1914 in response to the Titanic disaster, the second in 1929, the third in 1948, and the fourth in 1960. The 1974 version includes the tacit acceptance procedure which provides that an amendment shall enter into force on a specified date unless, before that date, objections to the amendment are received from an agreed number of Parties. As a result the 1974 Convention has been updated and amended on numerous occasions. The Convention in force today is sometimes referred to as SOLAS, 1974, as amended. To improve working condition and professional attractiveness, EU engages in maintaining high standard of job training of crews to ensure high quality and safe shipping operation and applying information and communication technologies (ICT) to improve crew's living quality at sea [1]. These measures need EU contribute in revision of the STCW Convention, promoting the cooperation and exchange between training institutions of Member States.
A 5	**Implementation examples**	- Ratifying of the ILO 2006 Maritime Labour Convention. [4] - Implementation of EU Community in various legislation (Directives) for the health and safety of persons employed on board ships. [3]
A 6	**Objectives of TPM**	- Implementation of the ILO 2006 Maritime Labour Convention (MLC) to improve working and living conditions on board and its rapid ratification by Member States.[1] - Support research of human factors in risk assessment for maritime safety and environmental protection. - Improve board health care and promote the goal-based framework for the safe manning of ships.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No change.
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	No change.
A 7.4	Choice of route:	No change.
A 7.5	Timing (day, hour):	No change.
A 7.6	Occupancy rate / Loading factor:	No change.
A 7.7	Energy efficiency / Energy usage:	No change.
A 8	**Main source**	1] [2] [3] [4]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I
		Improving the working skills and the environment of crew and seafarers toward a safer and higher quality of life at sea. [1]																			
B 1.2	**Summary: Income groups**																				
B 1.3	**Summary: Age groups**																				
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

B 2	**TRAFFIC IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				
B 2.I	**Overall impacts on social groups**																				
B 2.II	**Implementation phase**																				
B 2.III	**Operation phase**																				
B 2.IV	**Summary / comments concerning the main impacts**																				
B 2.V	**Quantification of impacts**																				

B 3	**ECONOMIC IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs																				
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness										➚							I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs										➔							I	N	E	I
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				
B 3.I	**Overall impacts on social groups**																				
B 3.II	**Implementation phase**																				
B 3.III	**Operation phase**																				
B 3.IV	**Summary / comments concerning the main impacts**	- Training and ICT equipment's for improving job condition may increase operation cost. [1] - Make maritime labour market more attractive can reduce the problem of lack of seafarers and its impact on a whole range of related industries. [3]																			
B 3.V	**Quantification of impacts**																				

		AFFECTED SEGMENTS																Geographical level		Source	
B 4	**SOCIAL IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)												↑				↗	I	N	E	I
B 4.2	Safety												↑				↗	I	N	E	I
B 4.3	Crime, terrorism and security												↗					I	N	E	I
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities												↑					I	N	E	I
B 4.6	Standards and rights (related to job quality)										↗		↗					I	N	E	I
B 4.7	Employment and labour markets										↗							I	N	E	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Positive impact on safety, security and job skills [1] - Improving job environment, the maritime labour market will become more attractive [1] - Implementation of the ILO 2006 Maritime Labour Convention (MLC) to improve working and living conditions on board ships [1][4] - Making a substantial contribution to the revision of the STCW Convention [1] - Applying simplification measures to reduce the administrative burden [1]
B 4.V	**Quantification of impacts**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 5	**ENVIRONMENTAL IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																				
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																→	I	N	E	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Marginal impacts on the emission of air pollutants and on the use of non-renewable resources. - Improving job skill of crew reduces the safety and environmental damage risk of human factor at sea [1]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Simplification of formalities for ships travelling between EU ports ("Blue Belt") - Single electronic environment for all port/maritime transport related information exchanges and management - e-Maritime
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2009): Strategic goals and recommendations for the EU's maritime transport policy until 2018. [2] European Commission (2005):Commission staff working document on the establishment of a sustainable European maritime labour force of quality. [3] European Commission (2001): Communication from the Commission to the Council and the European Parliament on the training and recruitment of seafarers, COM/2001/0188 final. [4] European Commission (2007): Council decision of 7 June 2007 authorising Member States to ratify, in the interests of the European Community, the Maritime Labour Convention, 2006, of the International Labour Organisation. In: Official Journal of the European Union L 161/63.

FACT SHEET NO: 29 **CATEGORY: 4.5** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Internal Markets**
A 2	**Subcategory**	**Internal Market (intramodal) - aviation**
A 3	**Transport policy measure (TPM)**	**Single European Sky II**
A 4	**Description of TPM**	The Single European Sky (SES) is an initiative to reform the architecture of the European air traffic control to meet future capacity and safety needs. Since the introduction of the Single European Sky (SES I, EC (549/2004)) package in 2004 much has happened, but it has not delivered the expected results, as e.g. the process of integrating functional airspace blocks, regardless of national borders, has been confronted with political and economic hurdles. In addition, the member states have not taken steps towards the necessary cost efficiency which will be intensified by adjusted regulations (charging scheme). [1] During the years of SES I, the ATM (Air Traffic Management) situation has changed - whilst safety and capacity are still major issues, an additional great emphasis has been put on environment and cost efficiency under a less prescriptive approach in the new SES II. [5] A massive increase in demand for air transport is straining the capacity of the aviation infrastructure and the (historical induced) fragmentation of air traffic management hinders the optimal use of capacity. In addition, unused capacities induce unnecessary financial burden for aviation management. Furthermore, safety requirements have to be improved and environmental awareness is putting pressure on aviation and its environmental performance. To tackle these challenges, the Commission elaborated and updated a package of proposals: - Performance scheme: Set up by the EC through the adoption of regulation 691/2010 laying down a performance scheme for air navigation services and network functions. [10] - Network management: Route network design, management of scarce resources, traffic flow management and slot coordination & allocation, management of network technologies resulting from SESAR, coordination of technologies & their procurement - Performance regulation / Network management / Technical updates to regulations. [4] - Integration of service provision: Support initiatives to set up functional airspace blocks (FAB) by setting firm deadlines (end 2012), extending the scope of lower airspace to the airport, clearing national legal and institutional obstacles. [10] - New technologies: Provision and implementation of SESAR (SES ATM Research), implementation of new operational concept. - Safety: European Aviation Safety Agency (EASA est.2002): Expand its competence to airports, air traffic management and air navigation services. - Managing capacity on airports: Implementation of an action plan for airport capacity, efficiency and safety COM(2006)819 [1]
A 5	**Implementation examples**	not yet implemented
A 6	**Objectives of TPM**	In general: SES II sets the community framework to improve the performance and the sustainability of the European aviation system. - Improvement of the air traffic management (ATM): Establish a sustainable aviation (air pollutants, noise emissions) by shortening flight routes and optimizing flight profiles (through reduced fragmentation by establishing functional airspace blocks (FAB)) [1]. - Improve the performance of air navigation services (ANS): safety, flight efficiency, capacity/delays, cost efficiency.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No direct change, but potential modal shift of passengers from competing high speed rail services in competition
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Significant enhancement by the implementation of 9 functional airspace blocks (FAB)
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Significant improvements regarding energy efficiency due to a decrease of energy usage expected
A 8	**Main source**	[12]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

B 1.1	**Summary**	- Implementing SES II will have positive impacts on the European aviation market (passengers, operators) and the indirectly affected segments (residents, employees, economy, society, public bodies) mainly resulting in: - Decreasing transport costs, congestion reduction, vehicle mileage, transport time - Increase of revenues and public/private income - Strengthening the direct and indirect employment sector - Decreasing air pollutants and noise emissions and a positive influence on climate change - Charging scheme adjustments / changes will set incentives for cost efficiency, balance of risk sharing between ANSPs and users positively influencing the public income
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time			↘						↘								**I**	**N**	**S**	**I**
B 2.2	Risk of congestion			↘						↘								**I**	**N**	**S**	**I**
B 2.3	Vehicle mileage			↘						↘								**I**	**N**	**S**	**I**
B 2.4	Service and comfort			↗														**I**	**N**	**S**	**I**

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Establishing SES II incl. FABs will reduce the number of delays by decreasing the travel time / increase the flight efficiency (lower risk of congestion, decrease of vehicle mileage) for passengers and operators; in addition this increases the service and comfort for aviation passengers in general. - Significant flight efficiency improvements due to the reduction of route extensions (decreasing vehicle mileage) between and within participating countries [6]
B 2.V	**Quantification of impacts**	- FAB: Annual benefits as % of 2006 total economic costs between 2 % and 37 % [6] - Average route extension in Europe is about 50km per flight in Europe [12] - Potential impacts of FABs by improved routing: between FABs 26%, between States 11% , within States 63% [6]

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs									↘								**I**	**N**	**S**	**I**
B 3.2	Private income / commercial turn over														↗			**I**	**N**	**S**	**I**
B 3.3	Revenues in the transport sector									↗								**I**	**N**	**S/E**	**I**
B 3.4	Sectoral competitiveness									↘					↗			**I**	**N**	**S/E**	**I**
B 3.5	Spatial competitiveness									↗								**I**	**N**	**S/E**	**I**
B 3.6	Housing expenditures																				
B 3.7	Insurance costs									↘								**I**		**E**	
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↓		**I**	**N**	**S/EE**	**I**
B 3.10	Public income (e.g.: taxes, charges)															↗		**I**	**N**	**S/EE**	**I**
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- High implementation costs of SES II have to be expected for public bodies
B 3.III	**Operation phase**	- In operation SES II will increase the cost efficiency for all involved participants.
B 3.IV	**Summary / comments concerning the main impacts**	- Flight efficiency will increase due to implementation of FABs, hence transport costs for operators and time for passengers will decrease [12] [EE] - FABs/Usage of scarce sources (e.g. Radio frequencies) will help to improve the cost efficiency of air navigation services (ANS) and ATM, hence administrative work of these public authorities will be diminished and public income will increase. Costs inefficiencies for Europe are estimated at 2bn € (2005), approximately 20% of the total costs. [12] [EE] - Setting regional FAB level performance targets and allocation accountability will reduce the number of local target setting procedures (Higher revenues for airspace navigation service providers (ANSP)), foster cooperation among ANSPs in the relevant FABs, encourage joint initiatives between ANSPs and limit opportunities of pushing issues to the neighbour (decrease of sectoral / spatial competitiveness) and enhance the collective accountability [6] - SES II incentivise cost-efficiency by implementing a performance scheme [9] - SES II respectively the new regulation on the charging of air navigation services (OJEU L333) will abolish the "automatic full costs recovery mechanism" for ANSP to enable cost-efficiency improvements [2] which will lead to better performances, cost containment and cost efficiency, which highers the public income [9] as the ANSPs are corporatized monopolies [12] - The aviation equipment industry (electronical / data systems) must ensure the swift introduction of new technologies [12] -3rd level impact: If aviation becomes more safe, then insurance costs can decline (on the long run).
B 3.V	**Quantification of impacts**	- Costs inefficiency accounts app 4.4 bn€/year [4]

B 4 SOCIAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety			↗													↗	**I**	**N**	**S/E**	**I**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)												↗					**I**	**N**	**S/E**	**I**
B 4.7	Employment and labour markets												→		↗			**I**	**N**	**EE/S**	**I**
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Strengthening the European Aviation Safety Agency (EASA) by SES II in the areas of airport infrastructure equipment, operation, air traffic management (ATM) and air navigation services (ANS) will improve safety for passengers as well as standards and rights of employees in these sectors. [7] [12] - Given the emphasis of human factor in air navigation service provision SES II will improve the performance scheme on a genuine safety culture, integrating effective incident reporting and 'just culture' as the basis for safety performance and ensure the adequate level of competence of the professionals [9] - The positive effects of improving the efficiency (by management) of the air transport network will give the industry 'a license to grow' and thus have a positive impact on jobs and employment. [12] In contrast and according to expert, there will be job losses or the need for relocation by consolidation of ATC centres. [EE] - Establishment of FABs: Efforts by the ANSPs in the social domain will be offset by the increased potential for job creation among airspace users and the induced effect on the economy at large. [12]
B 4.V	**Quantification of impacts**	

B 5 ENVIRONMENTAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	**I**	**N**	**S**	**I**
B 5.2	Noise emissions													↘				**I**	**N**	**S/E**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘				
B 5.6	Renewable or non-renewable resources																↓	**I**	**N**	**S/E**	**I**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Optimisation of network management and flight-efficiency by FAB by better organisation of the turnaround process (waiting time, in-time gate allocation, ground-handling, services) affects residents and society (less air pollutants and noise emissions) positively and decreases the usage of energy / resources. - The cut of flight inefficiencies lead to a more efficient usage of resources (save fuel) and lowers the GHG emissions [12] - It is impossible to evaluate exactly how much in the way of emissions will be avoided in practice (by efficiency gains), but the potential is more than the proportional increase in traffic since congestion will occur without SES II. [12] - SES II respectively the new regulation on the charging of air navigation services (OJEU L333) abolishes the" automatic full costs recovery mechanism" for ANSP and set incentives for ANSPs and users to improve services and reduce environmental impacts of aviation. [2]
B 5.V	**Quantification of impacts**	- Optimized ATM in Europe has the potential to significantly reduce fuel consumption and emissions by 10% [8] - 1.5 litres per passenger in average, resulting in a reduction of 5 mio.t CO_2 [8] - Defragmentation of European air space by implementation of FAB with for more direct routing will result in an emission reduction of 2% per year. - Aviation contributes to 3% of all CO_2 emissions in Europe (2007) [12] - Eurocontrol's Performance review Commission (PRC) report estimates that horizontal flight inefficiencies implicated 3.7% additional fuel consumption for 2007. If TMA airborne delays and taxiing delays are included as well, this will lead to an additional 3-7% fuel consumption. [12]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- SESAR
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2008e): Communication from the Commission - Single European Sky II: towards more sustainable and and better performing aviation. COM(2008)389 [2] European Commission press release (2010f): New Regulation on Single European Sky charging to make flying cheaper and more performing [3] European Commission (2009n): II Single European Sky package - Regulation 1070/2009 [4] European Commission : Slide presentation SES II - Aviation package [5] European Commission: SES II Information KIT - Fiche I: What it brings to Europe? [6] Eurocontrol / Performance Review Commission (2008): Evaluation of FAB initiatives [7] European Commission: SES II Information KIT - Fiche V: A Safer Sky with EASA [8] European Commission: SES II Information KIT - Fiche VI: Aviation and environment [9] European Commission: SES II Information KIT - Fiche IX: In the context of an ecomic downturn [10] SkyBrary, available under http://www.skybrary.aero, initiated by the European Organisation for Safety of Air Navigation - Eurocontrol [11] European Commission (2009b): Regulation 1108/2009 amending regulation EC 216/2008 in the field of aerodromes, air traffic management and air navigation services [12] European Commission: (2008b): Impact assessment; Proposal for a regulation. Improve the performance and sustainability of the European Aviation system. COM(2008)2093

FACT SHEET NO: 30 **CATEGORY: 4.5** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Internal Markets**
A 2	**Subcategory**	**Internal Market (intramodal) - aviation**
A 3	**Transport policy measure (TPM)**	**Implementation of the Single European Sky initiative (SESAR)**
A 4	**Description of TPM**	The transport policy measure SESAR (Single European Sky ATM (Air Traffic Management) Research) is the infrastructure modernisation programme for the Single European Sky (SES) initiative and represents its technological pillar and operational dimension. The Single European Sky initiative, launched by the European Commission, aims to reform and harmonise the European air traffic architecture by proposing a legislative approach to increase aviation capacity and safety on European level. The European air traffic control infrastructure modernisation programme (SESAR) will be implemented (from 2013) and meet the projected traffic by the year 2020. SESAR will quote a paradigm change in ATM by closing rank between ground and air by fastening and simplifying the exchange of information. ATM concerns ground based controllers which primary tasks are to organise and expedite the flow of air traffic. The improvement of technologies exchanging these information will not only be restricted between air traffic controllers and pilots, but also improve the information flow from airline operation centres, meteorological services and airports, hence the overall network performance. Founded by the European Commission and Eurocontrol, the SESAR program members cover the whole aviation industry including airport operators, air navigation service providers, equipment makers and aircraft builders. [1] SESAR aims at developing the new generation European air traffic management network which has hardly been modernized since the 1960s. ATM includes Air Traffic Controlling (= managing the synchronisation and separation of aircrafts on the ground and in flight), Air Space Management (by establishing permanent or dynamic air space structures in order to accommodate the different types of air activity, the traffic and the resources) and organisation of Air Traffic Flow and Capacity Management (by creating an orderly flow of air traffic). In Europe the ATM services are provided by Air Navigation Service Providers (ANSPs, typically one per country) and Eurocontrol. The purpose of the SESAR programme is to develop new flight procedures and to design the future European ATM system as an integrated and distributed system, which is interoperable and based on a single ATM architecture and common standards.
A 5	**Implementation examples**	
A 6	**Objectives of TPM**	The development of a better exchange of information by SESAR will lead to an overall improvement within the European aviation sector by: - increasing safety - increasing of system capacity and the manageable number of flights - environmental benefits - a better planning of flights leading to less congestion - increasing the fluidity of air transport by a higher predictability of departures and arrivals and avoid unnecessary waiting times - lower costs for airlines and tickets by increasing efficiency; lower maintenance and procurement costs - increasing cost-efficiency regarding economies of scales - development and avoidance of fragmentation - EU community level standards [1] [3] [4] [9]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No change
A 7.2	Origin and/or destination of trip:	No change
A 7.3	Trip frequency:	Increase of possible trip frequency due to higher capacity / predictability / manageable number of flights
A 7.4	Choice of route:	No change
A 7.5	Timing (day, hour):	Improvements in flight planning (operators, ground control) will increase capacity
A 7.6	Occupancy rate / Loading factor:	No change
A 7.7	Energy efficiency / Energy usage:	Improvement of energy efficiency. Less energy usage, because of reduction no delays (ground / air)
A 8	**Main source**	[5]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.2	**Summary: Income groups**	- Decrease of transport costs lowers the gap between the different income groups, which leads to social inclusion and more opportunities. The reduced costs are based on the fact that the aviation systems becomes more efficient, assuming that benefits are passed on to the customer.
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time			↘						↘								I	N	E	
B 2.2	Risk of congestion			↘						↘								I	N	E	
B 2.3	Vehicle mileage									↘								I	N	E	
B 2.4	Service and comfort			↗														I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	2013
B 2.III	**Operation phase**	2020
B 2.IV	**Summary / comments concerning the main impacts**	- Increasing flight efficiency [5] (reduction of delays, increase of punctuality). [6] - Increasing capacity. [5] - Service and comfort level will arise because of less delays and higher flight predictability. [5] - Air transport operators reduce their vehicle mileage.
B 2.V	**Quantification of impacts**	European Commission stated several high level goals until 2020 for the SES and its technological pillar (SESAR (ATM)): - 73% increase in capacity from 2004 which will reduce delays on ground and air. [5] - 50% reduction of cancellation and delays for passenger aviation (2013 - 2020). [7] - Reducing ATM costs by 50%. [1] - Reducing environmental impacts by 10%. [1] - Increase of safety by a factor of 10. [1]

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs			↘						↘								I	N	S	I
B 3.2	Private income / commercial turn over														↗		↗	I	N	S	I
B 3.3	Revenues in the transport sector									↗								I	N	S / EE	I
B 3.4	Sectoral competitiveness														↗						
B 3.5	Spatial competitiveness									↑					↗			I	N	E	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↑		I	N	EE	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations														↑			I	N	S	I

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Increase of asset costs for airspace operators (airlines), air navigation service providers, airports. - Research and development, implementation and deployment of SESAR will burden costs for public authorities (EU and national bodies) and aviation businesses. "The total estimated cost of the development phase of SESAR is € 2.1 billion, to be shared equally between the European Union, Eurocontrol and the industry (€700 million European Union, €700 million Eurocontrol, €700 million industry)" [3].
B 3.III	**Operation phase**	- Reduction of costs to maintain legacy systems [5] - Reduction of operating costs for air navigation service providers (ANSP) [5] - Increasing demand for aviation equipment after roll-out of SESAR - growing business revenues for aviation equipment manufacturers [5]
B 3.IV	**Summary / comments concerning the main impacts**	- Competitive advantages for European air transport industry (equipment manufacturing, research & development sector) because of similar programmes being duplicated in other parts of the world. [5] - Deployment costs are expected to to be significant. [EE] - Aviation industry directly impacts the level of economic activity; more efficient air travel improves the productivity (added value) in the transport sector, which positively affect wages. [5] - Aviation equipment manufacturers will experience increase in demand [5] - The aviation sector increase of output (capacity gains),will accommodate the projected growth in traffic demand, which will have positive direct, indirect and induced effects on wider economy. [5] [EE] - Increasing efficiency in air transport (passenger and freight) -> generates economies of scales in resource allocation -> increases competitiveness of European industries and consumers ->lower prices for import, export, travel -> positive for trade, investments and economic activities -> consumer have more choices and lower costs. [5] - SESAR directly aims to enhance the spatial competitiveness of air transport operators
B 3.V	**Quantification of impacts**	- The European aviation sector (without manufacturing) accounts for about 0.9% of GDP (ACARE study, 2003), with indirect and induced impacts it accounts for 1,5%. [5] - 2008 - 2020: Cost savings due to direct ATM (SESAR) costs per flight will account for around 8 bn € for commercial airlines. [6] - 2013 - 2020: impacting the GDP by 419bn € (41% direct effects). [7] - Aviation equipment manufacturers will experience limited increase of benefits by 10%. [7] - Cost reduction for airspace users of 50% until 2020 compared to 2005. [5]

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)			↗										↗			↗	**I**	**N**	**E**	**I**
B 4.2	Safety			↗										↗			↗	**I**	**N**	**E**	**I**
B 4.3	Crime, terrorism and security									↘							↘	**I**	**N**	**S**	**I**
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																↗	**I**	**N**	**E**	
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets									â					↗			**I**	**N**	**S**	**I**
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Lower transport costs will lower the regarding availability of flights (travel) and leads to social inclusion and more opportunities.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Reduced risk of accidents - increasing safety for society, residents living at the airport area and air passengers - SESAR will have the potential to increase the safety level in relation to the traffic growth [6] - Increasing health by reduced air pollutants and noise for society, as far as technological improvements keep pace with traffic growth. - SESAR directly impacts aviation industry and positively influences the level of regional employment [5] - Within the aviation sector (excl. manufacturing) it is unclear if SESAR will have positive (increasing number of flights) or negative (capacity improvements requires less employees) impacts on direct employment (transport operators). Indirect and induced employment is expected to grow (economy). [5] - SESAR ('ATM Self Protection') will provide improvements to prevent unauthorised access to and disclosure of ATM information (affecting air transport operators and society). [6]
B 4.V	**Quantification of impacts**	- SESAR will overall (direct, indirect, induced) create 328,000 additional jobs, largely derived from the increasing number of flights enabled (2013 - 2020). [7]

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	**I**	**N**	**S**	**I**
B 5.2	Noise emissions													↘			↘	**I**	**N**	**S / EE**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**I**	**N**	**E**	
B 5.6	Renewable or non-renewable resources																↘	**I**	**N**	**E**	

B 5.I	**Overall impacts on social groups**	- The reduction of noise will have very positive impacts on residential areas near airports - The reduction of air pollutants will have positive impacts on residential areas near airports
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Improvement of flight path efficiencies reduces the amount of fuels and emissions per flight.[5] - Environmental savings by a reduction of air pollutants (CO_2, NO_x, SO_x) [5]; dependent on growth in air traffic according to the implementation of SESAR. [5] - Less noise emissions, dependent on growth in air traffic according to the implementation of SESAR. [5] - Reduction of pollutants causing climate change. [5] - Increasing number of flights lead to more people exposed to aircraft noise if technological improvments do not keep pace with traffic growth. [EE]
B 5.V	**Quantification of impacts**	- "The enhancements in air traffic management through the optimisation of horizontal and vertical flight profiles have the potential to trim down the in-flight CO_2 emission cumulated over the 2008 to 2020 period with around 50 million tons." [6] - 2008 - 2020: Flight fuel efficiency savings 17 million tons (app. 8 bn €). [6] - Reduction of 50 million tons of CO_2 during 2013 ad 2030 [7] - Until 2020 10% reduction of environmental effects compared to 2005 [5]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Single European Sky II
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2010b): The future of flying. SESAR Joint undertaking, Brussels. [2] European Commission (2006a): The SESAR Initiative. Research paves the way for the Single European Sky. Brussels [3] SESAR Joint undertaking at http://www.sesarju.eu/ [4] Steer Davies Glaeve (2005): SESAME CBA and governance. Assessment of options, benefits and associated costs of the SESAME Programme for the definition of the future air traffic management system, London. [5] European Commission (2008a): Communication from the Commission - The Air Traffic Management Master Plan (The ATM Master Plan). COM(2008)750. Brussels. [6] European Commission (2008g): SESAR Consortium - SESAR Master Plan. SESAR Definition Phase - Milestone Deliverable 5 [7] European Commission (2011j): Assessing the macroeconomic impact of SESAR. Final report. [8] European Commission (2008b): Commission Staff working document accompanying the proposal for a regulation of the European Parliamant and Council amending regulations ..in order to improve the performance and sustainability of the European aviation system. Impact assessment. SEC(2008)2093, Brussels. [9] Council of the European Union (2009). Council resolution on the endorsement of the European Air Traffic Management Master Plan [30/03/2009]. http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/trans/106966.pdf

FACT SHEET NO: 31 **CATEGORY: 4.6** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Internal market**
A 2	**Subcategory**	**Transport security - cargo**
A 3	**Transport policy measure (TPM)**	**SafeSeaNet (European Maritime Information System)**
A 4	**Description of TPM**	To overcome information exchange problems in maritime transport, and to fulfil the obligation given in Directive 2002/59/EC (to establish a Community vessel traffic monitoring and information system), a pan-European system named SafeSeaNet (SSN) has been developed. SAFESEANET is concerned with the exchange of information between member states in relation to vessel arrivals and departures, hazardous material transportation, alerts, waste, security and ship data for monitoring purposes.
A 5	**Implementation examples**	The Blue Belt project was launched in 2010 as a pilot project to reduce the administrative burdens of the short-sea shipping industry; within the defined "blue belt" ships could operate freely, with only a minimum of the administrative burden supported by the most recent technology available for the monitoring of sea traffic. [7] National implementation examples can be found in the Netherlands [8] and Norway [9]
A 6	**Objectives of TPM**	1) Enhancing the safety and efficiency of maritime traffic 2) improving the response of authorities to incidents, accidents or potentially dangerous situations at sea (including search and rescue operations) and 3) contributing to improved prevention and detection of pollution by ships.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Maritime transport becomes safer. Therefore, this type of transport might be more attractive on long distances, compared to land modes
A 7.2	Origin and/or destination of trip:	No change in origin and destination expected
A 7.3	Trip frequency:	Maritime transport becomes safer. Therefore, the trip frequency may increase, especially regarding short-sea shipping
A 7.4	Choice of route:	Choice of route might be affected due to a mode shift
A 7.5	Timing (day, hour):	Extra trips by sea may take more time concerning travel and handling
A 7.6	Occupancy rate / Loading factor:	Occupancy rate is not affected
A 7.7	Energy efficiency / Energy usage:	Energy efficiency is not affected
A 8	**Main source**	[1] [2] [3] [4] [5] [6]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																				

The SafeSeaNet initiative enhances safety and improves the response to incidents or pollution. The TPM has some specific impacts for sea transport. Social impact concerns comfort and service which are increased in quality. The economic impact shows an increase in costs concerning the administrative burdens, but on the other hand a decrease in insurance costs might be expected. The environmental impact concerns less pollution at sea, which is a positive impact.
Other aspects:
- A substantially improved vessel position monitoring capability (every 6 minutes, instead of 2 hours);
- An increased level of confidence thanks to the ability to correlate two different types of information;
- Information provided on a free of charge basis;
- Potentially significant cost reductions in comparison to the present Vessel Monitory System (VMS) system.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort										↗										

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	Passenger and freight transport by sea becomes more safer. However, it does not affect B2.1-2-3. Service and comfort are increased in quality.
B 2.V	**Quantification of impacts**	No reported quantified impacts

B 3	**ECONOMIC IMPACTS**	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs										→							**I**			
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness										→							**I**		**E**	
B 3.5	Spatial competitiveness										↗							**I**		**E**	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs										↘							**I**		**E**	
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses										↘							**I**		**E**	
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- SAFESEANET is expected to increase efficiency of port logistics by cutting costs due to decreased delays, faster clearance and release. SAFESEANET increases the competitiveness of European ports by reducing the administrative overheads of businesses and maritime authorities once the system is in place. This will be achieved through the implementation of a Single Window whereby standardized electronic information is exchanged with a single entry. The information provided in the SAFESEANET system may also be useful to other public authorities, such as Customs and Border Police. [7]
B 3.V	**Quantification of impacts**	No quantified evidence available

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety										↗							I		E	
B 4.3	Crime, terrorism and security										↗							I		E	
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- This measure contributes to more safety of freight and passenger transport by sea due to the reduction in incidents and improvements in the response by search and rescue services.
B 4.V	**Quantification of impacts**	No quantified impacts available

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																				
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	**-** The pollution by transport operators will decrease due to SafeSeaNet by providing an improved emergency response in case of pollution at sea.
B 5.V	**Quantification of impacts**	No quantified evidence has been found

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	see below

International

[1] Leaflet SafeSeaNet (2009): http://ec.europa.eu/idabc/en/document/2282/5926.html

[2] http://emsa.europa.eu/operations/safeseanet.html

[3] Directive 2002/59/EC (Consolidated Version - 16/03/2011) OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC

[4] Directive 2011/15/EC of 23 February 2011 amending Directive 2002/59/EC of the European Parliament and of the Council establishing a Community vessel traffic monitoring and information system

[5] Directive 2009/17/EC of 23 April 2009 amending Directive 2002/59/EC establishing a Community vessel traffic monitoring and information system

[6] Directive 2002/59/EC of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC

[7] EMSA (2012). Blue Belt Pilot Project. Evaluation Report. Online http://emsa.europa.eu/operations/safeseanet/items/id/1463.html?cid=113; Retrieved [12 February 2013]

National

[8]http://www.rijkswaterstaat.nl/water/veiligheid/scheepvaartverkeersbegeleiding/SafeSeaNet/

[9]http://www.kystverket.no/en/EN_Maritime-Services/Reporting-and-Information-Services/SafeSeaNet-Norway/

FACT SHEET NO: 32 **CATEGORY: 4.9** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Internal Markets**
A 2	**Subcategory**	**Transport security - "end-to-end"**
A 3	**Transport policy measure (TPM)**	**'End-to-end' security certificates**
A 4	**Description of TPM**	The TPM is about the increase of cargo security for land transport in the European Union along the entire supply chain. The existing security checks are solely executed for single modes of transport (mostly at airports or ports) and not for entire supply chains. An 'End-to-end' security certificate provides an efficient and comprehensive solution for transport operators to secure their cargo throughout the entire supply chain. The 'End-to-end' certificate aims to deliver more security without limiting the free flow of goods. 'End-to-end' means that the cargo will be checked at or close to its point of department and remains secured (screening is only needing at boarding) for the entire supply chain. [1] Not all cargo transported has to be inserted in an 'End-to-end' security certificate system. The system has to be adjusted to the proportional risk and the value of cargo. [2] Typical supply chain security activities include the credentialing of supply chain participants, screening and validation of the cargo content, advanced notification of the content to the destination country, ensuring the security of cargo while in-transit (locks, tamper-proof seals), cargo inspection on entry. [10]
A 5	**Implementation examples**	
A 6	**Objectives of TPM**	- Increase security of cargo along the entire supply chain without restricting the free flow of trade. To avoid additional effort for transport enterprises and to reduce red tape it is desirable to integrate the 'End-to-end' certificates into existing schemes. [1] - Improve international cooperation to fight terrorism and other criminal activities like piracy and by ensuring the recognition of the EU concept of 'one stop security' system internationally. [1] [9] - Joint Security Assessment covering all modes of transport. [1] - Integrate potential effects of terrorist and criminal attacks in the preparation of mobility continuity plans. [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Cargo transport will be ensured for all modes of transport which means that security issues will become less important while choosing between modes of transport and multimodality will become more attractive.
A 7.2	Origin and/or destination of trip:	Unstable or unsafe regions may become more attractive due to comprehensive security certificates. [3]
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Unstable or unsafe regions may become more attractive due to comprehensive security certificates. [3]
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[1] [2] [3]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I

B 1.1 Summary: - No significant impacts for specific social groups.
- Mainly transport operators will benefit from one integrated and comprehensive 'End-to-end' security certificate. The crucial is about whether the introduction of an 'End-to-end' document leads to higher security costs and/or more regulations for transport operators. [1] [5] [6]

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						↘	↘	↘	↘	↘							I	N	S	I
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort						↗	↗	↗	↗	↗							I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- For cargo requiring security (valuable cargo like money, art, etc.) it is desirable that it is performed at the point of department and that the integrity is maintained throughout the journey. This 'End-to-end security' will replace existing safety measures at airports and ports and will ease transport of cargo throughout the entire supply chain.[2] - Service and comfort improves if the new certificate is integrated in existing systems for secure maritime and air transport. [1]
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↘	↘	↘	↘	↘							I	N	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness						↘	↘	↘	↘	↘							I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs						↘	↘	↘	↘	↘							I	N	S	I
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		I	N	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations						↗	↗	↗	↗	↗					↗		I	N	S	N

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Increasing costs: strengthening of international relations and training of port authorities (and other participants) will lead to more administrative burdens. [2]
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The sectoral competitiveness between different transport modes decreases if security levels are equal for all modes of transport along the entire supply chain and not differentiated between modes or routes. [10] - Insurance costs will decrease due to a higher level of security for the entire supply chain. [2] - International relations must be strengthened and cooperation between trading partners needs to be intensified. This counts for all transport operators and for public bodies (governments). [2] [3] - Increasing international cooperation between public bodies will lead to more administrative burdens. [2] [3] - An 'End-to-end' certificate generates overall positive economic effects for all parties involved in multimodal transport, as it will simplify and reduce the costs and delays of administrative procedures and the modal shift. [7]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																↗				
B 4.3	Crime, terrorism and security						↗	↗	↗	↗	↗		↗				↗	I	N	S	I
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)												↗					I		E	
B 4.7	Employment and labour markets												→			→		N	I	S	N
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- One of the main targets of this TPM is to protect European freight transport against possible terrorist attacks. International cooperation must be further strengthened to achieve this higher level of protection. A higher level of security will not only be favourable for transport operators, but also for society in general. [1][3] - In order to strengthen international cooperation and introduce 'End-to-end' security certificates there will be more employment in the security sector and within public bodies. But, when workers (for instance at security authorities) are trained these extra jobs will disappear. The effect on employment is uncertain, as the decreasing administrative burdens will reduce the need for employment. [4] - Improved safety level for the driver / captain [10] and reduction of accidents [10]. 3rd level impact: - The introduction of "End-to-end" security certificates could encourage international cooperation which could lead to more equal standards and rights for employees in transport.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	I		S	I
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I		S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Early warning of dangerous goods. [10] - A main pre-requisite for low-carbon services (within freight transport) is the availability for standards for the environmental impact of freight transport. Security certificates can initiate such standards, which will lead to a reduction of greenhouse gas emissions and the negative effects on climate change. However, this is not a direct impact. [10].
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011c): Commission Staff Working document . Roadmap to a single European transport area. SEC(2011)391. Brussels [2] European Commission (2012c): Commission Staff Working Document on Transport Security. SWD(2012)143. Brussels [7] European Commission (2009m): Details and added value of establishing a (optional) single transport (electronic) document for all carriage of goods, irrespective of mode, as well as a standard liability clause (voluntary liability regime), with regard to their ability to facilitate multimodal freight transport and enhance the framework offered by multimodal waybills and or multimodal manifests. Brussels: Directorate-General Energy and Transport [9] ERRAC (2011): WP03 - Ensuring Sustainable (Sub)urban Transport, Seventh Framework Programme, FP 7 Cooperation Work Programme: Transport [10] Logistics for LIFE Coordination Action (2011): Roadmap on ICT for sustainable freight transport and logistics. 7thFramework programme Theme 3: Information and Communication technologies, Challenge 6: ICT for safety and energy efficiency in mobility (p.30-32). **National** [3] United States Department of Homeland Security (2007): Strategy to Enhance International Supply Chain Security, Washington D.C.: U.S. Department of Homeland Security [4] United States Department of Homeland Security (2012): National Strategy for Global Supply Chain Security, Washington D.C.: U.S. Department of Homeland Security [5] Federal Ministry of Transport, Building and Urban Development (2010): Aktionsplan Güterverkehr und Logistikinitiative für Deutschland, Berlin: Bundesministerium für Verkehr, Bau und Stadtentwicklung [6] Federal Ministry of Transport, Building and Urban Development (2008): Masterplan Güterverkehr und Logistik, Berlin: Bundesministerium für Verkehr, Bau und Stadtentwicklung [8] Sweden National Board of Trade (2008): Supply Chain Security Initiatives - A Trade Facilitation Perspective, Stockholm: Kommerskollegium

FACT SHEET NO: 33 **CATEGORY: 4.10** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Internal Markets**
A 2	**Subcategory**	**Multimodal transport**
A 3	**Transport policy measure (TPM)**	**Stimulate bundling freight transport to make optimal use of road, rail and IWW**
A 4	**Description of TPM**	Freight operators are dissatisfied with the presence of numerous administrative and institutional barriers at terminals, the quality of operations and sub-optimal transhipment processes. This situation calls for new concepts for bundling freight into consignments and new transhipment schemes, which in turn will require advanced designs of intermodal terminals. Bundling is the process of transporting goods belonging to different flows in a common vehicle (like train, barge or truck) or other unit during part of their journey. The measure simulates freight transport bundling, which is one of the key driving forces of container service network dynamics. The bundling of cargo typically involves several layers starting with the consolidation of parcels onto a pallet up to the bundling of a large number of containers onto a trunk line at sea or in the hinterland.
A 5	**Implementation examples**	- Inland service configuration and bundling in the Hamburg-Le Havre range - Bundling in between the Antwerp, Rotterdam and the Rhine basin - Several bundling practices around Europe, and the rest of the world (China, North America)
A 6	**Objectives of TPM**	- Support energy efficiency - Reduction of congestion - Reduction of transport costs - Efficient use of transport infrastructure - Optimisation of infrastructure usage (rail, road, ports, hubs, iww)
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Improvement in multimodality
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	Need to be adapted to the 'bundling timetable'
A 7.4	Choice of route:	Route of goods adapts to the bundling route
A 7.5	Timing (day, hour):	Need to be adapted to the 'bundling timetable'
A 7.6	Occupancy rate / Loading factor:	Increase in efficiency of loading units.
A 7.7	Energy efficiency / Energy usage:	Significant improvement of energy efficiency and usage
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS — AFFECTED SEGMENTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	I	N	S	I

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS — AFFECTED SEGMENTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time						↘	↘	↘									I	N	S	I
B 2.2	Risk of congestion						↘											I	N	S	I
B 2.3	Vehicle mileage						↘	↗	↗									I	N	S	I
B 2.4	Service and comfort						↗	↗	↗									I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Bundling of freight transport helps to use the resources (energy, human, infrastructure etc.) in the most optimal rate, therefore reduces costs, risk of congestion, and improves service and comfort for operators.[1]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS — AFFECTED SEGMENTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs						↘	↘	↘									I	N	S	I
B 3.2	Private income / commercial turn over														↗			I	N	S	I
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness						→	↗	↗									I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses						↗														
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The overall effect of the measure is the improvement of multimodal transport. That means, the number of vehicles decrease on roads, and the traffic on rail and iww increases. Principally, the specific costs of the road transport is higher than the others (except air cargo) so the overall costs reduce, including externalities. - Through more efficient and effective transport chain, the sectoral competitiveness improves as well [3] [5]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	**I**	**N**	**S**	**I**
B 4.2	Safety																↗	**I**	**N**	**S**	**I**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- This measure have very limited social dimensions, however measures have to be fit in the socio-economic challenges. In overall, an efficient and low bothering system is positive for the society. [5]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	**I**	**N**	**S**	**I**
B 5.2	Noise emissions																↘	**I**	**N**	**S**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**I**	**N**	**S**	**I**
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Intermodal, combined and multimodal transport modes are (per definition) more environment aware than only road transport. Therefore an energy efficient bundling freight transport causes less air and noise pollutants. [5]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	Support deployment of new vehicles and vessels and retrofitting Eco-innovation in freight transport Promotion of handling installations for intermodal transport
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Ekki Kreutzberger : Lowest Cost Intermodal Rail Freight Transport Bundling Networks: Conceptual Structuring and Identification, 2010 [2] AN CARIS, CATHY MACHARIS, GERRIT K. JANSSENS, Planning Problems in Intermodal Freight Transport, 2008 **National** [3] T. Notteboom (2010): Bundling of Freight Flows and Hinterland Network Development [4] Kreutzberger, Ekki from bundling theory to network and node innovation, [5] Analysis of intermode connections in terms of transport system development in Poland.

FACT SHEET NO: 34 **CATEGORY: 5.1** **PERFORMED BY: FÖMTERV**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Standards - Transport safety**
A 3	**Transport policy measure (TPM)**	**Safety of road transport by means of ITS (Intelligent car initiative (e-Safety initiative))**
A 4	**Description of TPM**	The Intelligent Car Initiative is a policy framework set up by the European Commission to tie up all activities relating to 'intelligent' automobiles. The term covers all vehicles that are equipped with modern information and communication technologies (ICT) to increase road safety and/or the flow of traffic, or to reduce the environmental impact of road transport. For the benefit of road users and society in general, eSafety is working for a quicker development and increased use of smart road safety and eco-driving technologies.
A 5	**Implementation examples**	- e-Call - ADAS (Advanced Driver Assistance Systems, or ADAS, are systems to help the driver in the driving process. When designed with a safe Human-Machine Interface it should increase car safety and more generally road safety. Examples of such a system are: - In-vehicle navigation system with typically GPS and TMC for providing up-to-date traffic information. - Adaptive cruise control (ACC) - Lane departure warning system - Lane change assistance - Collision avoidance system (Precrash system) - Intelligent speed adaptation or intelligent speed advice (ISA) - Night Vision - Adaptive light control - Pedestrian protection system - Automatic parking - Traffic sign recognition - Blind spot detection - Driver drowsiness detection - Vehicular communication systems - Hill descent control - Electric vehicle warning sounds used in hybrids and plug-in electric vehicles the list could be very long, and longer from day to day
A 6	**Objectives of TPM**	- Improve road safety - Avoid accidents, especially cut back the fatalities on road - Reduce environmental problems, (especially reduce fuel consumption and CO2 emission) - Reduce congestion
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	The TPM can result in more energy efficient use of vehicles.
A 8	**Main source**	[3]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	N	I	S	I
		- Traffic impacts refers to road transport only. Risk of congestion and number of accidents decreases significantly thanks to the ITS applications.																			
B 1.2	**Summary: Income groups**																				
B 1.3	**Summary: Age groups**																				
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time	→					→											N	I	S	I
B 2.2	Risk of congestion	↓					↓											N	I	S	I
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort	↗					↗											N	I	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The e-Safety measures, as set aong the objectives significantly reduces the number of accidents and the risk of congestion. [2] [3]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	→					↘											N	I	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↗					↗											N	I	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs	↘					↘											N	I	S	I
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The measure has very limited economic impacts, however a set of measures may reduces transport costs for freight companies (with large fleet), and definitely reduces accident related costs (health and insurance, because of reduction of accidents) and makes road transport much more competitive.
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety	↑					↑											**N**	**I**	**S**	**I**
B 4.3	Crime, terrorism and security	↗																**N**	**I**	**S**	**I**
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The social impact of the measure is mainly related to the transport users on the road. For them, safety is the most significant positive impact. Others are neglible. [1] [2] [3]
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	**N**	**I**	**S**	**I**
B 5.2	Noise emissions																↘	**N**	**I**	**S**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**N**	**I**	**S**	**I**
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main**	- Efficient use of vehicles results in environmental benefits as well, namely reduction of pollutant emission and noise. [3]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	European Road Safety Action Programme RSAP (2001-2010)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Road Safety - Impact of new technologies, OECD 2003 [2] Kerry M. Malone, TNO (2006): Impact Assessment and the Intelligent Car Initiative [3] EU road-safety action programme (2004/2162(INI)) **National** [4] Safer Roads Thanks to ITS, Public Roads May/June 2002 Vol. 65· No. 6 [5] Intelligent Car Initiative, André Vits, DG-INFSO

FACT SHEET NO: 35 **CATEGORY: 5.1** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Standards - Transport Safety**
A 3	**Transport policy measure (TPM)**	**European Road Safety Action Programme RSAP (2001-2010)**
A 4	**Description of TPM**	Of all modes of transport, transport by road is the most dangerous and the most costly in terms of human lives. For this reason, the Road Safety Action Programme (2003-2010) proposes a series of measures such as stepping up checks on road traffic, deploying new road safety technologies, improving road infrastructure and measures to improve users' behaviour. The RSAP includes 60 measures which are quite diverse, but together cover all aspects of road safety. The measures are aimed at the three well-known areas of road safety: - Road users: RSAP aims to encourage road users to improve their behaviour, in particular through better compliance with existing legislation, through basic and continuous training and by combating dangerous practices. - Vehicle technology: RSAP aims for technical harmonisation and support for technological progress should help to make vehicles safer. With respect to vehicle technology a distinction can be made between actions aimed at improving active safety of vehicles and those at passive safety of vehicle. - Road infrastructure: by defining and disseminating best practices and elimination of black spots, the road infrastructure can be made safer.
A 5	**Implementation examples**	Netherlands [2]
A 6	**Objectives of TPM**	The RSAP has a clear focus on the reduction of road deaths. The RSAP describes concrete actions and proposals for actions by the Commission aimed at realising the target for improving road safety as set in the White Paper (European Transport Policy for 2010: time to decide, 2001), namely halving the number of road deaths by 2010 (compared to 2001 levels). In order to reach this reduction in fatalities, the actions broadly aim at two aspects: - To reduce the number of accidents; - To reduce the severity of the accidents in terms of fatalities. [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No change regarding the choice of transport mode (road transport), but regarding the type of road vehicle: the measure encourages the choice of safer vehicles. Modal shift policy as an additional strategy can be effective in freight traffic, to stimulate the use of safer and more environmentally friendly modes of transport.
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	No change.
A 7.4	Choice of route:	No change.
A 7.5	Timing (day, hour):	No change.
A 7.6	Occupancy rate / Loading factor:	No change.
A 7.7	Energy efficiency / Energy usage:	In general the RSAP actions affect the flow speed of the traffic to increase the safety on the road. A slower speed leads to less energy usage.
A 8	**Main source**	[2] [3]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	E	I, N
B 1.2	**Summary: Income groups**																				
B 1.3	**Summary: Age groups**	- The TPM has a particular impact on vulnerable road users, like young and elderly pedestrians and cyclists.[1]																			
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↗					↗											N	I	E	N
B 2.2	Risk of congestion	↘					↘											L	N	E	N
B 2.3	Vehicle mileage	→					→											N	I	E	N
B 2.4	Service and comfort	→					→											L	N	E	N

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main traffic impacts**	- Increased road safety reduces the number of interruptions through accidents and therefore has a positive impact on the risk of congestion; on the other hand the decreased travel speed leads to an increase of the average travel or transport time [2][3]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗					↗									↗		L	N	E	N
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs	↘				↘	↘											N	I	E	I
B 3.8	Health service costs	↘				↘	↘											N	I	E	I
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main economic impacts**	- Health service costs; the reduction of accidents reduces the amount of health service costs. - Innovation/sectoral competitiveness; The focus on developing safer vehicles directly stimulates innovation by car manufacturers and thereby economic growth. Impacts distinguished by the affected segments: - Households; Households experience a mixed impact from increased safety: Savings of lives and injuries result in lower economic damage (income, expenditures) and psychological damage. - A decrease in accidents in general will lead to a decrease in congestion costs. At the other hand, however, the various safety regulations can result in an increase in expenditures (e.g. safer but more expensive cars, compulsory use of helmets, etc.). - Road transport companies: Operating costs can increase if the average travel time increases, e.g. due to speed restrictions or longer travel routes (direct impact). Road infrastructure measures aimed at increasing safety may have the effect of a lower travel speed. The adoption of specific routes for (dangerous) cargo vehicles might result in longer travel distances. Operating costs can also reduce due to reduced congestion on the roads (indirect impact). - Government budgets; Increases in government expenditures are to be foreseen due to higher costs for road infrastructure (construction, maintenance). Also extra expenditures are to be expected due to implementation of regulation, enforcement of regulation and awareness campaigns.[1]
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)	↗				↗	↗						↗				↗	**L**	**N**	**E**	**I**
B 4.2	Safety	↗				↗	↗						↗				↗	**L**	**N**	**E**	**I**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Impact on elderly people: the risk of older road users to be killed in traffic is partly due to their higher accident involvement, but especially due to their physical vulnerability. Once an accident has happened, an elderly person is more likely to die or to be seriously injured than younger persons. Also elderly cyclists are at risk. Almost 40% of all cyclist fatalities are older than 65. [1]; - Another group of vulnerable road users are children. Children under the age of 15 represented some 3% of all fatalities in 2002. Especially as pedestrians and cyclists, children are at risk: they represent 7-8% of fatalities in these groups
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main social impacts**	- The RSAP was expected to have a positive social impact by decreasing the severity of road accidents and reducing the number of fatalities; however, the overall RSAP target (50% reduction) was not achieved.
B 4.V	**Quantification of impacts**	- [1] compares forecasts of road fatalities with the target RSAP (50% reduction) and calculates the gap: EU 15: 23% (i.e. only 27% reduction was expected to be achieved according to the modelling forecasts), for the 10 New Member States: a gap of 14%, EU 25: a gap of 31%; this means that the model, used in [1] predicted a gap of some 13,500 fatalities in 2010 [1].

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	**L**	**N**	**E**	**I**
B 5.2	Noise emissions																↘	**L**	**N**	**E**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																	**I**	**N**	**E**	**I**
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main traffic impacts**	- In general the RSAP actions affect the flow speed of the traffic to increase the safety on the road. As such, there is a relation with the environmental impacts as well: A reduction in speed has a positive impact on the environment (lower level of emissions, less noise and energy consumption) and thus for the society.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	Safety of road transport by means of ITS (Intelligent car initiative (e-Safety initiative))
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Emory's and SWATH (2005):Impact Assessment Road Safety Action Programme. Assessment for mid-term review. DG Energy and transport [2] COWI (2010): Technical Assistance in support of the Preparation of the European Road Safety Action Programme 2011-2020. Final Report. Lyngby: COWI. [3] Bosetti, et al (2010): Ex-Post Evaluation of the RSAP. The preparation of the European Road Safety Action Program 2011-2020. Final Report. Leuven: TML. **National** [4] CROW (2009): Handboek verkeersveiligheid (Road safety manual)

FACT SHEET NO: 36 **CATEGORY: 5.2** **PERFORMED BY: TRT**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Standards - Passenger rights**
A 3	**Transport policy measure (TPM)**	**Legislative framework on passenger rights on multimodal journeys with integrated tickets under a single purchase contract**
A 4	**Description of TPM**	To establish and complete the appropriate legislative framework on passenger rights with measures covering passengers on multimodal journeys with integrated tickets under a single purchase contract. EU passenger rights legislation needs to ensures uniform access conditions for passengers and a basic level of service quality, to ensure both a level playing field for the industry and a European standard of protection for the citizens. Passengers should expect a transport service that guarantees non-discrimination, assistance in case of disruption of their journey, transparency of travel conditions, dignity of treatment and full respect of the terms of their contract.
A 5	**Implementation examples**	Germany: Rail&Fly , AIRail France: tgvair, TGV Air France (France - Belgium) Sweden: Flyrail (SAS airlines, Statens Jarnvagar) UK: PLUSBUS Italy: IoViaggio Lombardia, Metrebus Lazio
A 6	**Objectives of TPM**	The TPM aim at ensuring both a level playing field for the industry and a European standard of protection for the citizens, also in the context of promoting a competitive and sustainable expansion of collective multimodal passenger transport. In this way, the rules on EU passenger rights facilitate also mobility and social integration. Passenger rights are based on three cornerstones: - non-discrimination; - accurate, timely and accessible information; - immediate and proportionate assistance.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Possible (minor) change
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	Possible (minor) change
A 7.7	Energy efficiency / Energy usage:	Possible (minor) change
A 8	**Main source**	[1] [3] [4]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	N	R	E	N

B 1.1	**Summary**	- Currently the majority of case studies are related to regional / national contexts; nevertheless, the TPM would aim at achieving results also at international level - Benefits in terms of accessibility, equality and reduced stress and uncertainty related to travelling - Specific benefits for disabled passengers (or with reduced mobility), not discriminated and provided with accessibility and assistance at no additional cost - Possible minor increase of cost for transport operators, in order to comply with regulation (especially for refund in case of delays, cancellations) [2]
B 1.2	**Summary: Income groups**	- Some groups (low income) might feel more protected thanks to the TPM
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	- Disabled passengers (or with reduced mobility) have more interest for the TPM, ensuring rules for accessibility and assistance at no additional cost
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort		→	→	→			→		→		→						N	R	E	N

B 2.I	**Overall impacts on social groups**	- Reduced stress and uncertainty related to travelling: improved services. - Increased reliability of collective and multimodal transport, with minor or null impact on mode choice.
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The implementation of regulation on passenger rights is expected to have minor or null impacts on traffic and mode choice. Actually, it mainly affect the social groups and their feeling of protection related to multimodal travelling.
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs							→		→		→						N	R	E	N
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs		→	→	→													N	R	E	N
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Possible minor increase of cost for transport operators, in order to comply with regulation (especially for refund in case of delays, cancellations). [2] - Passenger cost should be unchanged (not affected). - Increased passenger protection might reduce expenditure for private insurance contract related to disruption that may happen during multimodal trips.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)		→	→	→													**N**	**R**	**E**	**N**
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems		→	→	→													**N**	**R**	**E**	**N**
B 4.5	Social inclusion, equality & opportunities		→	→	→													**N**	**R**	**E**	**N**
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Benefits in terms of accessibility, equality and reduced stress and uncertainty related to travelling
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Reduced stress and uncertainty related to travelling for all passengers. - Specific benefits for disabled passengers (or with reduced mobility), not discriminated and provided with accessibility and assistance at no additional cost. - Increased equality treatment and opportunity.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																				
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1 **Other TPMs of this subcategory**

C 2 **References** (detailed references are included in an alphabetical list placed in "List of References")

International
[1] European Commission (2011c): IMPACT ASSESSMENT, Accompanying document to the WHITE PAPER - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system
[2] European Commission (2010): DG Energy and Transport (2010), EVALUATION OF REGULATION 261/2004
[3] European Commission (2005a): Commission Communication "Strengthening passengers rights within the European Union"
[4] European Commission (2011k): COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT AND THE COUNCIL - A European vision for Passengers: Communication on Passenger Rights in all transport modes
[5] https://www.lufthansa.com/de/en/AIRail-just-like-flying
[6] http://www.bahn.com/i/view/GBR/en/prices/germany/rail_and_fly.shtml
[7] http://agence.voyages-sncf.com/vol/tgvair.aspx
[8] http://www.flyrail.se/

FACT SHEET NO: 37 **CATEGORY: 5.3** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Efficiency standards & Flanking Measures**
A 2	**Subcategory**	**Standards - Environment**
A 3	**Transport policy measure (TPM)**	**Biofuels directive (Directive 2003/30/EC) - Introduction of a biofuels quota; bioethanol quota**
A 4	**Description of TPM**	This Directive promotes the use of biofuels in the EU. The Directive stipulates that 5.75% of all transport fuels should be replaced by bio fuels in 2010 and up to 10% in 2020. The ECs general objective is that biofuel should be sustainable. In that sense the intention of the Directive is positive, but the TPM may have some negative side effects, depended upon its implementation. • On the positive side there is the development of biofuel as an alternative to fossil fuels. This will lead to less CO2 emission. Also, new technologies to produce biofuel are being developed. (see WorldBank, 2008, World Energy Council, 2010 & UNCTAD, 2008). • The main challenge is to develop biofuels which do not compete with the food chain. This concerns a negative side of the Directive. For example, Tableau (2009) indicates that the Directive has an impact on the markets for cereals, oilseeds and sugar. The imports to Europe will grow more than twice. The study shows that domestic prices of biofuel crops and sugar is expected to rise by 25% and 19% respectively.
A 5	**Implementation examples**	General measure
A 6	**Objectives of TPM**	The directive stipulates that 5,75% of all transport fuels should be replaced with biofuels by 2010.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No change
A 7.2	Origin and/or destination of trip:	No change
A 7.3	Trip frequency:	No change
A 7.4	Choice of route:	No change
A 7.5	Timing (day, hour):	No change
A 7.6	Occupancy rate / Loading factor:	No change
A 7.7	Energy efficiency / Energy usage:	Biofuels seems to be more fuel efficient, therefore less fuel is needed.
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I

B 1.1	**Summary**	- The Biofuels Directive aims at a 5.75% replacement of all fuels by bio fuels in 2010 and up to 10% in 2020. Biofuels have a positive and negative side. On the positive side there is the development of biofuel as an alternative to fossil fuels. Furthermore, CO2 emissions are expected to reduce. - Also, new technologies to produce biofuel are being developed. (see WorldBank, 2008, World Energy Council, 2010 & UNCTAD, 2008). - There will be more transport for operators, which is positive from the perspective of the transport operators. The main challenge is to develop biofuels which do not compete with the food chain. This concerns a negative side of the Directive. It has some impacts on the food-supply chain. Tableau et al (2009) show that the Directive has an impact on the markets of cereals, oilseeds and sugar. The domestic prices of biofuel crops and sugar is expected to rise by 25% and 19% respectively (see Tableau, 2009)
B 1.2	**Summary: Income groups**	- Lower income groups might be slightly affected by increasing food prices, though it is expected that this is a minor impacts
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	- In poor production countries gender inequalities seem to be reinforced according ActionAid. Women are more vulnerable to displacement from uncontrolled expansion of large-scale mono-crop agriculture, due to the fact that women traditionally grow crops for household consumption. Conversion of land might cause displacement of women's agricultural activities to increasingly marginal lands.
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion										↗							I	N	E	E
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- As the volume of biofuel increases, the volume at sea will increase, as well as the imports into the EU. This may lead to extra traffic in ports, both on sea and land side. On the other hand if fossil fuel is replaced (partly) by biofuel, then this will lead to less transported volumes. In the end the two may level
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	➔																N		E	
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations													↗				I		E	

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	The introduction of biofuels is not without debate. Concerns are about food security, food prices, infringement of farmer rights, biodiversity and pollution in third countries. On the other hand, development of new technologies will help to overcome problems. The World Energy Council (2010) states that technology is a key factor to enhance both food and bio-energy production and increase the output without adverse economic and environmental implications.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	Especially in third countries negative social impacts (see reference Actionaid below).
B 4.V	**Quantification of impacts**	No quantified impacts available

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants	↘					↘										↘	L	N	E	I
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use													↘				N	R	E	E
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																	I	N	E	E

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The environmental impacts concern CO2 emission. A Canadian study indicates that a substitution of 10% into gasoline means a 62% reduction in net greenhouse gas, on a per-litre base. The corn prices will rise by $ 0,4-0,6 per bushel (see KD communications 2011). - The use of biofuels concern mainly road transport. - An often mentioned incentive for using biodiesel is its capacity to lower greenhouse gas emissions compared to those of fossil fuels. If this is true or not depends on many factors. Especially the effects from land use change have potential to cause even more emissions than what would be caused by using fossil fuels alone (see KD Communication)
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Regulation International legislation: European directives: emission standards Euro I -VI - Noise emission standards (SEC(2008)2203, SEC(2011)1505) - CO2 emission limits for LDV, cars, etc. - Standards for controlling air pollution (CO, NOx, particulate matter)
C 2	**References**	**International** [1] Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels and other renewable fuels for transport. [2] World Energy Council (2010): Biofuels: Policies, Standards and Technologies. London: World Energy Council. [3] World Bank (2010):Advanced Biofuel Technologies. Status and Barriers. Policy Research Working Paper 5411. [4] UNCTAD (2008): Biofuel production technologies: status, prospects and implications for trade and development. New York/Geneva: UNCTAD. [5] Biofuels (2011): Ethical issues - Nuffield Council on Bioethics [6] What are the Effects of Biofuels and Bio products on the Environment, Crop and Food Prices and World Hunger? - KD Communications (Karen Daynard) and Terry Daynard (2011) [7[Tabeau et al (2009): Impact of the EU Biofuels Directive on the EU food supply chain. Paper prepared for presentation at the 113th EAAE Seminar 'A resilient European food industry and food chain in a challenging world', Chania, Greece, September 3-6, 2009. [8] ActionAid (2012) Fuel for thought. Addressing the social impacts of EU biofuels policies. Brussels: Actionaid.

FACT SHEET NO: 38 **CATEGORY: 5.3** **PERFORMED BY: Fraunhofer-ISI**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Standards- Environment**
A 3	**Transport policy measure (TPM)**	**CO_2 emission limits for LDV, cars, etc.**
A 4	**Description of TPM**	As part of the Community's integrated approach to reducing CO_2 emissions from transport activities CO2 emissions can be regulated to set emission performance standards for new vehicles registered in the European Union Community at different point of time. [1]
A 5	**Implementation examples**	Regulation (EC) 443/2009 already sets CO2 emissions standards for European car manufacturers in terms of average maximum CO_2 emissions of new vehicles registered in the European Union in 2015 and 2020. For passenger cars average CO2 emissions of the new vehicle fleet should be 130 g/km in 2015 and 95 g/km in 2020. The regulation also takes into account the mass of vehicles by an equation calculating the specific CO2 emission target per manufacturer. [1] Regulation (EC) 510/2011 is setting CO2 emission standards for new light duty vehicles (LDV). The CO2 emission target for 2017 is 175 g/km, for 2020 147 g/km. [2]
A 6	**Objectives of TPM**	- To reduce CO2 emissions and improve fuel efficiency of new registered vehicles - To create incentives for the vehicle manufacturers to invest in new technologies [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Decreasing costs for fuel per km evoke a rebound effect in terms of increasing modal share of the regulated road transport mode. As modal choice depends largely on out-of-pocket costs for fuel, higher investment costs for the vehicles are not relevant for the modal choice. [8]
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Reducing CO2 emissions of road vehicles can be achieved by increasing energy efficiency of fossil fuel cars and by alternative fuel cars with less CO2 emissions [3]
A 8	**Main source**	[1] [2]

B IMPACTS

B 1 OVERVIEW ON IMPACTS — AFFECTED SEGMENTS / Geographical level / Source

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I, N

B 1.1	**Summary**	- Overall positive impact, especially on climate.
B 1.2	**Summary: Income groups**	- Slightly negative impact on lower income groups because of the higher car retail prices.
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS — AFFECTED SEGMENTS / Geographical level / Source

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																	R	L	S	I,N
B 2.2	Risk of congestion	↗					↗											I	N	E	I
B 2.3	Vehicle mileage	↗					↗											I	N	S	I
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	- Mainly persons in medium to high income groups can benefit from more fuel efficient vehicles as lower income groups have a generally lower motorization rate and a higher share of small vehicles which are already comparably fuel efficient. [12] - Higher investment costs mainly affect modal share of persons in low income groups.
B 2.II	**Implementation phase**	- During the implementation phase, vehicle manufacturers have to widen their vehicle portfolio and offer more fuel efficient or alternative fuel vehicles. Vehicle prices for fuel efficient vehicles could be higher than in the operation phase as the level of learning is still on an initial level. [7]
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Fossil fuel based vehicles need to be equipped with additional technology to reduce fuel consumption. Hence, higher investment costs for vehicles could lead to an increased use of public transport especially for people in lower income groups [3]. Rebound effects can occur as the competitive position of cars improve against other modes which can result in an overall increasing vehicle mileage. [5]
B 2.V	**Quantification of impacts**	- EU27 passenger-km by car are expected to increase due to a rebound effect initiated by significantly decreasing fuel costs by up to 7% until 2020. [11]

B 3 ECONOMIC IMPACTS — AFFECTED SEGMENTS / Geographical level / Source

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↘																I	N	S	I, N
B 3.2	Private income / commercial turn over														↗			I	N	S	I, N
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness														↗			N	R	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↘		N	R	S	I,N
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	- Low income groups will be more affected if the cost impacts on small /medium size vehicles are higher. [3]
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The research, development and implementation of technologies to reduce CO2 emissions will increase investment costs for vehicles. - As opposed to, fuel efficient vehicles lead to decreasing fuel costs. Savings over lifetime by fuel efficiency overcompensate higher investment costs. Therefore, total cost of ownership (TCO) decrease. [3] [7] - Improving fuel efficiency leads to a decrease of fuel tax revenues for the European economies. [11]
B 3.V	**Quantification of impacts**	- The lifetime fuel savings are about twice the additional retail price [3] - About 23 billion Euro less fuel tax revenues until 2030 [6] - 6% higher investment costs for vehicles [4] - For the German case, fuel cost savings between 2008 and 2020 account for 79 billion Euro while in parallel vehicle investment increases by 45 billion Euro [4]

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	R	L	E	I
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems				→													R	L	S	I,N
B 4.5	Social inclusion, equality & opportunities	↘															→	I	N	S	I,N
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗		↗			I	N	S	I,N
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- The TPM has a slightly negative impact on society. As the prices for new cars will increase, it will be more difficult for persons in low and middle income groups to purchase a new car and can cause social exclusion [3]. Slightly reduced air pollutant emissions lead to positive impacts on health for the society.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Because of higher investment costs for vehicles, demand can decrease and therefore a loss of work is possible. On the other hand, there is an increase in work because of the development of new technologies. [3] Studies like GHG-TransPoRD confirm that emission targets can be achieved with slightly increasing investment costs. - Investments in research and development and new production sites induce new jobs in the automotive industry. [9]
B 4.V	**Quantification of impacts**	- People in low income groups are expected to be impacted only marginally as the motorization rate is low and the average monthly mileage is by about 670 km about 60% lower than in the second highest income group. The major benefits in terms of fuel cost savings are expected for the second highest income group. [12]

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	I	N	S	I,N
B 5.2	Noise emissions																↘	I	N	S	I,N
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↓	I	N	S	I,N
B 5.6	Renewable or non-renewable resources																↘	I	N	S	I,N

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- By reason of new technologies and more fuel efficient vehicles the CO2 emission will decrease. An effect on the air pollutants is not expected, but if there is one, it will be small [3,4]. Improved aerodynamics and rolling resistance of vehicles result in less noise emissions. [4] - Fuel efficient cars and a higher share of alternative fuel cars lead to decreasing consumption of renewable energy. [6]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Regulation International legislation: European directives: emission standards Euro I -VI - Noise emission standards (SEC(2008)2203, SEC(2011)1505) - Biofuels directive (Directive 2003/30/EC) - Introduction of a biofuels quota; bioethanol quota - Standards for controlling air pollution (CO, NOx, particulate matter)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2009o): Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles [2] European Commission (2011s): Regulation (EC) No 510/2011 of the European Parliament and of the Council of 11 May 2011 setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO 2 emissions from LDV [3] European Commission (2007k): Possible regulatory approaches to reducing CO2 emissions from cars 070402/2006/452236/MAR/C3: Final Report [4] European Commission (2007j): Proposal from the Commission to the European Parliament and Council for a regulation to reduce CO2 emissions from passenger cars - Impact assessment. [5] Robert M., Johnson D. (2006): Assessment of transport policies toward future emission targets - a back casting approach for Stockholm 2030. In: Journal of Environmental Assessment Policy and Management, Vol. 8, No. 4 [6] Schade W. et. al. (2010): The iTREN-2030 Integrated Scenario until 2030. Deliverable 5 of iTREN-2030 project cofounded by European Commission 6th RTD Programme. Fraunhofer-ISI, Karlsruhe, Germany. [7] Schade W. et. al. (2012): Bottom-up quantifications of selected measures to reduce GHG emissions of transport for the time horizons 2020 and 2050: Cost assessment of GHG mitigation measures of transport. Deliverable D3.1 of GHG-TransPoRD. Project cofounded by European Commission 7th RTD Programme. Fraunhofer-ISI, Karlsruhe, Germany. [8] Schade W., Rothengatter W. (2011): Economic Aspects of Sustainable Mobility. On behalf of the European Parliament, DG for Internal Policies. [9] Nieuwenhuis P. (2007): Car CO2 Reduction Feasibility Assessment; is 130g/km Possible? Centre for Business Relationships, Accountability, Sustainability and Society, Cardiff, Wales. [10] Smokers R. et.al. (2009): Review and analysis of the reduction potential and costs of technological and other measures to reduce CO2-emissions from passenger cars. Delft, The Netherlands. [11] Fiorello et. al. (2012): Results of the technoeconomic analysis of the R&D and transport policy packages for the time horizons 2020 and 2050. Deliverable D4.1 of GHG-TransPoRD: Project co-funded by European Commission 7th RTD Programme. TRT Trasporti e Territorio SRL, Milan, Italy. **National** [12] Rothengatter W., Krail M. (2008): Sozialverträglichkeit der Nutzerfinanzierung für die Verkehrsinfrastruktur. Study on behalf of Friedrich Ebert-Stiftung, Karlsruhe, Germany.

FACT SHEET NO: 39 **CATEGORY: 5.3** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Standards - Environment**
A 3	**Transport policy measure (TPM)**	**Regulation International legislation: European directives: emission standards Euro I -VI**
A 4	**Description of TPM**	The emission standards apply to all motor vehicleswith a “technically permissible maximum laden mass” over 3,500 kg, equipped with compression ignition engines or positive ignition natural gas (NG) or LPG engines. [1] The regulations were originally introduced by the Directive 88/77/EEC followed by a number of amendments.[2] European emission standards Euro V, which came into force in 2008 and will be replaced by Euro VI in 2013, define the acceptable limits for exhaust emissions of new vehicles sold in EU member states, especially regarding emissions of carbon monoxide (CO), hydrocarbons (HC), nitrogen oxides (NOx), particulate matter (PM) and Smoke.
A 5	**Implementation examples**	Impact of Euro 5 in the Netherlands [a]; The Introduction of Euro 5 and Euro 6 Emissions Regulations for Light Passenger and Commercial Vehicles in Ireland [7]
A 6	**Objectives of TPM**	- To set harmonised rules on the construction of motor vehicles - To improve air quality by reducing pollutants emitted from the road transport sector
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	At the national level, several Member States have adopted fiscal measures to promote the purchase of cars that emit less CO2, but a significant effect of these measures on the EU average CO2 emissions of new cars has not been demonstrated (in 2005).[3]
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Increase of energy efficiency: this has been achieved by the promotion of fuel efficient cars via fiscal measures [3]
A 8	**Main source**	[3]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

	AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1 Summary																	**I**	**N**	**S**	**I, N**

B 1.1	**Summary**	- Overall positive impact on passenger road transport and road transport operators, due to cleaner vehicles while prices increased less than inflation. [3] - The economy, namely the car and lorry manufacturing industry, benefits from developments in clean vehicle engine design. - Society as a whole benefits from a less polluted environment.
B 1.2	**Summary: Income groups**	- No specific impact, because during 1995 - 2004, new cars sold in the EU have become significantly bigger and more powerful, while prices increased less than inflation.[3]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

	AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1 Travel or transport time																				
B 2.2 Risk of congestion																				
B 2.3 Vehicle mileage																				
B 2.4 Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The EURO standards do not impact on the traffic, but on the supply side of vehicles (car and lorry manufacturing industry) and European fleet composition; therefore the standards affect the purchase of the types of vehicles rather than their usage; the expected increase in transport activity occurs independently from the EURO standard regulation; with respect to CO2, the increase in transport activity will – in the next ten years, 2006 - 2016 – be off-set by a.o. the introduction of more fuel-efficient cars following the voluntary agreement of the car industry and the promotion of biofuels and CNG.[6]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

	AFFECTED SEGMENTS: Passengers					Transport operators											Geographical level		Source	
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1 Transport costs																				
B 3.2 Private income / commercial turn over														↗			**I**	**N**	**E**	**I**
B 3.3 Revenues in the transport sector																				
B 3.4 Sectoral competitiveness														↗			**I**	**N**	**E**	**I**
B 3.5 Spatial competitiveness														↗			**I**	**N**	**E**	**I**
B 3.6 Housing expenditures																				
B 3.7 Insurance costs																				
B 3.8 Health service costs																↘	**N**		**E**	**I**
B 3.9 Public authorities & adm. burdens on businesses																				
B 3.10 Public income (e.g.: taxes, charges)																				
B 3.11 Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	- Positive impact on the economy, especially on the vehicle manufacturing industry
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- An improvement in air quality will improve public health, thus enabling the national governments to generate savings in the longer term [7]. - Increase in sectorial and spatial competitiveness of the European economy [4] - There are competitiveness benefits to the automotive industry through the implementation of new technology, which would enable diesel vehicles to be exported to markets around the world where stricter vehicle emission limits are in place.
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main**	- The NOx emission reduction from Euro 6 will increase the health benefits by approximately 60 to 90% relative to Euro 5 [4].
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	I	N	S	I
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I	N	S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	Society as a whole benefits from the reductions in CO2 and NOx [4, p.9] and air pollutants, such as PM [a, p.6].However, forecast indicates that the introduction of Euro 6 will have no significant impact on CO2 emissions or sales of diesel vehicles [4]
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Emissions from the average new car sold reached 163 g CO2/km in 2004, 12.4% below the 1995 starting point of 186 g CO2/km21. Over the same period, new cars sold in the EU have become significantly bigger and more powerful, while prices increased less than inflation. Investigations on the impact of the measures adopted so far by Member States on the demand side have shown that improvements in car technology have delivered the bulk of the reductions in CO2.[3] [6] - According to [6] and [4] the EURO standards would lead to a decrease of the market share for diesel cars.
B 5.V	**Quantification of impacts**	- The modelling suggests that Euro 6 will have a significant role in reducing NOx emissions from road transport. It is forecast that in 2020 with the introduction of Euro 5, total NOx emissions from light duty vehicles would be 706 kilotons, however with Euro 6 emissions will be around 534 kilotons. Therefore, the total NOx emissions from light duty vehicles in 2020 will be 24% lower than they would be with just Euro 5 being introduced.[4]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- CO2 emission limits for LDV, cars, etc. - Noise emission standards (SEC(2008)2203, SEC(2011)1505) - Biofuels directive (Directive 2003/30/EC) - Introduction of a biofuels quota; bioethanol quota - Standards for controlling air pollution (CO, NOx, particulate matter)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] http://www.dieselnet.com/standards/eu/hd.php [2] http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31988L0077:en:NOT [3] Council Directive 88/77/EEC of 3 December 1987 on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous pollutants from diesel engines for use in vehicles.http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0019:FIN:EN:PDF [4] European Commission (2006c): Impact Assessment for Euro 6 emission limits for light duty vehicles. Staff working document. http://ec.europa.eu/enterprise/sectors/automotive/files/environment/impact_assessment_euro6_en.pdf **National** [5] L.G. Wesselink, E. Buijsman, J.A. Annema (2006): The impacts of Euro 5: facts and figures. Netherlands Environmental Assessment Agency [6] B. van Herbruggen and J. Knockaert(2006). TREMOVE 2: Model application for the assessment of alternative scenarios on future light duty vehicle emission legislation. http://www.tmleuven.be/methode/tremove/200601_paper_Tremove_Bart.pdf [7] Road Safety Authority. The Introduction of Euro 5 and Euro 6 Emissions Regulations for Light Passenger and Commercial Vehicles. http://www.rsa.ie

FACT SHEET NO: 40 **CATEGORY: 5.3** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Standards - Environment**
A 3	**Transport policy measure (TPM)**	**Noise emission standards SEC(2008) 2203, SEC(2011) 1505**
A 4	**Description of TPM**	Noise emissions, caused by humans, animals or machines disrupt the activity or balance of human or animal life. Particularly noise from road traffic, but also from rail and aviation, is a major problem in urban and suburban areas. Noise represents the third biggest environmental burden causing disease (after air pollution and exposure to smoking). The abatement of noise is necessary not only for comfort for residents near for instance motorways, but also because of other important health effects such as cardiovascular diseases and cognitive impairment. Research determined that during the day people start to get moderately annoyed by noise at 50dB (A) and seriously at 55 dB(A). [1] [3] Noise emission standards: Currently, legislation for noise emissions is different between and within member states. This is time-consuming, expensive and negatively effecting the internal market (with high bureaucracy effort leading to frustration and additional production costs). It is therefore necessary to harmonize rules at the EU level including the limitation of the noise emissions from transportation. [6] This TPM will solely assess noise pollution from road and rail transport. SEC(2008)2203 assumes that rail noise emission can be reduced by 8 dB(A) in average by retrofitting wagons with low noise blocks What causes noise emissions? Noise from rail transport is basically caused by the wheel - rail contact. Roughness of rails and train wheels cause noise emissions. Higher rail roughness, caused by intensive traffic and by the use of damaged wheels, will lead to increasing noise emissions. [5] Noise caused by road transport is generated by many sources, like tyre-road noise, power train, engine noise and exhaust noise. [6]
A 5	**Implementation examples**	- Road vehicle noise is covered by two European directives. Motor vehicle noise emission has been covered by legislation since the 1970s (Directive 70/157) and tyre-road noise since 2001 (Directive 2001/43). - Railway noise is addressed by directives on railway interoperability for high-speed rail (Directive 96/48/EC) and conventional rail (Directive 2001/16/EC), which provide a legislative framework for technical and operational harmonisation of the rail network.
A 6	**Objectives of TPM**	The objective of this TPM is to ensure a high level of health and environmental protection for European citizens while ensuring the good functioning of the internal market for road and rail transport. [5] [6] The current legal framework is insufficient (mainly because measurement methods do not reflect reality and limits are too weak/low to solve the problem) to solve noise pollution and therefore needs to be replaced based on new standards and testing procedures. [2]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	A minor change to slow modes can be expected (minor because of the limited competitiveness between road/rail transport and slow modes), because of rising transport costs for road and rail transport and increasing attractiveness of slow modes. Although it is questionable whether less exposure to noise a reason is to switch modes.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Traffic management (mainly based on technology used to optimise traffic flows) leads to more energy efficient driving behaviour (less petrol use, tire wire, etc.). Trains will be forced to run smoother which is beneficial for their energy consumption. [5] [6]
A 8	**Main source**	[5] [6]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

	AFFECTED SEGMENTS															Geographical level		Source	
	Passengers					Transport operators													
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1 Summary																	N	I	S	I

B 1.1	**Summary**	- Road and rail passengers will benefit from improved comfort, due to more quiet road vehicles and trains, while travelling. On the other hand, transport costs will rise due to higher production costs for transport operators (which will charge these higher costs to the consumer). - Slow modes in urban areas (where noise pollution is high) will benefit significantly from noise emission standards. Walking and cycling will become more attractive and users will notice a higher level of comfort while travelling. - In particular if the requested adjustment period is relatively short, high development and implementation costs will occur to transport operators (producers). [2] - Research and development is needed to meet new standards which will demand for more highly educated workers [6]. On the contrary, higher production costs will lead to higher prices for road and rail passengers which negatively effects production (and the amount of jobs) [2]. - Given the substantial negative impact of noise pollution in urban areas, noise emission standards are highly favourable for residents (especially those near motorways and busy railroad tracks) and society (reduced health costs). - If noise emission standards will lead to end-of-pipe measures (for instance noise barriers), then this will change the impact of the TPM (mainly higher costs for public bodies). The cost effectiveness of at-source measures is significantly higher compared to end-of-pipe measures [4]. - Finally, public bodies will face reduced maintenance costs for railway infrastructure. New emission standards will demand smoother braking(systems) for trains which lead to less friction and therefore less damage to rail infrastructure. This will save public bodies (mainly responsible for railway infrastructure) money. [5]
B 1.2	**Summary: Income groups**	- Night shift workers will significantly benefit by lower transport noise emissions. [EE]
B 1.3	**Summary: Age groups**	- The health effects of noise are not distributed uniformly across society, with groups like children and elderly suffering most. One of the main reasons for this severe impact is that both the elderly (and those already ill) and children are more affected by sleep disturbance (especially awakenings) than other social groups. [4]
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

	AFFECTED SEGMENTS															Geographical level		Source	
	Passengers					Transport operators													
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1 Travel or transport time																				
B 2.2 Risk of congestion	↘																L	R	E	
B 2.3 Vehicle mileage					↗												N		E	
B 2.4 Service and comfort	↗	↗			↗												N	I	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Risk of congestion decreases on motorways where traffic management (real-time traffic information to prevent congestion and warnings on emissions) will be implemented to reduce noise emissions. - Service and comfort will increase for road passengers, rail passengers and slow modes. These modes will all benefit from the noise emissions standards. Road vehicles and trains will be more quiet which increases travel comfort. Slow modes in urban areas will be less exposed to traffic noise and will become more attractive. [3] [5] [6]
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	↗	↗															N	I	S	I
B 3.2	Private income / commercial turn over												→					N	I	S	I
B 3.3	Revenues in the transport sector						↘	↘										N	I	S	I
B 3.4	Sectoral competitiveness								↗									N		E	
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses						→	→								↘		N	I	S	I
B 3.10	Public income (e.g.: taxes, charges)															↗		N		E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	Concerning road transport: - Vehicle maintenance costs will change. New wheels and braking systems will generate different maintenance costs per vehicle-km mainly depending on vehicle characteristics, type of operation, type of brake blocks. Old vehicles will have to be adjusted to new standards which leads to additional costs (replacement costs). [6] - Lowering noise limit values for road transport creates incentives for car producers (and other road transport producers) to develop quieter propulsion / vehicles. This will increase the demand for more funds and expertise for research and development, leading to more jobs in transport. [6] On the other had, higher prices of road vehicles will decrease the demand which has negative impact on employment in transportation (production). [2] - Production, development-, engineering- and testing-costs for road vehicles will increase due to new noise emission standards. This will lead to more employment and higher costs. These higher costs will probably be charged on vehicle prices and thus higher the transport costs for the road passengers. [2] Concerning rail transport: - Reduced maintenance costs for infrastructure: noise emission standards will lead to smoother braking(systems) for trains which lead to less friction and therefore less damage to rail infrastructure. This will save public bodies (mainly responsible for railway infrastructure) costs and will increase the revenues of operators [5]. - Production, development-, engineering- and testing-costs, which are relevant for new models or model upgrades in rail transport, will increase due to new noise emission standards [5]. It is uncertain who is going to pay for the additional costs (the user, the transport operator, both?). It is assumed that costs (short-term) will rise for both transport operators (leading to lower revenues) as for rail passenger (higher transport costs). [2] - Additional costs due to administrative burdens are not expected as the required manpower for testing and administration of new trains will not change significantly. [5] - 3rd level impact: Sectoral competitiveness of road and rail transport is negatively affected by higher costs. Transport by IWW will benefit from these increasing costs for road and rail transport.
B 3.V	**Quantification of impacts**	- The Dutch Noise Innovation Programme (IPG) calculated that every decibel of noise reduction at-source will save € 100 million in national expenditure on noise barriers and building insulation. [8]

B 4	SOCIAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)												↗	↑			↗	L	N	S / EE	I
B 4.2	Safety	→	→															N	I	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												→					N		S/E	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Especially nightshift workers will benefit by a reduction of noise emissions. [EE]
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Well-being, mainly for residents in urban areas (where noise emissions contribute to a substantial amount of health problems) will increase considerably due to noise emission standards for road and rail transport. [1] - "Low-noise brake blocks" for trains are made of composite materials resulting in lighter blocks compared to current blocks. This means that the weight handled by wagon maintenance workers will be reduced and lead to improved working conditions and a reduced chance on health problems. [5] - Furthermore, no adverse impact on road safety is expected as the technical measures and modifications necessary to meet with the new test limit values are unlikely to affect any of the vehicles/trains active or passive safety features. [5] [6] - The needed research and development to adjust road vehicles and trains to new standards will demand more highly educated workers [6]. This rise of employment is not expected to last over a long period of time and employment will reach current rates within a few years. Furthermore, higher transport costs will reduce the demand (for road and rail transport), which has a negative impact on employment. [2] - Especially nightshift workers will benefit by a reduction of noise emissions. [EE]
B 4.V	**Quantification of impacts**	- Passenger cars and lorries are responsible for 90 % of the total social costs of road and rail traffic noise in Europe. [7] - The social cost of road traffic noise in the EU27 is estimated to be at least € 38 billion per year. [7]

B 5	ENVIRONMENTAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants													↘			↘	L	R	S	
B 5.2	Noise emissions													↘			↘	L	R	S	
B 5.3	Visual quality of the landscape													↗			↗	L	R	S	N
B 5.4	Land use													↗			↗	L	R	S	N
B 5.5	Climate																↘	L	R	S	
B 5.6	Renewable or non-renewable resources																↘	L	R	S	

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Reducing noise emissions at their source, through measures relating to vehicle propulsion, tyres, road surfaces and traffic management, is far more effective than end-of-pipe measures (like noise barriers). Moreover, e.g. through traffic management (optimising traffic flows), not only noise emissions can be reduced. Traffic management will also lead to several other (mostly positive) environmental impacts like reduced air pollution, less CO2 emissions and more economical driving behaviour (which leads to less petrol use). [4] - End-of-pipe measures to reduce noise (by increasing the distance between source and recipient or by hampering noise propagation by insulating buildings or constructing noise barriers) will lead to more land use and have a negative impact on the visual quality of the landscape. This will mostly count for residents near motorways or (busy) railroad tracks. [4]
B 5.V	**Quantification of impacts**	- A new speed limit on a few Dutch motorways near cities (from 100 to 80 km/h) has had a positive effect on air quality, but noise emission has also been reduced by up to 1.5 dB(A). [9] - Studies have stated that a reduction of 8-10 dB(A) can be achieved if all tread-braked rail freight wagons are retrofitted with composite brakes [4]. - Night time restrictions on heavy vehicles can reduce up to 7 dB(A) at night time [4]. - A very effective way to reduce noise emissions is to simply reduce traffic. A 20 % reduction of traffic on a certain road will decrease noise emissions with 1.0 dB(A) [4].

C	REFERENCES	
C 1	**Other TPMs of this subcategory**	- CO_2 emission limits for LDV, cars, etc. - Regulation International legislation: European directives: emission standards Euro I -VI - Biofuels directive (Directive 2003/30/EC) - Introduction of a biofuels quota; bioethanol quota - Standards for controlling air pollution (CO, NOx, particulate matter)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011c): Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, Luxembourg: Publications Office of the European Union. [3] World Health Organization (2010): Health and Environment in Europe: Progress Assessment, Copenhagen: WHO Regional Office for Europe [5] European Commission (2008f): Rail noise abatement measures addressing the existing fleet, SEC(2008) 2203, Brussels [6] European Commission (2011f): Proposal for a Regulation of the European Parliament and of the Council on the sound level of motor vehicles, SEC(2011) 1505 final, Brussels. **National** [2] Centrum für Europäische Politik (2012): EU Regulation Sound Level of Motor Vehicles - Policy Brief, Freiburg: CEP [4] CE Delft (2007): Traffic noise reduction in Europe - Health effects, social costs and technical and policy options to reduce road and rail traffic noise, Delft: CE Delft publications [7] INFRAS/IWW (2004): External Costs of Transport, Update Study, Zürich/Karlsruhe: INFRAS/IWW [8] IPG (2007): Innovatieprogramma Geluid (Noise Innovation Programme (in Dutch)) [9] Dutch Ministry of Transport (2006): Evaluatie 80 km zones (Evaluation of 80-km zones (in Dutch), letter from the Minister of Transport to the Dutch parliament, DGP/WV/u

FACT SHEET NO: 41 **CATEGORY: 5.4** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Flanking measures - promotion, information, dialogue**
A 3	**Transport policy measure (TPM)**	**Ecodriving**
A 4	**Description of TPM**	The promotion of ecodriving is one of the objectives of the EU White Paper on Transport 2011: “ Include eco-driving requirements in the future revisions of the driving license directive and take steps to accelerate the deployment of ITS applications in support of eco-driving.” By changing driver behaviour, a more sustainable behaviour is fostered. Eco-driving (from the longer term “economical and defensive driving”) is a style of driving that saves energy consumption, reduces air pollution emission and creates safe and relaxed driving atmosphere. It involves a number of activities that begin even before a driver turns on the engine, including route planning and basic vehicle checks. Ecodriving can also be supported by ITS / RTTI and general vehicle-infrastructure communication. Eco-driving is an alternative that does not require significant investments; it only needs educational programs, and if possible a strategic monitoring or enforcement system. Thus, it is considered one of the most cost-effective approaches to reduce fuel consumption, increase safety and improve air quality. The measure is also valid for drivers of passenger cars and not limited to transport operators. In summary, ecodriving is not only an ecological measure, but it also implies economical and defensive driving.
A 5	**Implementation examples**	- Switzerland: reduction of fuel consumption by 11,7% and increase of average speed from 47,02 km/h to 48,21 km/h [1] [2] - Canada: during the first five weeks after the training reduction of fuel consumption of 6.5% to 15.0% on the highway and from 9.0% to 13.0% in the city; after nine months: 6.2% on the highway and 7.2% in the city. - Jakarta and Surabaya (Indonesia): GTZ training of bus drivers achieved an energy reduction of 7-15% - Buenos Aires: fuel savings 14,2%, increase of average by 7,3% - Mendoza (Argentina): fuel savings of 15-18%
A 6	**Objectives of TPM**	The TPM is aimed at reducing energy use from transport and thereby the impact of oil prices on transport costs in road transport. By reducing the fuel consumption, significant cost savings can be achieved. Furthermore, ecodriving increase the safety of professional drivers and increases job satisfaction.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Possible change
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Major change
A 8	**Main source**	[1] [2]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**L**	**R**	**S**	**L**

B 1.1	**Summary**	- Positive impacts, especially cost reductions, for the road transport operators, especially due to savings in fuel consumption and time savings; the time savings can be achieved through trip consolidation and anticipation of traffic conditions. Further reductions in variable costs (repairs, maintenance, tyres), the truck drivers benefit from higher levels of safety; stress reduction for the drivers and the passengers [2] - The impact on the performance (fuel consumption, travel time) depend on the traffic flow rates. Under normal traffic conditions moderate acceleration is beneficial to the environment with only little impact on travel time. However, when the traffic is heavy (i.e., the traffic flow rate is 1000veh/hour) moderate acceleration significantly increased all the measures of performance. [3]
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	→					→											**L**	**R**	**S**	**N**
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Applying ecodriving principles led to an increased time spent driving at a constant speed as well as drop in idle-time. [1] - An Australian study showed that under normal traffic condition moderate acceleration is beneficial to the environment accompanying little impact on travel time. However, when the traffic is heavy (i.e., the traffic flow rate is 1000vehicles/hour) moderate acceleration significantly increased all the measures of performance. [3]
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs						↘											**L**	**N**	**S**	**N**
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector						↗											**L**	**N**	**S**	**N**
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main**	- Reductions in variable costs: reduced fuel consumption, repairs, maintenance, tyres, leading to greater profit margins and revenues. [2]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 4.1	Health (incl. well-being)	↗			↗		↗					↗	↗					L	R	S	N
B 4.2	Safety	↗			↗		↗					↗	↗					L	R	S	N
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)						↗						↗					N	I	S	N
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Increased job satisfaction.
B 4.II	**Implementation phase**	- The positive effects of ecodriving training decrease over time if no refreshment training is taking place. [4]
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The total GHG reduction potential of fuel-efficient driving depends strongly on the way the measure is implemented or promoted and on the assumed effectiveness of such promotion measures. Indicative calculations for EU-15 estimate that a total reduction of 1.8 Mtonne/y could be achieved in 2012, increasing to 5.5 Mtonne/y in 2020 if eco-driving is included in the lessons for new drivers. [4]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 5.1	Air pollutants																→	L	R	S	I
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	L	R	S	L
B 5.6	Renewable or non-renewable resources																↘	L	R	S	L

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The main environmental benefit from ecodriving concerns the reduction of fuel consumption and CO2. - Furthermore, ecodriving also reduces air pollutants such as Hydrocarbons, carbon monoxides, particulates and nitrous oxides [2]
B 5.V	**Quantification of impacts**	- Ecodriving training can be very effective with savings in fuel consumption between 3-11%: 10% fuel savings on average directly after the ecodriving course. The average reduction of the mean fuel consumption rate is in the range of 9.5 % on the highway and 11 % in the city. This positive benefit was maintained approximately six months after which a significant drop was observed. The long term effect is less well known, but is expected to be significantly smaller: 5-7% savings aver a year or more [2] and [5]. Other sources claim that the long term effect of applying eco-driving is a fuel consumption reduction of between 3% to 4.5%. [4]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Fuel efficiency labelling for new cars
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Bureau de l'efficacité et de l'innovation énergétiques (2011): Eco-driving training pilot project for light vehicles. Ministère des Ressources naturelles et de la Faune, Quebec Website of Quality Alliance Eco-Drive (QAED). [2] GTZ (2005). Sustainable Transport. A sourcebook for policy-makers in developing cities. Module 4f: Ecodriving. Commissioned by Federal Ministry for Economic Cooperation and Development. [3] Qian, G. and Chung, E. (2011): Evaluating effects of eco-driving at traffic intersections based on traffic micro-simulation. Australasian Transport Research Forum 2011 Proceedings 28 - 30 September 2011, Adelaide, Australia; Publication website: http://www.patrec.org/atrf.aspx [4] TNO (2006): Review and analysis of the reduction potential and costs of technological and other measures to reduce CO2-emissions from passenger cars.Commissioned by the European Commission. DG-ENTR. [5] CE Delft (2009): EU Transport GHG: Routes to 2050. Operational options for all transport modes. Delft (http://www.eutransportghg2050.eu/cms/)

FACT SHEET NO: 42 **CATEGORY: 5.4** **PERFORMED BY: Fraunhofer-ISI**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Flanking measures - promotion, information, dialogue**
A 3	**Transport policy measure (TPM)**	**CO2 and fuel efficiency labelling for new passenger cars**
A 4	**Description of TPM**	Information plays a key role in the operation of market forces; whereas the provision of accurate, relevant and comparable information on the specific fuel consumption and CO2 emissions of passenger cars may influence consumer choice in favour of those cars which use less fuel and thereby emit less CO2, thereby encouraging manufacturers to take steps to reduce the fuel consumption of the cars that they manufacture [1]. The car labelling was introduced by the Directive 1999/94/EC.
A 5	**Implementation examples**	Car labelling in combination with "Green motor tax" in Denmark [a, p.53]; car labelling based on the fuel efficiency in the Netherlands [5, p.54]
A 6	**Objectives of TPM**	- To ensure that information relating to the fuel economy and CO2 emissions of new passenger cars is made available to consumers [1] - To influence the purchasing behaviour such that fuel efficient cars are purchased preferably
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	Lower transport costs may lead to a higher trip frequency.
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Increase of energy efficient and CO2 saving cars [5, p. 53]
A 8	**Main source**	[1]

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I, N

B 1.1	**Summary**	- Overall positive impact especially on climate. The additional information through the labelling system leads to a consumer behaviour buying energy efficient and CO2 saving cars. The adequate type of car labelling would be a relative one, because consumers tend to buy the more efficient cars compared to other cars in similar size. Also the impact on energy efficiency is higher than that of an absolute comparison [6, p.4]. Besides, an additional taxation of C02 emission leads to an higher impact.
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion	↗					↗											I	N	E	I
B 2.3	Vehicle mileage	↗																I	N	E	I
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Lower costs for operating cars due to improved fuel efficiency lead can cause a rebound effect in terms of increased vehicle mileage. Therefore, the risk of congestion increases slightly.
B 2.V	**Quantification of impacts**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 3	**ECONOMIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↘																I	N	E	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness														↗			I	N	S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The consumers' decision to buy more fuel efficient cars will lead to lower transport prices because of lower petrol consumption. The consumers' behaviour to buy efficient cars leads to more competition in the vehicle manufacturing industry [7, p. 3]. - Positive impact on the economy, especially on the vehicle manufacturing industry.
B 3.V	**Quantification of impacts**	- Studies have a range of economic impacts in terms of fuel costs from zero [3], close to zero [4] up to 5% less fuel costs [d] due to change in car purchasing behaviour towards more fuel efficient vehicles.

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	**R**	**L**	**E**	**I**
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Car labelling can lead to decreasing average fuel consumption [4,d] and thus also helps to slightly reduce air pollutants. This impacts health of the societal groups mainly exposed by air pollutants from road transport.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	**I**	**N**	**S**	**I**
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**I**	**N**	**S**	**I**
B 5.6	Renewable or non-renewable resources																↘	**I**	**N**	**S**	**I**

B 5.I	**Overall impacts on social groups**	- Society as a whole benefits from the reductions in CO2 and and air pollutants [5, p. 53]
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	-Because of CO2 labelling of passenger cars, consumers are influenced to buy more fuel and CO2 efficient cars. Therefore, the CO2 emission could decrease as well as air pollutant emissions due to decreasing fuel consumption [5]
B 5.V	**Quantification of impacts**	- Studies have a range of environmental impacts. Some studies assess no impact on CO2 emission reductions [3], some only with a marginal positive impact [4] up to 5% less CO2 emissions [d] due to change in car purchasing behaviour towards more fuel efficient vehicles. Studies did not consider rebound effects due to lower costs of operation of more fuel and CO2 efficient cars.

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Eco- driving - Low resistance lubricants legislation; Usage of ultra fluid lubricants - Labelling scheme for tyres (consumption, noise)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] DIRECTIVE 1999/94/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31999L0094:EN:pdf [2] Schade W. et. al. (2009): ADAM 2-degree scenario for Europe – policies and impacts. Deliverable D-M1.3 of ADAM. Project co-funded by European Commission 6th RTD Programme. Karlsruhe, Germany. [3] ADAC (2005): Study on the effectiveness of Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars. Project on behalf of DG Environment. Munich, Germany. [4] E.V.A. -Energieverwertungsagentur (1999): Energy Efficiency of Passenger Cars. Labelling and its Impacts on Fuel Efficiency and CO2-Reduction, Study for the Directorate General for Energy /DGXVII) of the Commission of the European Communities, Contract No. SAVE-XVII/4.1031/Z/96-005, Wien, Austria. **National** [5] Andrea Gärtner (2005): Study on the effectiveness of Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars. http://ec.europa.eu/clima/policies/transport/vehicles/labelling/docs/final_report_en.pdf [6] Wilfried Raimund (2005): Energy Efficiency of Passenger Cars: Labelling and its Impacts on Fuel Efficiency and CO2-Reduction. Austrian Energy Agency. http://www.eceee.org/conference_proceedings/eceee/1999/Panel_5/p5_5/paper [7] Entwurf Novellierung der Pkw- Energieverbrauchs- Kennzeichnungsordnung. Stellungnahme des VDA. [d] Iten R., Hammer, S., Sammer, K., Wüstenhagen, R. (2005): Evaluation energieEtikette - Massnahmen zur Absenkung des Flottenverbrauchs, Bericht im Auftrag des Bundesamtes für Energie, Bern/Zürich/St. Gallen.

FACT SHEET NO: 43 **CATEGORY: 5.5** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Standards & Flanking Measures**
A 2	**Subcategory**	**Flanking measures - regulation**
A 3	**Transport policy measure (TPM)**	**Introduction of speed limitation for light commercial road vehicles (LCV)**
A 4	**Description of TPM**	Definition LCV: A light commercial vehicle (LCV, often referred to as a 'van') is defined as a commercial freight vehicle (N1 vehicle class in EU legislation) with a maximum weight (GVW) of 3.5 tonnes. Currently, light commercial road vehicles (LCVs) have the same speed limitations as passenger cars. The number of LCV has been, and still is, rising fast and LCVs account for almost 15 % of Europe's road vehicle stock. There are two main reasons to set a reduced speed limit for LCVs: 1. LCVs contribute significantly to the increase of greenhouse gas emissions of transport. The European Commission adopted a Communication 'COM(2007)19 final' which provides a comprehensive strategy to reduce CO2 emissions from new cars and LCVs sold in the European Union. [1] [7] 2. Accidents in which LCVs are involved are often serious, especially for the crash opponent. [8] The exact new speed limit for LCVs in Europe is still uncertain. A 100 km/h speed limit for LCVs on motorways is under investigation, but a comprehensive strategy for all roads is also a possibility.
A 5	**Implementation examples**	Until now, LCVs have the same speed limit as passenger cars. Speed regulations take only trucks and coaches into account. Upcoming regulation: Starting in 2014, 70 % of new LCVs up to 3.5 tonnes must comply with an average emission limit of 175 grams CO2 per kilometre. This percentage increases to 75 % in 2015 and 80 % in 2016. As from 2017, all new LCVs have to fulfil the limit. In 2020, the limit will decrease to 147 grams CO2 per kilometre. [10]
A 6	**Objectives of TPM**	There are two main objectives of the TPM: 1. Reduce CO2 emissions from LCVs. LCV legislation is part of the EU's CO2 Strategy to reduce emissions by 20 % in 2020. In order to reach this objective LCVs CO2 emissions will be limited. One way to reach lower CO2 emissions is to reduce speed limits (on motorways). A 100 km/h speed limit for LCVs on motorways will reduce LCVs CO2 emissions nearly by 7 %. [8] 2. Improve safety for all road users. LCVs are bigger and heavier than passenger cars and their rear view is not sufficient. Especially their large mass contributes to the seriousness of accidents involving LCVs. Crash opponents fatality rate is twice as high for LCVs as for passenger cars. A reduced speed limit leads to less accidents and decreasing seriousness of injuries. [8]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Fuel consumption decreases due to lower speeds for LCVs. Experiments in the Netherlands showed that speed limits on motorways (limited to 110 km/h instead of 120 km/h) in LCVs resulted in 5% fuel savings. [5]
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 1.1	**Summary**																	**N**	**R**	**S**	**I**

B 1.1	**Summary**	- First of all, reduced speed limits for LCVs lead to a significant decrease of environmental impacts. Summarised, these benefits are: reduction of air pollutants and CO2 emissions due to less fuel consumption as well as less noise. Mostly, society and residents near motorways will benefit from this improved environmental conditions. [4] [5] [6] - Furthermore, road users, transport operators and public transport operators will profit from increased safety on roads. Speeding leads to accidents and limited speeds for LCV will decrease the number of casualties and injuries on roads. [1] [3] [4] [5] - Finally, the net effect for of a reduced speed limit for LCVs is positive (see B 3.V). Although lower speeds will result in longer transport times, positive effects as reduced fuel consumption, less congestion, less health costs and decreasing costs for maintenance will be beneficial for transport operators. [2] [3] [12]
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 2.1	Travel or transport time	➔					↗											**N**	**R**	**S**	**I**
B 2.2	Risk of congestion	↘					↘											**L**	**R**	**S**	**I**
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Longer travel time due to limited speeds for LCVs. On the other hand, shorter travel time due to less congestion. [1] - Reduced risk of congestion due to fewer accidents. A more homogeneous traffic flow on motorways depends on the speed limit of other road users (passenger cars, trucks and coaches), as growing maximum speed differences between road users may hamper the traffic flow. The net effect concerning the more homogeneous traffic flow is still unknown. [1]
B 2.V	**Quantification of impacts**	

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS: Passengers: Road	Rail	Air	Public transport	Slow modes	Transport operators: Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	2nd level	Source: Source of assessment	Spatial level of source
B 3.1	Transport costs	➔					↘											**N**	**I**	**S**	**I**
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	↘					↘											**N**		**E**	
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs	↘				↘								↘			↘	**N**		**S**	**I**
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The transport costs will increase due to longer travel time, but the fuel and maintenance costs for LCVs will decrease due to the lower top speeds. The cost-benefit ratio for a reduced speed limit for LCVs turned out to be positive (see quantification of impacts). The exact change in transport costs is unknown, but the positive cost-benefit ratio seems to prove that costs for transport operators will certainly not rise. [2] [3] - Reduced speeds for LCVs improves road safety for all road users (including slow modes). This will lead to less accidents and reduced health service costs for road users, residents and society. [2] [3] - Benefits for transport operators are: fewer vehicles off the road for repair (due to accidents or high engine loads (meaning how many engine power is used)), less chance of employees being involved in accidents or getting injured; improved image of transport operators using LCVs (greener image and less often involved in accidents). [11] -3rd level impact: If LCVs transport time will increase due to speed limitation, then this could be advantageous to other transport modes (those in competition)
B 3.V	**Quantification of impacts**	- Countries with a good safety record, such as Norway, Great Britain, Sweden and the Netherlands, assign a high monetary value to the prevention of a traffic fatality (when using a cost-benefit analysis). [2] - The IMPROVER study concluded that the benefits of reduced speed limits for LCVs outweigh the costs with a factor of 1.65 for the existing vehicle fleet. [2] - The total costs of ownership for LCVs will be reduced by up to 12 % when top speeds will be limited. The cost reduction will be attributable to the fuel consumption reduction, the reduction in the costs of purchase (less powerful engine needed), the decreasing maintenance costs and lower taxes. [9]

B 4 SOCIAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	**N**	**R**	**S**	**I**
B 4.2	Safety	↑				↑	↑					↑						**N**	**R**	**S**	**I**
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- CO2 emissions, air pollutants and noise will decrease when speed limits will be reduced. This will improve the well-being of residents near motorways and the entire society. [1] [4] - The level of safety will increase substantially for all road users. Lower speeds reduce stopping distances, give a greater time to recognize hazards, increase the ability of other road users to judge vehicle speed and time before collision and reduce the likelihood that a driver will lose vehicle control. [4]
B 4.V	**Quantification of impacts**	- A 1% reduction in the average speed of traffic (all traffic modes) leads to a 2% reduction in injury accidents. [5] - If on a road the average speed goes down from 120 to 119 km/h, the number of road fatalities is estimated to be reduced by 3,8% and the serious road injuries by 2,9%. [4] - Limiting top speeds of LCVs to 100 km/h instead of 110 km/h increases the number of deaths saved by 15 % (46 % vs. 31 %). [1] - Limiting top speeds of LCVs in the EU to 100 km/h will reduce fatalities by approximately 190 deaths per year. [1]

B 5 ENVIRONMENTAL IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	**L**	**R**	**S**	**I**
B 5.2	Noise emissions													↘				**L**	**R**	**S**	**I**
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																↘				
B 5.5	Climate																↘	**I**		**S**	**I**
B 5.6	Renewable or non-renewable resources																↘	**I**		**S**	**I**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	Lower maximum speeds for LCVs will lead to several positive impacts for the environment, such as: - Reducing air pollution (mainly NOx, but also PM10) through lower engine loads of LCVs. This will be beneficial for the entire society and for especially for residents living near motorways. [4] - Noise will decline through lower speeds and less congestion [5]. Again, this counts mostly for residents near motorways. - CO2 emissions will reduce with the introduction of speed limits for LCVs which is desirable for the entire society and in accordance with the EU policy to reduce C02 emissions by 20% in 2020. [6] - Fuel consumption of LCVs will decline with the introduction of speed limitation devices. Especially because driven speeds on motorways are above the optimum level for fuel efficiency. [6] - In addition, the potential indirect effects of speed limitation devices lead to even more significant CO2 reductions. For example, lower top speeds and their resulting safety benefits incentivise the market for lighter and less powerful LCVs. This potential development reduces significant additional carbon savings in the long run. [6] - Indirect effect: Decline of additional land-use due to lower demand for new road infrastructure based on higher road capacities.
B 5.V	**Quantification of impacts**	- Practical experiments in the Netherlands showed that speed limiters (limited to 110 km/h) in vans and light trucks resulted in 5% fuel savings. [5] - A study in the UK showed that a new 60mph (96 km/h) speed limit will reduce CO2 emissions by an average of 1.88 million tonnes of carbon per year. [6] - Decreasing speed limits around Rotterdam (NL) from 100 to 80 km/h gave a 25 % reduction in NOX emissions from traffic. [4] - When the speed limit will be reduced to 100 km/h on motorways the CO2 emissions of LCVs will be reduced by 6 to 7 %. [1]

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	see below

International

[1] Boer, E. den., et al. (2010): Speed limiters for vans in Europe - Environmental and safety impacts, Delft: CE Delft

[2] SafetyNet (2009): Cost-benefit analysis, Brussels: Directorate-General Transport and Energy

[3] Global Road Safety Partnership (2008): Speed Management - A road safety manual for decision-makers and practitioners, Geneva: Publications of GRSP

[4] European Federation for Transport and Environment (2005): Road transport speed and climate change, Brussels: Transport & Environment

[5] European Transport Safety Council (2008): Managing Speed - Towards safe and sustainable road transport, Brussels: European Transport Safety Council

[7] European Federation for Transport and Environment (2009): Emission performance standards for light commercial vehicles (LCVs), Brussels: Transport and Environment

[9] Verbeek, M.M.J.F., et al. (2010): Potential CO2 reduction from optimal engine sizing for light commercial vehicles, Eindhoven: TNO

[10] European Commission (2010e): Progress report on implementation of the Community's integrated approach to reduce CO2 emissions from light-duty vehicles, COM(2010) 656 final, Luxembourg: Publications Office of the European Union

[11] European Transport Safety Council (2011): "PRAISE": Preventing Road Accidents and Injuries for the Safety of Employees, Brussels: European Transport Safety Council

[12] European Commission (2006e): IMPROVER - Impact Assessment of Road Safety Measures for Vehicles and Road Equipment, Luxembourg: Publications Office of the European Union

National

[6] Anable, J. Mitchell, P. Layberry, R. (2006): Getting the genie back in the bottle: Limiting speed to reduce carbon emissions and accelerate the shift to low carbon vehicles, London: Lowcvp

[8] SWOV (2009): SWOV Fact Sheet - Lorries and delivery vans, Leidschendam: Institute for Road Safety Research

FACT SHEET NO: 44 **CATEGORY: 6.1** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Mobility strategies and plans**
A 3	**Transport policy measure (TPM)**	**Promoting car sharing / car clubs**
A 4	**Description of TPM**	Promoting the instalment and extension of car sharing / car club organisation in European cities. Support of national / regional governments (financially and legally) to extend car sharing. Car sharing is car rental for short periods of time, charging by time and distance combined. Other than rental cars, the cars can be rented for short time periods (per hour). On the one hand, car sharing can be a substitute for a privately owned car, on the other hand it offers mobility possibilities for people and who don't want to or can't afford to own a car. Assumption here: Substitution of privately owned car. Car sharing also offers the opportunity to avoid purchasing a company car for (small) businesses.
A 5	**Implementation examples**	- Mobility services for urban sustainability (MOSES) [1] [10] - Momo Car-Sharing project (more options for energy efficient mobility through Car-Sharing) [2] - CIVITAS - CARAVEL (Promotion car sharing, among other measures, in Geneva) [11] - Collaboration of car share companies and the city of Düsseldorf [14]
A 6	**Objectives of TPM**	- Reduce dependence on private cars without restricting mobility [1] - More rational use of the car and, altogether, reduction of car use in cities.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Overall a modal shift away from road occurs due to a reduced motorization rate. But there is a difference in participants with and without car before: On average a modal shift from road to public transport and slow modes occurs for former car owners, while a slight increase in car usage occurs for car sharing participants without a car before. [6]
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	Reduction of car trips. (Reduced car ownership and thus modal shift to public transport and slow modes.) [6]
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	Increase in the hours per day a vehicle is used (a privately owned car is used on average less then an hour per day). A shared car replaces several privately owned cars, e.g. in Bremen the replacement number was 4-10 cars per shared car. [10] A North-American study shows that the average number of vehicles per household participating in car sharing drops from 0.47 to 0.24. [13]
A 7.7	Energy efficiency / Energy usage:	Adequate vehicle choice concerning e.g. capacity and performance when using a shared car. When buying a car, often the choice is influenced by peak demands and thus most of the time exceeds the needed capacity. [7] This results in reduced energy usage as smaller cars are usually used by participants of carsharing.
A 8	**Main source**	[6] [7] [8]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																				

B 1.2	**Summary: Income groups**	- Positive effect on people with a low income, as the occasional use of a car becomes affordable. [7]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	- Under the condition that specially equipped cars are provided, people with disabilities have access to this car sharing system and thus increase their mobility options. [11]
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time	↗																L		E	L
B 2.2	Risk of congestion	→																L		S	N
B 2.3	Vehicle mileage	↘			↗	↗												L		S	I
B 2.4	Service and comfort	↘																L		S	N

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Mode change to public transportation, walking and cycling for former car owners. Previously carless customers use car sharing mostly as a substitute for car rental, taxis and other car-centered modes, but a slight increase in vehicle-km travelled by car occur in this group. [6] - There is also a positive effect on comfort and service as the car-sharer is not responsible for the maintenance of the car. [4] and the increasing level of comfort by a shift from public transport to car sharing. Nevertheless comfort is reduced as the car is not as easily and not as spontaneously available as a privately owned car. - The travel time increases, if the car has to be picked up at a specific parking spot, often in a longer distance from home compared to privately owned vehicles. Hence the additional (walking) distance and overall transport time increase. Nevertheless, it is less likely, that shift occurs from public transport to carsharing, thus the total traveling time will decrease. - A congestion reduction is not quantifiable [8], as the modal shift effects are relatively small.
B 2.V	**Quantification of impacts**	- Percent of vehicle kilometres reduced due to car sharing in Europe: 28 to 45% [3]. - Mainly the vehicle miles are reduced by people who owned a car before and participated in car sharing, e.g. the average reduction of vehicle miles travelled determined by several studies is 44% [6].

B 3	**ECONOMIC IMPACTS**	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	↘																N	L	S	N
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness				↘							→						R	N	E	
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures													→				L		S	N
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																	N	L	E	
B 3.10	Public income (e.g.: taxes, charges)															↘		I	L	E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	- Missing legislation (parking space) lead to system distortion (example Germany)
B 3.IV	**Summary / comments concerning the main impacts**	- A private car has smaller variable costs, but high fixed costs. In several cities parking costs for a privately owned car have to be added. - User of car sharing systems are not faced with unexpected costs (repair bills). [7] - The decrease in transport costs does not hold in general, but for car users who have a low vehicle mileage or use their car only sporadically. The age of the alternatively owned private car is also an important factor when comparing the costs. [4] - Slight decrease in cost saving for housing development and thus housing expenditures, as less parking spaces are necessary. [8] - System subsidies affect an increase of public expenditures. Dependent on operating model: private / public - 3rd level impact: If car sharing is evolving rapidly and the number car sharing options will increase substantially, then this could negatively affect the competitiveness of public transport (assuming that people who are currently using public transport can change to car sharing).
B 3.V	**Quantification of impacts**	- Switzerland: Cost for parking = 10% and thus a slight decrease in costs for housing development occurs (-0.02%). [8]

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	↗															↗	**N**	**L**	**S**	**I**
B 4.5	Social inclusion, equality & opportunities	↗															↗	**N**	**L**	**S / E**	**I**
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- For low income people the occasional use of a car becomes affordable.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- People who don't own a car benefit a lot from being able to use one, and thus have a better access to the transport system road. [7] However, studies indicate that the average user of car sharing earns above average. [9] - Experts state, that car sharing is particularly important for households / users with more than one private car, that means that car sharing can decrease the rate of 2nd car ownership. [EE] - Even car owners benefit from the option value of having the possibility to use car sharing in case of emergencies. [7] - It is possible to equip some of the cars specially for the disabled and thus increase their mobility options. [11] (Geneva)
B 4.V	**Quantification of impacts**	- Positive effect on people with a low income, as the occasional use of a car becomes affordable. [7]

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	**L**	**N**	**E**	
B 5.2	Noise emissions													↓			↓	**L**	**N**	**EE**	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																↘	**L**	**R**	**S**	**N**
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The modal shift from road (own cars) to slow modes, public transportation and car sharing leads to a decrease of air pollutants and noise. On the other hand there can be a shift from public transport to road (car sharing) and thus the air pollutants will increase. - The structure of the car-sharing fleet consists of newer cars compared to the average age of private cars and emit thus less CO2. [12] [EE] Additionally, the fleet consists on average on smaller cars than the privately owned vehicles. [7] In some cities the car sharing fleet is complemented by e-vehicles. [3] - Car sharing leads to a reduction of car ownership (motorization rate), either that the current car is sold, 2nd car is substituted or no new car is bought. [EE] This reduction of cars in a city means that less parking spaces are needed.
B 5.V	**Quantification of impacts**	- North America GHG emission: Mean observed impact (changes in emissions that physically occur): -0.58 t GHG/year per household. Mean full impact (emissions that were avoided due to car sharing): -0.84 t GHG/year per household. [5] - The average CO_2 emissions in 2005 from the "mobility" car sharing fleet in Switzerland has been 18 % lower than those of new cars on the road and 25 % lower than the average emissions of all private cars in Switzerland. [12] - The share of the "mobility" car-sharing fleet on the whole Swiss car fleet is 0.05%. This results in a reduced parking demand of -0.20% [8]

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Mobility Services for Urban Sustainability - A European project for the City of Tomorrow: http://polymorphing.server72.de/upload/Projekte/moses/moses_brochure_web.pdf [2] momo: momorandum, http://scp-knowledge.eu/sites/default/files/knowledge/attachments/momorandum.pdf [3] Shaheen, Cohen (2007): Worldwide carsharing growth: an international comparison, Transportation Research Record: Journal of the Transportation Research Board, volume=1992 [5] Martin, Shaheen (2011): Greenhouse Gas Emission Impacts of Carsharing in North America, IEEE Transactions on Intelligent Transportation Systems, volume: 12, issue:4 [6] Cohen, Shaheen and McKenzie (2008): Carsharing: A Guide for Local Planners; Institute of Transportation Studies [7] Litman (1999): Evaluating Carsharing benefits; Victoria Transport Policy Institute [9] Millard-Ball, Murray, ter Schure, Fox, and Burkhardt (2005); Car-Sharing: Where and How it Succeeds; Transit Cooperative Research Program Report #108 [11] CIVITAS CARAVEL (2009): Final Project Report, Burgos, Genoa, Krakow, Stuttgart [13] Martin, Shasheen, Lidicker (2010): Impact of Carsharing on Household Vehicle Holdings - Results from North American Shared-Use Vehicle Survey, Transportation Research Record: Journal of the Transportation Research Board, No. 2143, Transportation Research Board of the National Academies, Washington, D.C., 2010 **National** [4] Bonsall, Jopson, Pridmore, Ryan and Firmin (2002): Car Share and Car Clubs: potential impacts, Institute for Transport Studies, University of Leeds. Report prepared for DTLR and Motorists' Forum [8] Ciari, Balmer and Axhausen (2008): Concepts for a large scale car-sharing system: Modeling and evaluation with an agent-based approach, Working Paper, 517, IVT, ETH Zürich, Zürich [12] Haefeli, Matti, Schreyer, Maibach (2006): Evaluation Car-Sharing, Schlussbericht, Im Auftrag des Bundesamtes für Energie, Bern **Regional / Local** [10] City of Bremen Germany: Integration of Car-Sharing - / moses project, http://www.managenergy.net/download/nr126.pdf [14] Landeshauptstadt Düsseldorf: car2go startet in Düsseldorf mit 300 Fahrzeugen - Neues Carsharing-Modell ab Frühjahr 2012 in der Landeshauptstadt, 2. Dezember 2011, pld – Pressedienst der Landeshauptstadt Düsseldorf

FACT SHEET NO: 45 **CATEGORY: 6.2** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Urban mobility - plans & audits**
A 3	**Transport policy measure (TPM)**	**Park & Ride systems (urban)**
A 4	**Description of TPM**	Park and ride systems (P&R) are parking facilities at the periphery of cities linked to public transportation. Hence, urban / suburban trips do not have to be entirely performed by car and can partly be conducted by bus or other modes of public transport. Park and ride mostly aims at commuters but is also made for people who make irregular trips to the inner city as well as tourists. The concept targets to improve the accessibility of people which are poorly connected to public transportation and therefore are reliant upon the usage of a car.
A 5	**Implementation examples**	- EC Smile Project: Park and Ride System in Prague, Czech Republic in 2001 [1] - Park and ride system in Greater Manchester [8]
A 6	**Objectives of TPM**	- Reduction vehicles in the inner city and thus a reduction of congestion. - Reduce the number of parking facilities in the inner city. - Achieve modal shift to public transport by integrating it with private car use. [4]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	- Increase of multimodality - Choice of transport mode is not definite: Some (exclusive) car users will use the park and ride system and travel part of their journey by public transportation. Concerning people, which used public transportation systems so far, the convenience of the parking spaces close to the station reveals the opportunity to partly use the car for the trip.
A 7.2	Origin and/or destination of trip:	P&R facilities instead of city centre
A 7.3	Trip frequency:	Slight increase number of leisure trips with city relevance.
A 7.4	Choice of route:	Dependent on the location of park and ride facilities.
A 7.5	Timing (day, hour):	No impact
A 7.6	Occupancy rate / Loading factor:	Increase of public transport occupancy rates
A 7.7	Energy efficiency / Energy usage:	Depends on the overall vehicle mileage, which is difficult to determine. Likely higher energy efficiency due to increased public transport usage and less energy consumption.
A 8	**Main source**	[4] [6] [7]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																				

- The measure reduces traffic in the inner city and increases it in the non urban areas. This means positive effects on health, safety, emissions and land use (parking spaces) in the inner city, but has the opposite effect on the surrounding (sub-)urban areas.
- The effect on absolute vehicle mileage is difficult to determine.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	- Due to reduced traffic in the inner city the measure has a positive effect on the safety of children and elderly.
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time	↗																**R**	**L**	**E**	
B 2.2	Risk of congestion	↘																**R**	**L**	**S**	**N**
B 2.3	Vehicle mileage	↘			↗							↗						**R**	**L**	**S**	**N**
B 2.4	Service and comfort	↘																**L**		**E**	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The effect on vehicle mileage is ambiguous, there are several effects that increase or reduce the vehicle mileage, depending on the specific area: Inner city: The TPM is expected to reduce traffic in the inner city and reduced congestion. Whether congestion is really reduced depends on how much induced traffic occurs due to the freed road capacity. [3] [4] Whether a reduction of traffic occurs also depends on the available parking space in the inner city. [4] Park and ride might, due to the increased convenience (concerning parking possibilities and avoidance of congestion) induce (leisure) traffic to the inner city. [4] [6] - An increase in traffic occurs in the suburban areas, especially around the park and ride facilities. This is enhanced by public-transport and slow mode users switching to park and ride and thus using a car. [3] But the negative impact on congestion is smaller than the positive impact in the inner city. [3] [4] The new trips to the park and ride facilities might be longer than trips to the city centre, but empirical evidence indicates that even with some longer trips, the overall vehicle mileage of the P&R trips decrease in comparison to the trips made before. [6] Considering urban and non-urban areas, the reduction of vehicle mileage of cars is expected to be larger than the additional mileage of the P&R-buses [3], but they are high frequent and thus have often a low load factor. [6] This indicates, that then effect on vehicle mileage for all modes can not be determined. - The travel and transport time of road users is expected to increase, because of an additional mode shift. The very transport time on road infrastructure is not affected.
B 2.V	**Quantification of impacts**	- Case study of seven UK cities of traffic implications of the instalment of short-range bus-based park and ride opportunities: The traffic avoided in case studies, where reduction occurred, ranged between 1.1 car-km per intercepted car (Brighton) to 6 car-km (Shrewsbury). [3] - Case study of seven UK cities: removed/redistributed traffic outside urban area: The range of traffic redistribution per intercepted car is between 1.5 car-km (Reading) to 6 car-km (Cambridge). [3]

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	→																**L**	**R**	**E**	
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector											↗						**L**	**R**	**E**	
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness														→			**R**	**L**	**S**	**N**
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		**R**	**N**	**S**	**N**
B 3.10	Public income (e.g.: taxes, charges)															↘		**L**	**R**	**E**	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Increase of spatial competitiveness concerning local businesses and shops compared to those of a town nearby, but without park and ride facilities. [4] - The public bodies have to subsidise the parking spaces (in good location), as these are expensive and not be accepted otherwise, thus in fact subsidises car owners. [4] Some P&R spaces can even be used for free. At the same time, this reduces the need for urban road maintenance and construction, which reduces costs. [4] - The impact on transport costs depends on the implemented scheme. - Effects on public income: Less charges due to reduction of parking fees, higher revenues for public transport services.
B 3.V	**Quantification of impacts**	

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**		1st level	2nd level	Source of assessment	Spatial level of source	
B 4.1	Health (incl. well-being)													→			→		L	R	S	N	
B 4.2	Safety	↘				↗								→			→		L	R	S	N	
B 4.3	Crime, terrorism and security	↘																					
B 4.4	Accessibility of transport systems	→																					
B 4.5	Social inclusion, equality & opportunities																						
B 4.6	Standards and rights (related to job quality)																						
B 4.7	Employment and labour markets												↘						L	R	E		
B 4.8	Cultural heritage / culture																						

B 4.I	**Overall impacts on social groups**	- Especially children and elderly profit form increased safety due to less traffic in inner cities.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The reduced traffic in the inner city has positive effects on the safety, especially on the (more vulnerable) slow mode users as there are more pedestrians and cyclists in the inner city. - Growing traffic in non urban areas increases accidents, especially the average traffic speed in non urban areas is higher than in urban areas. [7] - The reduced traffic in inner cities has a positive effect on health for urban residents, the increased traffic in the non urban areas an negative effect for the residents in those areas. [7] - 3rd level impact: Park and ride systems can decrease vehicle mileage of passenger cars, which reduce the need for maintenance for cars. This means that passenger cars will require less maintenance which will negatively affect car repair shops.
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													→			→	R	L	S	
B 5.2	Noise emissions													→			→	R	L	S	
B 5.3	Visual quality of the landscape													→				L	R	S	N
B 5.4	Land use													→			→	L	R	S	N
B 5.5	Climate																→	I		E	
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- The reduced traffic in inner cities reduces air pollutant and noise, while the traffic in the non urban areas increases air pollutants and noise. [7] - As it is difficult to determine the overall effect on the vehicle mileage, the effect on CO2 emissions and thus the effect on the climate is not definite. - Negative impact on the visual quality of the landscape as well as land use for the peripheral areas. [4] The latter includes the direct negative impact on land use due to large parking spaces near the stations, which are costly and could be used otherwise and furthermore fostering the urban sprawl. [3] [5] - Positive impact on land use for the urban area as it opens former parking space for other uses. [4]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission Energy: http://www.managenergy.net/resources/771. [5] Oxford et al. (2010): OPTIC Deliverable 1: Inventory of measures, typology of non-intentional effects and a framework for policy packaging **National** [2] Whitfield, Cooper (1998): The travel effects of park and ride, in Public Transport Planning and Operations. Proceedings of Seminar F held at the European Transport Conference, Loughborough University, England, 14-18 September 1998. Volume P425 [3] Parkhurst (2000): Influence of bus-based park and ride facilities on users' car traffic, in: Transport Policy 7, p. 159–172 [4] Department for Regional Development, Transport Policy Division (2011): Strategic review of park and ride: Report of the park and ride project group, UK [6] Meek, Ison and Enoch (2007): Park and ride: Lessons for the UK experience, Proceedings of 87th Annual Meeting of the Transportation Research Board. Paper 08-0730. Washington DC, January 2008 [7] KonSULT: Policy Instruments: A Policy Guidebook, Park and ride: Evidence on Performance. http://www.konsult.leeds.ac.uk/private/level2/instruments/instrument035/l2_035c.htm. **Regional / Local** [8] Transport for Greater Manchester: Greater Manchester's third Local Transport Plan 2011/12 – 2015/16, http://www.tfgm.com/ltp3/documents/Greater_Manchester_Local_Transport_Plan_Core_Strategy.pdf.

FACT SHEET NO: 46 **CATEGORY: 6.4** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Urban mobility - management & monitoring (freight / passengers, microlevel applications/implementations)**
A 3	**Transport policy measure (TPM)**	**Promotion of energy efficiency commercial vehicles (delivery vans, taxis, buses…)**
A 4	**Description of TPM**	This TPM aims to promote the use of energy efficient commercial vehicles in the European Union. In order to enlarge the market share of energy efficient commercial vehicles there is a need to provide support for Member States through facilitating and structuring the exchange of knowledge and best practices for promoting the purchase of clean and energy-efficient commercial vehicles. Energy efficient commercial vehicles can be defined as vehicles with a significant degree of energy transformation, often capable of using electricity (also hybrids), hydrogen, biogas and liquid biofuels in high blends. To promote the usage of energy efficient commercial vehicles it is necessary to take environmental impacts of vehicles over their whole lifetime (cradle to grave) into account by influencing the purchase decisions for public transport (buses) and commercial vehicles (LCV - light commercial vehicles, HCV - heavy commercial vehicles). These lifetime impacts of vehicles include energy consumption, carbon dioxide emissions and emissions of the regulated pollutants of NOx and PM. For public transport (buses) the EU aims to include lifetime costs for energy consumption, CO_2 emissions and pollutant emissions as a award criteria in the procurement of vehicles for public transport services. This way energy efficient buses will become more attractive for (local) authorities. It is important to mention that this TPM is not aiming to shift freight from short-sea shipping, rail and inland waterways to road transport.
A 5	**Implementation examples**	- Clean Vehicle Europe: "The Clean Vehicle Portal is a new web-database which aims to ensure a level of demand for clean and energy-efficient road transport vehicles and encourage manufacturers to invest in development of vehicles (also buses, LCV, HCV) with low energy consumption, low CO_2 emissions and pollutant emissions" (www.cleanvehicle.eu). - Energy in transport (STEER - Sustainable Energy use in Transport) is designed by the EU to promote energy efficiency and the use of new and renewable energy sources in transport. - The CIVITAS Initiative (City-Vitality-Sustainability) has been launched by the EU to support cities to introduce ambitious transport measures and policies towards sustainable urban mobility (including the stimulation of clean and energy-efficient public and private vehicles for passenger and freight transport). Several implementation examples (EU cities stimulating energy efficient transport) can be found on the website: www.civitas-initiative.org. - The EU Regulation (510/2011) demands that the average new LCV sold in the EU in 2017 will be required to emit 175g CO2/km or less and 147g CO2/km or less by 2020. [5]
A 6	**Objectives of TPM**	- Direct objective: Broad market introduction of energy efficient vehicles is often hampered by high initial costs for vehicles and thus insufficient customer demand. By stimulating the market for energy efficient vehicles, the EU aims to create markets of sufficient size to cut production costs of vehicles with better environmental performance. [1] [2] - Furthermore, the stimulation of the market for energy efficient vehicles aims to contribute to the EU objectives (Clean Transport Systems (CTS) Initiative) of increasing energy efficiency in the transport sector and protecting the environment by reducing emissions of carbon dioxide and air pollution from vehicles. [1] [2]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No key changes, more sustainable public transport (buses) will probably not lead to a change in modal split. Besides, it is not the objective of this TPM to generate a modal shift. This TPM only aims to increase the current and future vehicle stocks (buses, LCV, HCV) energy efficiency. [7]
A 7.2	Origin and/or destination of trip:	No key changes
A 7.3	Trip frequency:	No key changes
A 7.4	Choice of route:	No key changes
A 7.5	Timing (day, hour):	No key changes
A 7.6	Occupancy rate / Loading factor:	No key changes
A 7.7	Energy efficiency / Energy usage:	Energy efficient commercial vehicles will lead to a decreasing demand for resources (mainly oil), caused by the shift to sustainable combustion engines (hybrids, electric, biofuel, etc.) and more efficient conventional engines (petrol and diesel). To achieve a significant reduction of the use of non-renewable resources (like oil) it is crucial to use of renewable sources (solar, wind, biomass, etc.) to power commercial vehicles [10]. Quantification of some technical changes to HCVs will have the potential to increase energy efficiency of commercial vehicles. A few examples are: - Aerodynamic changes to HCV can reduce fuel consumption up to 5 %. [13] - Reducing rolling resistance (= rolling friction or rolling drag) of HCVs can save 3 % fuel consumption. [13] - Reducing the weight of HCVs (for instance by using different building materials like aluminium) will save up to 5 % fuel consumption. [13]
A 8	**Main source**	[2]

B IMPACTS

B 1 **OVERVIEW ON IMPACTS**

	AFFECTED SEGMENTS															Geographical level		Source	
	Passengers					Transport operators													
	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1 Summary																	N	L	S	I

- Promoting the usage of energy efficient vehicles (and thus sustainable behaviour) will only be successful if transport operators (public transport companies and road freight companies) will acknowledge the policy objective. History has proven that promoting sustainable behaviour (for instance vehicle labelling) is very challenging. [3]
- Public bodies will have to support the whole product development and innovation chain from research to market introduction in a more integrated approach on creating more energy efficient commercial vehicles. This will require additional investments from public bodies. [9]
- Without support from public bodies producing energy efficient commercial vehicles will continue to have a higher price for producers and consumers.
- A life cycle approach (costs and benefits of commercial vehicles during their lifetime) is needed to promote the attractiveness of energy efficient commercial vehicles.
- Promoting energy efficient commercial vehicles will not have major impacts on traffic. A minor rise in vehicle mileage is foreseen because of reduced environmental impacts which removes boundaries for new infrastructure investments in urban areas.
- Environmental benefits of increasing energy efficient vehicles will only be meaningful if (semi) electric vehicles will be using power from renewable energy. Electric cars driving on electricity generated by coal power plants will even produce more greenhouse gases during their lifetime than conventional diesel engines. [10]
- Potentially (if above mentioned conditions and considerations will be taken into account), the promotion of energy efficient commercial vehicles will have a positive effect on road users (including slow modes), transport operators, residents in urban areas and society (especially children and people with reduced lung function). These groups will mainly benefit from the reduced energy consumption (less resources needed). Furthermore, energy efficient commercial vehicles (as defined in the description) will cause less air pollutants (especially in urban areas), and reduce CO2, NOx and PM emissions. [1] [2] [4]

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	- Air pollutants (mainly PM) lead to increased use of medication by people with asthma, and reduced lung function [6]. - A high exposure to transport-related air pollution is associated with increased prevalence of bronchitis in children [8]. These groups will benefit substantially when commercial vehicles will become more energy efficient and produce less air pollutants. Especially those living in urban areas and near busy motorways.
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	TRAFFIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage	→			→		→					→						N	L	S	I
B 2.4	Service and comfort	↗			↗	↗												L	R	E	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The promotion of energy efficient commercial vehicles is meant to enable growth of public and commercial transport (trucks) without further harming the environment. Enabling growth does not mean that vehicle mileage increases more due to this TPM. This TPM "only" allows the already expected growth [1] [2]. - An increase of the level of comfort, due to cleaner (less air pollutants) commercial transport, will increase for all road traffic participants (including slow modes).
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	→				→	→					→						N		S	I
B 3.2	Private income / commercial turn over																↗	N		E	
B 3.3	Revenues in the transport sector						→					→						N		S	I
B 3.4	Sectoral competitiveness						↗					↗						R		E	
B 3.5	Spatial competitiveness															↗		I	N	S	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs													↘			↘	L	N	S	I
B 3.9	Public authorities & adm. burdens on businesses															↗		N	I	S	I
B 3.10	Public income (e.g.: taxes, charges)															↘		N		E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Clean and energy-efficient commercial vehicles initially have a higher price than conventional ones (petrol or diesel combustion. [2]
B 3.III	**Operation phase**	- Operational lifetime costs of a vehicle (including energy consumption, CO_2 emissions, and pollutant emissions) will decrease through the use of energy efficient commercial vehicles. [2]
B 3.IV	**Summary / comments concerning the main impacts**	- A cost-benefit analysis, weighting possible higher investment costs for commercial vehicles up-front against the saving from lower energy consumption and CO_2 and pollutant emissions, shows potentially large economic gains (mainly gains because of fuel savings) for operators as well as for society. Still, these savings will require additional investments during implementation phase. [2] - The purchase of clean and energy-efficient vehicles for public transport (buses) offers an opportunity to cities wishing to brand themselves as environmentally conscious. This increases the spatial competitiveness between European cities. [2] - An increasing demand for energy efficient commercial vehicles will enable producers to expand their production which leads to lower production costs. - Health service costs for society and especially residents in urban areas will decrease by reduced air pollutants (result of energy efficient commercial vehicles). [6] - The specific (CO_2) emissions from commercial vehicles will have to be measured on a harmonised basis in the Union according to the methodology laid down in Regulation (EC) No 715/2007. This will lead to more administrative burdens for the Member States who are responsible for applying the new rules and standards. [5] - Innovation will be a key factor for maintaining the competitiveness of the automotive sector and increasing the energy efficiency of commercial vehicles. Public funding will have to support the whole product development and innovation chain from research to market introduction in a more integrated approach on creating more energy efficient commercial vehicles. [9] 3 level impacts: - Energy efficient vehicles will require less fuel. This will lead to reduced public income for public bodies because they receive excise tax on petrol. - European vehicle manufacturers sectoral competitiveness will increase compared to non-European vehicle manufacturer, because on the long run, energy efficient vehicles will become more attractive due to increasing energy costs. - The demand for non-renewable resources will decrease due to higher efficiency. Hence, the energy prices will not increase as much as without energy efficient vehicle promotion and thus transport costs for all users will decrease and private income / commercial turnover increases.
B 3.V	**Quantification of impacts**	- Heavy commercial vehicles (HCV) are a major problem to air quality. For instance an average diesel truck produces 50–100 times more fine and ultra-fine particles (PM) per km travelled than a passenger car. [6]

B 4	SOCIAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	L	N	S	I
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗					N	I	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	- A rising demand for energy efficient commercial vehicles will lead to more employment during the take off phase (a phase with a rapidly increasing demand for energy efficient vehicles). [9] [12]
B 4.III	**Operation phase**	- The additional demand for employment in transport during implementation phase will hamper after a few years and employment rates will decline to current levels.
B 4.IV	**Summary / comments concerning the main impacts**	- Well-being of residents (mainly in urban areas and near busy motorways) and society increases when commercial vehicles become more energy efficient and produce less air pollutants, CO_2, Nox and PM emissions. [4] - Employment in transport will benefit a few years from the higher demand for energy efficient vehicles. Importantly, new skill profiles (for workers in the transport industry) are required, because current production capacities will have to be adapted, new production methods devised, further sources of raw materials secured and new clusters and business models developed. [9]
B 4.V	**Quantification of impacts**	- A 10-μg/m3 increase in traffic-related PM will lead to a 3.4% increase in mortality [8]. - In Germany, calculations forecast 30.000 new jobs (in the automotive industry) by 2020 if the government promotes the development of electric vehicles. [12]

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	**L**	**N**	**S**	**I**
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	**N**	**I**	**S**	**I**
B 5.6	Renewable or non-renewable resources																↓	**N**	**I**	**S / EE**	**I**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Energy efficient commercial vehicles will lead to reduced fuel energy consumption (less resources needed). Furthermore, energy efficient commercial vehicles (as defined in the description) will cause less air pollutants (especially in urban areas) by reducing CO2, NOx and PM emissions. [1] [2] [4] [EE] - The effect on noise emissions is uncertain. This depends on the kind of energy efficient vehicles used and the growth of vehicles mileage (within urban areas). Importance of life cycle effects**:** Several studies have shown that life cycle acidification rates (amount of greenhouse gases produced by vehicles over their life cycle) of PHEVs (Plug-in Hybrid Electric Vehicles) and BEVs (Battery Electric Vehicles) are only significantly lower (compared to conventional petrol cars) if the power necessary for driving(semi) electric vehicles is produced by renewable energy systems (solar, wind, etc.). From an environmental point of view, it is necessary that the market penetration of energy efficient vehicles (BEVs, PHEVs) is based on the use of renewable energy sources [10]. Unfortunately this research mainly focuses on passenger cars the findings are expected to be reasonable for LCV and HCV. Still, similar results can be expected for commercial vehicles. - 3rd level impact: The demand for non-renewable resources will decrease due to higher efficiency. Hence, the energy prices will not increase as much as without energy efficient vehicle promotion.
B 5.V	**Quantification of impacts**	- Heavy-Duty Vehicles (HDV) represent about a quarter of EU road transport CO_2 emissions and some 6% of the total EU emissions. [11]

C REFERENCES

C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2007i): Sustainable economics with clean and energy efficient vehicles, Memo/07/594, Brussels [2] European Commission (2009c): Directive 2009/33/EC, On the promotion of clean and energy-efficient road transport vehicles, Brussels [4] European Commission (2011n): Commission Staff Working document . Accompanying the White Paper - Roadmap to a single European transport area. SEC(2011)391. Brussels [5] European Commission (2011q): Regulation No 510/2011, Setting emission performance standards for new light commercial vehicles as part of the Union's integrated approach to reduce CO 2 emissions from light-duty vehicles, Brussels [6] World Health Organization (2000): Transport, Environment and Health, Copenhagen: WHO Regional Publications, European Series, No. 89 [7] European Commission (2012e): Call for proposals 2012 for actions under the programme "Intelligent energy - Europe", Brussels [8] World Health Organisation (2005): Studies on health effects of transport-related air pollution, Copenhagen: Publications WHO Regional Office for Europe [9] European Commission (2012b): CARS 21 High Level Group - On the Competitiveness and Sustainable Growth of the Automotive Industry in the European Union, Brussels [13] Shell (2011): Shell Lkw-Studie - Fakten, Trends und Perspektiven im Straßengüterverkehr bis 2030, Hamburg: Shell Deutschland Oil GmbH (in german) **National** [3] Gärtner, A. (2005): Study on the effectiveness of Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars, München: ADAC e.V. [10] Helms, H., et al. (2010): Electric vehicle and plug-in hybrid energy efficiency and life cycle emissions, Heidelberg: Ifeu – Institut für Energie- und Umweltforschung [11] Borken-Kleefeld, J., Ntziachristos, L. (2012): The potential for further controls of emissions from mobile sources in Europe, Laxenburg: International Institute for Applied Systems Analysis (IIASA) [12] Nationale Plattform Elektromobilität (2011): Zweiter Bericht der Nationalen Plattform Elektromobilität, Bonn: Bundesministerium für Verkehr, Bau und Stadtentwicklung

FACT SHEET NO: 47 **CATEGORY: 6.5** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Urban mobility - urban logistic strategies**
A 3	**Transport policy measure (TPM)**	**Introduction of city logistics / urban freight distribution**
A 4	**Description of TPM**	Urban mobility policies often lie in the responsibility of local and regional authorities. However, European urban transport policies provide a framework for decisions adopted on local level, which also other EU policies have to take into account. The traffic in cities throughout Europe is increasing and as a consequence congestion with its negative impacts as the loss of time and the increase of pollution is a fundamental problem, which costs about 1% of the EU's GDP per year. Also freight logistics have an urban dimension COM (2009)490, because the distribution of goods to its final destination in the city often is a part of the supply chain and represents the interface to long-haul transport segment. There are several different concepts concerning city logistics - the most common one is the local distribution of goods by smaller, cleaner and efficient vehicles. The main target of urban freight distribution is to avoid traffic passing through cities and metropolitan areas by means of the implementation of technical and planning measures as urban consolidation centres / city logistics. "City logistics incorporates many activities (i.e. production, commerce and supply) between different actors, which appear in form of inner urban goods transport or distribution of interurban freight, fulfilling a substantial contribution to economy, city life and operations." ([4], p.5)
A 5	**Implementation examples**	- 'City Plus' Milan (IT): Urban platforms to group and load 'City Plus' Shuttles for goods distribution - 'City Cargo' (pilot project) Amsterdam (NL): Distribution of goods in the city by means of the tram rail network, the usage of 'Crossdocks' as transfer points near the main highway and 'hubs', inner-city transfer points from tram to electrically powered vehicles (e-cars) - RegLog - City logistic Regensburg (DE): Cooperation of logistics service providers concerning the bundling of daily consignments - City logistics Bremen (DE): Consolidation system and logistics software - Freight consolidation scheme Bristol (UK): Design to serve retailers in Bristol's core retail area by a consolidation centre - 'SpediThun', Thun (CH): Bundling of city consignments to shops in a terminal outside the city - 'Chronopost' Paris (FR): Last mile urban delivery of goods by electric vehicles - CargoHopper Utrecht (NL): Bundling of retail goods and usage of (smaller) eletrified vehicles [4]
A 6	**Objectives of TPM**	Minimising the internal costs of transport, the external costs of transport and the social costs of the community as: - Costs for investments, operation and storage - Costs of time, accidents and damages - Costs of air pollution, noise and space - Reduction of (heavy) freight traffic in urban areas
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Possible change, dependent on applied concept - increasing demand of multimodal transport (due to concept) and use of lighter vehicles
A 7.2	Origin and/or destination of trip:	No major change, except that terminals as part of logistics outside urban areas may serve as an intermediate origin or destination
A 7.3	Trip frequency:	Reduction of vehicle-kilometres and trip frequency of heavy vehicles, dependent upon TPM increase of light duty vehicle kilometres and their trip frequency
A 7.4	Choice of route:	Possible change, dependent on concept (but not main instrument)
A 7.5	Timing (day, hour):	Possible change, dependent on concept (but not main instrument)
A 7.6	Occupancy rate / Loading factor:	Increase of loading factor (freight consignment) by reducing the number of unsuitable vehicles
A 7.7	Energy efficiency / Energy usage:	Increase of energy efficiency by operation of energy efficient and light duty vehicles and reduction of energy usage
A 8	**Main source**	BESTUFS II - Best Urban Freight Solutions (2004- 2008)

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**L**	**R**	**S**	**L**
		- Main impacts are positive and mainly concern the transport operators (Road/public transport), Residents of affected cities, the local public bodies and the overall society.																			
B 1.2	**Summary: Income groups**	- Comparably affecting lower income groups more positively (living in previously heavy loaded areas) - Displacement of lower income groups is conceivable due to appreciation of urban areas and decrease of social inclusion+E66																			
B 1.3	**Summary: Age groups**																				
B 1.4	**Summary: Disabled people**																				
B 1.5	**Summary: Gender groups**																				
B 1.6	**Summary: Ethnic groups**																				

		AFFECTED SEGMENTS																Geographical level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘			↘		↘					↘						**L**	**R**	**S**	**L**
B 2.2	Risk of congestion	↓			↓		↓					↓						**L**	**R**	**S**	**L**
B 2.3	Vehicle mileage						↓											**L**	**R**	**S**	**L**
B 2.4	Service and comfort						↗														

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Reduction of travel and transport time for long distance haulage transport operators - Less risk of congestion and less vehicle mileage for HGVs. Increase of LGVs might be expected. - Improvement of volume / weight utilisation rates for vehicles from centre, fewer heavy goods vehicles required [7] - Likely relief of urban freight transport will also positively impact passenger (road, public transport) traffic by decrease of transport time and less risk of congestion (Estimation)
B 2.V	**Quantification of impacts**	- The sources concerning quantitative information of urban freight transport are not very numerous, because the problem of urban freight distribution is not considered as first priority project and national authorities often consider it as a local project. - Reduction of 20% trucks in city centre (Spedithun); about 1-2 full loaded trucks replaced 7-8 partial loaded trucks, which delivered goods in the city (RegLog) - Replacement of app. 2500 trucks in inner-city (CityCargo => AMS) - Reduction of vehicle-km and 'stop-and-go' trips by 20%, because of tour organisation (RegLog) [all 4]

B 3	**ECONOMIC IMPACTS**	AFFECTED SEGMENTS: Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs						↘											L	R	S	L
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector						↘											L	R	E	
B 3.4	Sectoral competitiveness						↗								↑			L	R	EE	
B 3.5	Spatial competitiveness						↗								↑			L	R	E	
B 3.6	Housing expenditures													↗				L	R	E	
B 3.7	Insurance costs						↘											L	R	E	
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses						↗											L	R	S	L
B 3.10	Public income (e.g.: taxes, charges)															↗		L	R	S	L
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Costs (Investments/adjustment of infrastructure): 150-200 mio. € (CityCargo), but lower costs of road maintenance [4]
B 3.III	**Operation phase**	- Lower costs of road maintenance (CityCargo) [4], higher operating costs due to additional step in supply chain.
B 3.IV	**Summary / comments concerning the main impacts**	- Lower transportation costs of HGVs, some increase due to use of LGVs - Increase of public income, due to the possibility to optimise personnel deployment, efficient planning and enhanced capacity (see quantification) - Better freight vehicle usage (interurban/innerurban) (Spedithun) [4]; Better driver and vehicle utilisation [7] - Additional logistical stage (additional handling) [7] - Better logistical organisation, Reduction of delivery lead times and improving product availability [7] - Possible appreciation of houses/property in directly affected areas (positive due to less traffic); this leads to increasing rents; assuming the residents are not the owners and mostly the lower income group is living at the heavily loaded urban areas (by road freight transports) this measure leads to a displacements of residents (based on increasing rents) and decreasing social inclusion - Increasing spatial / sectoral competitiveness of shopkeepers compared to an area not managed by city logistics. The shopkeepers and retailers are significantly influenced positively due to a higher predictability of their workflow. [EE] - 3rd level impact: Accidents concerning road freight transport mostly occur within cities. Decreasing vehicle mileage within cities can reduce the number of accidents with HGVs which can lead to lower insurances for road freight operators. On the other hand an increase of the use of LGVs is expected.
B 3.V	**Quantification of impacts**	- No costs of investments necessary by public authorities and no subsidies to any commercial enterprise (RegLog) [4] - Investment / Adjustment Costs: 150-200 mio. € (CityCargo) [4] - Lower costs of road maintenance (CityCargo) [4] - Increase of public income (city) by optimal deployment of personnel, efficient planning, increase of capacity (24/7), reduction of theft (CityCargo) [4] - Possible costs of services (weight related) can be outweighed by time gains of transportation companies avoiding entering the inner city (SpediThun) [4] - Decrease of veh.km by 75% [4], less costs by km/veh (e-vehicle) (Chronopost) [4]

B 4	**SOCIAL IMPACTS**	AFFECTED SEGMENTS: Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	L	R	E	L
B 4.2	Safety					↗								↗			↗	L	R	S	L
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities													↗			↘	L	R	E	
B 4.6	Standards and rights (related to job quality)												↗					L	R	S	L
B 4.7	Employment and labour markets												→		↗			L	R	S/E	L
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Urban logistics strategies may harmonise labour conditions at overall lower levels; increasing qualification requirements towards staff - Comparably affecting lower income groups more positively (living in previously heavily loaded areas)
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Increasing employment (see quantification) - Increase of road safety and reduction of traffic accidents (CityCargo) [4] - Positive impacts on health and quality of life (increasing health, safety for residents and society (tourists) due to less freight traffic in the inner city (see quantification) ; - Increase quality of life and accessibility of the city centre (CityCargo) [4] - Increasing quality of job [4] - Residents living in areas heavily loaded by road freight vehicles will be influenced more positive by less transport traffic with its air pollutants and especially noise emissions. Assuming that predominantly lower income groups live in these areas, the measures concerning city logistics will especially affect this social groups positively by a higher level of health (incl. well being) and increasing urban road safety. - Slow modes transport passengers will benefit from less road freight traffic.
B 4.V	**Quantification of impacts**	- Creation of app. 1200 jobs in storage, cargo trams and distribution (e-vehicles) (CityCargo) [4] - Better job quality due to better working conditions (stress by congestion, parking etc.) and faster accessibility of workplaces by 50% (location of cross-docking place near city) (Chronopost) [4]

B 5	**ENVIRONMENTAL IMPACTS**	AFFECTED SEGMENTS: Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants													↘			↘	L	R	S	L
B 5.2	Noise emissions													↘			↘	L	R	S	L
B 5.3	Visual quality of the landscape													↗				L		S	L
B 5.4	Land use																				
B 5.5	Climate																↘	N	I	E	L
B 5.6	Renewable or non-renewable resources																↘	N	I	E	L

B 5.I	**Overall impacts on social groups**	Residents and shops / offices in the served areas will primarily benefit from the new concepts
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Less air pollutants in city, due to possible utilisation of less polluting vehicles in urban areas (CityPlus) [4], unless an increase of LGVs is foreseen. - Less noise emissions in city (Reduction of noise levels in the city due to possible replacement by other vehicles, for instance e-vehicles (trams - CityCargo [4])) - Positive impacts on climate and resources - Increase of urban attractiveness for residents and tourists (RegLog) [4]
B 5.V	**Quantification of impacts**	- Reduction of particulate (matter), CO_2, NO_x emissions up to 16% (CityCargo) [4] - Decrease of air pollutants by 75% and noise (Chronopost) [4]

C	REFERENCES	
C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2009g): Communication from the commission to the European parliament, the council, the European economic and social committee and the committee of regions; Action plan on Urban mobility. COM (2009)490 final, Brussels [2] European Commission (2009i): Communication from the commission, Freight transport logistics action plan. COM (2007) 607 final, Brussels [3] European Commission (2007c): Green paper - Towards a new culture for urban mobility. COM (2007) 551 final, Brussels [4] BESTUFS II - Best Urban Freight Solutions (2006): Deliverable 5.2 - Quantification of urban freight transport effects II [5] CIVITAS initiative: Diverse information. Retrieved from: www.civitas-initiative.eu [6] European Commission (2007b): Commission Staff Working Document - Freight transport Logistics Action Plan, Impact assessment. SEC(2007)1320 [7] BESTUFS II - Best Urban Freight Solutions (2005): Deliverable 1.1 - Policy and research recommendations I, Urban consolidation centres, Last mile solutions **Regional / Local** [4] BESTUFS II - Best Urban Freight Solutions (2006): Deliverable 5.2 - Quantification of urban freight transport effects II; Various examples with practical relevance (see Implementation examples)

FACT SHEET NO: 48 **CATEGORY: 6.6** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Urban mobility - "zero/low emission" strategies**
A 3	**Transport policy measure (TPM)**	**Influencing demand for sustainable transport – promotion of cycling within urban / suburban areas**
A 4	**Description of TPM**	Congestion in urban areas has negative impacts on the economic, the society, the level of health, [and] the environmental and degrades the natural and built environment. In order to preserve and improve the quality of life within cities it is crucial to enhance and promote sustainable mobility. A demand-oriented approach to sustainable mobility is based on information, co-ordination and motivation. Besides, it complements traditional, infrastructure oriented transport planning, and it can be applied to a range of target groups. [1] [2] [7] There are different ways to positively influence and induce sustainable transport. As this TPM solely focuses on cycling as relevant transport mode, there are two ways to basically influence the demand for cycling: Through infrastructure improvements (1) or by so-called 'soft measures' (2): (1) (Local) authorities can improve the attractiveness of cycling by expanding their cycling infrastructure. There exist various methods to expand cycling infrastructure, like: introduction of fast cycling lanes, dedication of cycling lanes, designation / generation of bicycle parking's and introduction of cycling bridges / tunnels. These are 'traditional' and new infrastructure measures. [7] (2) Furthermore, cities, companies and schools can promote cycling, for example by introducing awareness campaigns, traffic games, road safety assessments, financial incentives (mostly within companies) or educational packages. This measures are often referred to as 'soft measures', which are designed to encourage people to use bicycles (in combination with public transport) for a journey that previously have been made by car. [7]
A 5	**Implementation examples**	The implementation examples follow the two methods as mentioned in the above description: 1. CIVITAS (City-Vitality-Sustainability) example Gent - Belgium: Sustainable mobility planning by the construction of bicycle tunnels and bridges; completion of the main bicycle routes; smaller improvements on bicycle routes (plateaus, cycling in one way streets, etc…). Goal: creating an integrated, sustainable mobility policy to reduce the number of cars and promote cycling and public transport. Results so far: 10% more bicycle use on average and a growing number of train commuters cycle between their home and the railway station (+10 % every year). [6] 2. ELTIS (The Urban Mobility Portal) example: Ocean's 11 - Promoting Active Travel in the East End of London. In order to promote a more active lifestyle for the local population, the "Get out Get Active" project was introduced. The project aimed to educate the residents on the rewards of travelling more actively (walking and cycling). Over 60 % of the 800 participants felt healthier at the end of the project than they did at the start (see www.eltis.org for further details). 3. The CIVITAS example of Graz: several infrastructure investments (new cycling zones, new safer junctions, bike & ride facilities) combined with promoting activities (a new electronic route planning that helps cyclists to plan fast and safe bicycle trips, a series of information campaigns, organised tours and other events organised together with professional bicycle retail shops) have led to an increased use of bicycles by 6 %. [7]
A 6	**Objectives of TPM**	The objective is clear: promote cycling and cycle-related multimodal transport and reducing road vehicle usage in order to achieve a more sustainable transport system within cities and urban areas. Promotion of cycling targets to improve the quality of life for citizens and reduce environmental impacts. [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Cycling becomes more popular and private automobile usage will decrease. A modal shift occurs from road to slow modes. Moreover, public transport might increase due to increased multimodal transport options.
A 7.2	Origin and/or destination of trip:	The accessibility of city centres will become easier by slow modes and car trips will end up more often at the edge of cities. (P&R / B&R). It is unlikely that a change of origin/destination due to cycling policies occur, even in case of B&R applications, because the origin and final destination do not change, while the choice of route with different modes change.
A 7.3	Trip frequency:	No key changes
A 7.4	Choice of route:	Change from roads to cycling paths and railroads.
A 7.5	Timing (day, hour):	No key changes
A 7.6	Occupancy rate / Loading factor:	No key changes
A 7.7	Energy efficiency / Energy usage:	Energy usage will decline as cycling requires far less energy (for instance no fuel/oil required) compared to passengers cars and even compared to public transport.
A 8	**Main source**	[1], [5]

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
B 1	**OVERVIEW ON IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**L**	**R**	**S**	**I**

		- Although mobility plays a crucial role in contributing to the socio-economic growth of urban areas, its negative effects have been increased (partly because of increased mobility) extensively over the years. Promoting sustainable transport (example: cycling) will mostly have positive impacts on all road users (especially slow modes), public transport operators, residents and society. They will benefit from increased well-being (less passenger cars -> less air pollutants and noise emissions), increased physical activity (and expansion of the cycling network). - Road transport operators (car industry) will face negative impacts because of the initiated modal shift from road to slow modes and public transport. A reduced demand of passenger cars will lead to a decreased sale of cars which will implicate unemployment in the car industry. [5] - Public bodies will have to invest in cycling infrastructure, but will save part of the expenses (maintenance) because of a lower demand for road infrastructure. - The private income will increase due to less travel and transportation costs (e.g. commuting costs) and less investments for the infrastructure.
B 1.2	**Summary: Income groups**	- Cycling is an inexpensive way of transport within the financial reach of almost everyone. For each kilometre travelled, travel costs for the bicycle are lower than those of any other means of transport, except walking. Promotion of cycling will thus be beneficial for low income groups, because these depend on cycling when it comes to means to transportation (as other means are to expensive). [11]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

		AFFECTED SEGMENTS																Geographical level		Source	
B 2	**TRAFFIC IMPACTS**	Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘				↘												**L**	**R**	**E/S**	**I**
B 2.2	Risk of congestion	↘																**L**	**R**	**E**	
B 2.3	Vehicle mileage	↘	→		→	↗												**L**	**R**	**S**	**I**
B 2.4	Service and comfort					↑												**L**	**R**	**E**	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Travel or transport time for slow modes will decline when additional cycling infrastructure is going to be built. Cycling paths and extensive cycling networks will reduce the number of stops and enable an efficient travel by bike [3]. - The risk of congestion for road users will decline when more people will switch from passenger cars to slow modes, which will slightly influence the road transport time positively. - Vehicle mileage of passenger cars will decrease and vehicle mileage of slow modes will increase. Fast cycling lanes, cycling lanes, cycling bridges and other cycling infrastructure investments will reduce travel time for slow modes and allow people using a bicycle to cover greater distances in a shorter period of time. Vehicle mileage for public transport (including rail transport) will stay the same, or notice a minor increase. The latter will only take place when multimodal transport is being promoted (for instance by introducing improved cycling facilities at rail/bus stations) [1] [7]. - Service and comfort will increase significantly for slow mode users (cyclists). User-friendliness will increase by more parking facilities and improved hiring options.
B 2.V	**Quantification of impacts**	- A reduction of travel time by bicycle of 10 % will increase bicycle use by 3 % [10].

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 3.1	Transport costs																				
B 3.2	Private income / commercial turn over														↘	→	↗	L	R	E/S	I
B 3.3	Revenues in the transport sector						↘											R	N	S	N
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																↘	N		S	N
B 3.9	Public authorities & adm. burdens on businesses															→		L	R	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Public bodies will have to invest in cycling infrastructure (e.g. cycling lanes, cycling bridges, fast cycling lanes) during implementation phase. [See quantification for cost examples of cycling infrastructure measures.] - Administrative burdens for public bodies and participating companies will increase when starting awareness campaigns or introducing financial incentives to promote cycling.
B 3.III	**Operation phase**	- Public bodies will have less maintenance costs concerning road infrastructure (due to reduced vehicle mileage of passenger cars). [5]
B 3.IV	**Summary / comments concerning the main impacts**	- Public bodies, responsible for cycling infrastructure, will have to invest in new cycling infrastructure or promotion campaigns. But investments in bicycle infrastructure and maintenance are much cheaper than investments in car infrastructure. [5] This means, that investments of public bodies will increase during implementation and will decrease during operation. - Revenues in the car industry will decline when there is a demand shift from car to cycle. [5] - Health service costs for society will decline when more people decide to cycle instead using the car. Mainly, because physical activity (like cycling) leads to a longer and healthier life which will reduce health costs. [5] - Administrative burdens will rise when public bodies or companies start awareness campaigns, traffic games, road safety assessments, financial incentives (mostly within companies) or educational packages. [2] - The private income will increase due to less travel and transportation costs (e.g. commuting costs) and less investments for the infrastructure.
B 3.V	**Quantification of impacts**	- Each kilometre of travelling by cycled instead of car saves €0.97 of indirect costs (costs like time savings, air pollutants, noise, health problems, etc.). [2] - Within the CIVITAS II city of La Rochelle (France) the costs for one kilometre bicycle path was EUR 150.000 (in Poland one kilometre costs 250.000 EUR). [7] - Cycling promotion campaigns proven to be effective in Denmark. The "We bike to work" campaign led to about 10.000 new cyclists annually. [11] - The construction of a two-way cycle track (2.5 – 3.0 m wide) in Denmark cost DKK 2.5 – 6.0 million (within cities) and DKK 1.0 – 2.5 million (countryside) per kilometre. [11]

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographi-cal level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 4.1	Health (incl. well-being)					↗								↗			↗	L	R	S	N
B 4.2	Safety	↗				↗												L	R	S/E	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems					↗												L	R	E	
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets						↘					→	→					R	N	S	N
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Health of slow mode users will increase due to a better physical condition e.g. less chance of cardiovascular diseases, less chance to become overweighed, etc. (see quantification of impacts). [9] - Well-being of residents and society will increase due to the modal shift from road to slow modes (and public transport). Air pollutants and noise emissions will decline substantially if more people will use bicycles instead of passengers cars, especially within congested urban areas. [1] - About 60 % of the accidents and 25 % of the road fatalities occur in urban areas and affect slow modes users as the most vulnerable road users. The risk of being killed in a road accident is six times higher for cyclists and pedestrians than for car users. A well designed infrastructure, especially at intersections, can increase the level of safety for cyclists significantly. [1] - Accessibility of slow modes will increase when promoting leads to more bike & ride areas, "rent a bike" stores and particularly if (local) authorities offer financial incentives to low-income groups. In other words, there will be more possibilities to hire and use bicycles. - A modal shift from road towards slow modes and public transport will have a negative impact on employment within the car industry. Still, more jobs can be expected in public transport (if cycling will lead to an increase of multimodal transport) [5], if the demand increases. - Road passenger safety level increases when there is less traffic.
B 4.V	**Quantification of impacts**	- Over 70 % of all cycle accidents resulting in lethal or serious injuries occur at intersections. [5] - Everyday cycling to work increases the level of fitness 13 % on average. [9] - The health effect of the individual cyclist (internalised benefits as optimised weight, less risk of a cardiovascular disease, etc.) are calculated to approximately DKK 3.80 per kilometre (compared to car based travelling). [11] - Employees which travel to work by bicycle everyday are approximately 2 days fewer ill (on average) than employees travelling by car. [9] - Society (residents, health sector and state) benefit by about DKK 1.81 per kilometre. The benefits include cost savings for medical treatments and increased work value due to less sick leave (compared to car based travelling). [11]

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↓			↘	**L**	**R**	**S**	**I**
B 5.2	Noise emissions													↓			↘	**L**	**R**	**S**	**I**
B 5.3	Visual quality of the landscape																↘	**L**	**R**	**E**	
B 5.4	Land use																↘	**L**	**R**	**S**	**N**
B 5.5	Climate																↘	**N**		**S**	**N**
B 5.6	Renewable or non-renewable resources																↘	**N**		**S**	**I**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Short-distance trips (< 10 km) by passengers cars are the most fuel - inefficient car trips and generate the most pollution per kilometre compared to long-distance trips. These short-distance trips can be replaced by cycling, which will lead to a strong decrease in air pollutants on a local scale. [2], [8] - If road vehicle transportation is being reduced; noise emissions will decline (see quantification). [2] - A modal shift from cars to bicycles will save land use. Cycling will require less space for parking and travelling. [4] [5] [9] - The visual quality of urban areas will increase when less space is needed for parking and roads. - Climate will benefit from less greenhouse gases produced by passenger cars. [5] [9] - A reduction of vehicle mileage of passengers cars will lead to a decreased demand for oil (non-renewable resource). In other words, a modal shift from passenger cars to slow modes will decrease the amount of non-renewable resources used. [1]
B 5.V	**Quantification of impacts**	- If road vehicle transportation on an urban road is being halved; noise emissions will decline with 3 db(a). [2] - If all trips up to 7.5 kilometres by passengers cars will be replaced by trips on bicycles than this will save about 300-900 ton NOx, 20-60 ton PM and 100-300 ton SO2 annually [9]. - The space need for a parked bicycle has been calculated to be only 8 % of the space needed to park a car. [5]

C REFERENCES

- **C 1**	**Other TPMs of this subcategory**	- Low Emission Zones (LEZ) / Environmental zone
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2007c): Green Paper - Towards a new culture for urban mobility, COM (2007) 551 final, Brussels [2] European Cyclists' Federation (2011): Call for an integrated European Cycling Policy - ECF Position on the European Commission's White Paper on Transport, Brussels: ECF Publications [3] PRESTO consortium (2010): Promoting Cycling for Everyone as a Daily Transport Mode - Cycling Policy Guide - Cycling Infrastructure [4] PRESTO consortium (2010): Promoting Cycling for Everyone as a Daily Transport Mode - Cycling Policy Guide - Promotion of Cycling [7] Gualdi, M., Proietti, S. (2007): CIVITAS in Europe - A proven framework for progress in urban mobility, Rome: ISIS [8] European Parliament (2010a): Directorate general for internal policies, Policy department B: Structural and cohesion policies: The promotion of cycling, Brussels: European Parliament **National** [5] Hout, K. van (2008): Annex I: Literature search bicycle use and influencing factors in Europe. Instituut voor Mobiliteit (IMOB): University of Hasselt [9] Hendriksen, I. Gijlswijk, R. van (2010): Fietsen is groen, gezond en voordelig - Onderbouwing van 10 argumenten om te fietsen, TNO: Leiden (in dutch) [10] Nijland, H., Wee, B. van (2006): De baten van fietsen en de mogelijkheden van fietsbeleid, Bijdrage aan het Colloquium Vervoersplanologisch Speurwerk 2006, Amsterdam (in dutch) [11] Andersen, T., et al. (2012): Collection of Cycle Concepts 2012, Copenhagen: Cycling Embassy of Denmark **Regional** [6] Bekaert, V. (2011): Cycling policy in Ghent, City of Ghent: Mobility Department

FACT SHEET NO: 49 **CATEGORY: 6.6** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Transport Planning**
A 2	**Subcategory**	**Zero/low emission strategies**
A 3	**Transport policy measure (TPM)**	**Low Emission Zones (LEZ) / Environmental zone**
A 4	**Description of TPM**	The transport policy measure covers the integration of 'low emission zones' in urban transport / mobility. A 'low emission zone (LEZ)', also called 'Environmental zone', is a specific area mostly within cities, where the usage of specific transport modes is restricted or prohibited.[1] It is a defined geographical area that can only be entered by vehicles meeting certain emission criteria. [4] Further access restrictions can additionally being implemented in a LEZ: - a time restriction - vehicle restrictions (type, weight, length, height) - loading factor / utilisation rate - permanent street closures and pedestrianisation schemes [1], [4], [5] The purpose of a low emission zone is to restrict the most polluting vehicles entering the area of adaptation when they exceed a certain emission level. Hence, to lower the emissions in a certain area a LEZ is introduced when the level of pollutants has reached a dangerous level, which will negatively influence the public health. [4] In 2009 low emission zones have been established in about 70 European cities, with different access rules and different enforcement methods. The rules may be determined by national, regional and local legislation. Within the zones the access criteria vary widely (also across different environmental zones in the same country) and include: - Euro pollutant emission standards - Emission level for particulates only - Equipment of vehicles with a particulate filter (without checks on actual emission levels) - Equipment of vehicles with a catalytic converter - Weight, with local classifications varying for different vehicle categories - Age, differentiated by vehicle category - Vehicle technology (petrol, diesel, natural gas, LPG or electric) - Vehicle number plates [3]
A 5	**Implementation examples**	- Low emission Zone Utrecht (NL) [5] - Environmental zones Gothenburg, Stockholm, Lund, Malmo (SE) [5] - Protected zone Prague (CZ) [5] - Other cities in Italy, Norway, Denmark, Germany etc. - Delivery time windows and vehicle restrictions (53% of the Dutch municipalities) (NL) [5]
A 6	**Objectives of TPM**	- Reduction of pollutant emissions and to meet the obligations arising from the EU air quality legislation [3]; the main air pollution problems in European are caused by particulate matter (PM), nitrogen dioxide (NO2) and ground level ozone. Road traffic is a significant source of NO2 and PM. [4] - The implementation of LEZ may also reduce the traffic noise emissions and improve the road safety (new vehicles). [4] - In the last years there emerged other strategic objectives (reduction of congestion, Increasing liveability of cities). [6]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Increase of intermodality.
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	Reduction (increase of load factor).
A 7.4	Choice of route:	No change.
A 7.5	Timing (day, hour):	Depending on characteristic of measure.
A 7.6	Occupancy rate / Loading factor:	Increase.
A 7.7	Energy efficiency / Energy usage:	Energy usage will be reduced, thus energy efficiency will be positively affected.
A 8	**Main source**	[4]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	- "A potentially useful instrument to improve environmental conditions in urban areas, and, in particular , help Member states to meet Air Quality Limit values" [4] - A comparison among the different implementation examples regarding their economical impacts are not very meaningful, because of the heterogeneous extensions, technologies, back office procedures and enforcement processes.
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	- Through the implementation of low emission zones all the residents will be positively affected by a reduction of air pollutants. However, the very young and old population/residents will be positively affected by a reduction of air pollutants as this are the age groups which suffer most from transport emissions. [4]
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographical level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion	→					→											**L**		**S**	**L**
B 2.3	Vehicle mileage						↗											**L**		**S**	**I**
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Indifferent result regarding the risk of congestion. Strong dependency on measure configuration. - Reduction of congestion, because of access restriction (Prague, Protected zone). [5] - Increase of congestion, due to the time window. Hence, the majority of the drivers transport goods in the morning (Dutch municipalities, NL). [5] - Same volume of freight to/from city centre will be split among other road vehicles (possibly light goods vehicles), which will generate more traffic in terms of vehicle-km. [6]
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗					↑											L	N	S	I
B 3.2	Private income / commercial turn over														↘			L	N	E	
B 3.3	Revenues in the transport sector						↘	↗				↗						L	N	S/E	I
B 3.4	Sectoral competitiveness		↗		↗	↗	↘	↗				↗						L	N	E	
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																↘	N		E	
B 3.9	Public authorities & adm. burdens on businesses															↗		L		S/E	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations						↗						↗				↘			EE	

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- Freight Distributors: Strategy of redeployment (old / new vehicles) depends on market coverage (local - national) and size of vehicle fleet.
B 3.III	**Operation phase**	- Freight Distributors: Operating costs are closely related to the companies frequency of replacing vehicles and stringency of individual LEZ.
B 3.IV	**Summary / comments concerning the main impacts**	- Transport costs increase. - Increase of capital costs (replacement/adaptation) for road transport operators; Potential economic inefficiency due to imposed replacement of vehicles before end of economic life, if not only time restricted access [6] This is potentially positive for developing countries as these may use the old vehicles, thus replacing even older / inefficient vehicles. [EE] - Reduction of revenues for transport operators. - Costs for public authorities increase due to additional investigation. - Higher potential business costs for directly affected companies (businesses within zone) => Reduction of revenues. - Reduction of health service costs - Changed transport costs influence the sectoral competitiveness between modes for passenger traffic.
B 3.V	**Quantification of impacts**	- The major reasons for higher operational costs are the variety of conditions regarding the individual time windows for freight deliveries and vehicle-type related restrictions; estimation at 100 million € per year for freight distributors caused by local regulations at supermarkets in the Netherlands. Potential significant increase of vehicle operating costs between 0.1 and 70%. [3] - Estimations for urban rail based transport systems gain about 4.5 bn € for the rail supply industry up to 2020 due to fragmentation. [3] - Copenhagen: Estimation of implementation and operation cost of 45-100 million € (HGV>3.5t gross weight; EURO 3). [4] - Utrecht Low emission Zone: Additional costs for companies due to replacement/adaptation of vehicles (6500 vehicles: 69 million €); Additional costs for municipality (cameras, signs, communication, capacity costs). [5] - Additional annual costs of mesh containers (MC) in core shopping areas for the whole Dutch retail sector: 425 million €. 63% of costs increase by time windows, 37% of costs increase by vehicle restrictions (height, length, width, axle pressure, weight) [5]

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↑			↗	L	N	S/E	I
B 4.2	Safety													↑			↗	L	N	S/E	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																↗	R		E	
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																↗	N		S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- The very young and old population/residents will be positively affected by a reduction of air pollutants (health benefits) as this are the age groups which suffer most from transport emissions. [4]
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Health benefits for residents and society. - Safety benefits for residents and society. - Benefits for employment according to the improvements in the vehicle sector (including retrofitting). - Measure does not work when "illegal" entrants accept the fines, which occurred in some LEZ's [EE]. -3rd level impact: Inequality between residential areas can increase if some areas will become LEZs and other areas will not be appointed. This can cause dissatisfaction in residential areas which suffer from air pollution but are not appointed as LEZ.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↑			↗	L	R	S	L
B 5.2	Noise emissions													↑			↗	L	R	S	L
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↗	I		E	
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	- The very young and old population/residents will be positively affected by a reduction of air pollutants (health benefits) as this are the age groups which suffer most from transport emissions. [4]
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Improved air quality: Not only reduction of NOx and PM, also emission reduction of CO, HC, CO2. - Reduction in noise emissions. - More attractive environment for companies and people; Increase of life quality.
B 5.V	**Quantification of impacts**	- Reduction of NOx from HGV within low emission zone by 10% and emissions of particulates by 40% (Stockholm). [4] - Less emissions inside (CO -6%, HC -4% , NOx -8% and PM -33%) and outside the zone because of generally newer fleet. Older vehicles generally operating countryside, where external costs are lower (Gothenburg, SE). [5] - LEZ London: Older goods vehicles will be displaced for company operations outside the LEZ; this can lead to a net increase of air pollution from freight transport vehicles in the UK. [4]

C	REFERENCES	
C 1	**Other TPMs of this subcategory**	- Influencing demand for sustainable transport – promotion of cycling within urban / suburban areas
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2009h): Transport Research Knowledge Centre - Thematic research Summary: Urban Transport, Brussels. [2] European Commission (2009g): Communication from the Commission to the European Parliament, the Council, the European economic and social committee and the Committee of Regions. Action Plan on Urban Mobility. COM(2009)490, Brussels [3] European Commission (2009i): Commission staff working document Communication form the Commission to the European Parliament, the Council, the European economic and social committee and the Committee of Regions. Action Plan on Urban Mobility - Impact Assessment. SEC(2009)1211, Brussels [4] Best Urban Freight Solutions II (BESTUFS II) (2008): Policy and Research Recommendations IV. Environmental zones in European cities, Accommodating the needs of passengers and freight transport in cities, and BESTUFS Project Recommendations [6] European Commission (2010a): Study on urban access restrictions, Rome **Regional / Local** [4] Best Urban Freight Solutions II (BESTUFS II) (2008): D1.4 Policy and Research Recommendations IV. Environmental zones in European cities, Accommodating the needs of passengers and freight transport in cities, and BESTUFS Project Recommendations [5] Best Urban Freight Solutions II (BESTUFS II) (2006): D5.2 Quantification of urban freight transport effects II

FACT SHEET NO: 50 **CATEGORY: 7.1** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Technology - vehicle**
A 3	**Transport policy measure (TPM)**	**Electromobility on roads**
A 4	**Description of TPM**	The TPM 'Electromobility - roads' describes the fostering of electric road vehicles. This especially means the support of research and development leading to an increase of efficiency, safety and reliability of vehicles with electronic propulsion. An implementation of this measure is expected to increase the number of electric road vehicles, including passenger as well as freight vehicles. In this context passenger road vehicles include motorized private as well as public transport vehicles (buses and coaches). In contrast, within the electrification of road freight vehicles this assessment focuses only on light-duty vehicles (LDV) used in city logistics, hence long-haul trucks propulsions are expected to remain based on internal combustion engines (ICE) for the foreseeable future. [1] Electromobility encompasses semi- and full hybrid electric vehicles, plug-in hybrid electric vehicles and battery electric vehicles, while this TPM focuses the last two types of vehicles. The following assessment will not describe policies concerning the instalment of a charging infrastructure, whereas these are considered separately. Potential first -time private customers (economic incentive) are full-time employee from cities (inh.<100.000) commuting to work regularly 30-50km [12]. There lies a high potential (economic feasibility) in integrating e-mobility (vehicles) in carsharing-, company- and service-fleets [12].
A 5	**Implementation examples**	- DIRECTIVE 2009/33/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles (EU) [7] - European Green Cars Initiative (EGCI) Public-Private Partnership (EU) [1] - German Federal Government's National Electromobility Development Plan (DE) [3]
A 6	**Objectives of TPM**	The objective is to accelerated the market introduction of electric vehicles to achieve: - climate protection - reduction of local emissions and improve the air quality - noise reduction - decrease oil dependency - increase energy security - strengthening the motor-vehicle manufacturing industry, and thus the whole economy [3]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	Likely smaller distances because of lower distance range.
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Shortest route instead of fastest route.
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	- Higher well-to-wheel energy efficiency of electrical propulsion (2010 30%) compared to a combustion engine (18-23%) [4] (Well-to-wheel: life-cycle assessment for transport fuels and vehicles, which includes fuel production and processing as well as the vehicle operation) - The energy efficiency depends on the type of electricity generation. [5] - For the tank-to-wheel efficiency a range from 60-80% is given. [9] (Tank-to-wheel: life-cycle assessment for transport fuels and vehicles for the vehicle operation)
A 8	**Main source**	[5] [9]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	-Vehicle users and operators face high purchase costs and a reduced driving range. Although at first sight these issues have negative influence, the support of R&D could turn out in a price decrease in the future. The economy benefits from a support of research and development of the new technologies, which have also positive effects on the labour market. - Workers, residents and society profit from the reduced noise, air and CO2 emissions.
B 1.2	**Summary: Income groups**	- Potential first -time private customers (economic incentive) are full-time employee from cities (inh.<100.000) commuting to work regularly 30-50km [12].
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	- An increase in electric, and thus silent, vehicles poses a safety risk for blind and low vision pedestrians.
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage	↘					→													E	
B 2.4	Service and comfort	↘					→					→								E	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Electric vehicles have a considerable smaller driving range than combustion engines, additionally there are insufficient charging possibilities are at the moment. This could mean that closer destinations and shorter routes are chosen. - The transport time does not change, but the charging time has to be taken into account. This might, at least for private motorized traffic, have a negative effect on the user-friendliness/ service and comfort level of the vehicle.
B 2.V	**Quantification of impacts**	

B 3	**ECONOMIC IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↗			↗		↗					↗						N		S	I
B 3.2	Private income / commercial turn over														↗			I	N	E	
B 3.3	Revenues in the transport sector						↘					↘						I	N	E	
B 3.4	Sectoral competitiveness														↗			I	N	E	
B 3.5	Spatial competitiveness														↗			I		S	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																↘	L	N	E	
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↘		N	I	E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	- Potential first -time private customers (economic incentive) are full-time employee from cities (inh.<100.000) commuting to work regularly 30-50km [12].
B 3.II	**Implementation phase**	- High purchase costs: The costs for the acquisition of a electric vehicle are higher than of an alternative vehicle with a combustion engine. It is expected to remain higher even in the next two decades. [5] - The purchase costs differ however, depending for example on the exact type of vehicle and additionally on the type of battery used. [9]
B 3.III	**Operation phase**	- The operation costs are lower for electric vehicles, but relatively high compared to the costs of acquisition. [5] - The support of R&D will results in expenses for the public bodies. - After implementation, when more and more electric cars are being produced, the prices of the EV will decline as their market increases. [11]
B 3.IV	**Summary / comments concerning the main impacts**	- Operation costs are lower, but the overall costs increase with the use of a electric vehicle, for passengers as well as transport operators and service providers. For the latter this means a reduced revenue. [5] - Strengthening of the research and technology location of the country / the EU by the support of R&D in the automotive sector increases the competitiveness and strengthens the entire economy. [3] - Since regional competitiveness is motivated by the support R&D within the automotive sector, one would expect that also the sectoral competitiveness of this sector is improved. - Energy suppliers will benefit from higher energy demand. - 3rd level impact: Energy efficient vehicles will require less fuel. This will lead to reduced public income for public bodies because these receive excise taxes on petrol
B 3.V	**Quantification of impacts**	Purchase costs 2007: Conventional diesel car: 22,046 €, Hybrid car: 24,371, Electric car: 25,485; Conventional diesel bus: 216,320€, Hybrid bus: 248,768€, Electric bus: 367,744€ [8]

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**		1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗		L	N	S	I
B 4.2	Safety					↘													L		S	I
B 4.3	Crime, terrorism and security																					
B 4.4	Accessibility of transport systems																					
B 4.5	Social inclusion, equality & opportunities																					
B 4.6	Standards and rights (related to job quality)																					
B 4.7	Employment and labour markets														↗				I	N	E	
B 4.8	Cultural heritage / culture																					

B 4.I	**Overall impacts on social groups**	- An increase in electric, and thus silent, vehicles poses a safety risk for blind and low vision pedestrians.
B 4.II	**Implementation phase**	- The general acceptance of electromobility is mainly influenced by: Efficiency gains, lower maintenance costs, personality/lifestyle, cost- / environmental advantages, driving properties/behaviour, distance/driving range , purchasing price [12] [13].
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Due to the reduced noise level, especially at low speed, the electric vehicle is silent an thus more dangerous for cyclists and pedestrians, especially pedestrians who are blind or low vision. [2] [6] - The reduced air pollutants and noise emissions have a positive effect on the health of residents and the society in general. Nevertheless, the health effect depends, apart from noise, on the reduction of air pollutants, which differs depending on the used energy source. [10] - Due to the strengthened economy, a positive effect on the labour market can be expected.
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**		1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↓			↘		L	N	S	I
B 5.2	Noise emissions												↓	↓			↘		L	N	S	I
B 5.3	Visual quality of the landscape																					
B 5.4	Land use																					
B 5.5	Climate																↘		I		S	I
B 5.6	Renewable or non-renewable resources																↗		I		S	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Noise emissions are reduced significantly by an increased usage of electric vehicles. - The reduction of air pollutions is only on the local level (concerning residents) unambiguous. In general the level of air pollutants depends on the production of the electric energy, which depends on the energy mix used (nevertheless the electricity mix also varies widely depending on geography, time of day and season) [9]. - The emission of CO2 of a electric vehicle depends on the source of energy, which do not emit NOx and PM. [8] Especially in urban areas with a high population density this reduced emissions have a strong effect. [9] - Nevertheless, negative local environmental impacts are expected by the large-scale production of lithium for the lithium-ion batteries. [9] - Depending on the source of energy, the energy production may have a negative effect on land use (coal) and produce radioactive waste (nuclear power plants). [10] - Reduced oil consumption: energy security [5]
B 5.V	**Quantification of impacts**	- Total CO2 emissions: Conventional ICE car: 145-215 g/km; Electric Vehicle (depending on the source of energy: 8-140g/km. CO2 in g/km/NEDC WTW (NEDC: New European Driving Cycle; WTW: Well to Wheel) [1] - The difference of well-to-wheel GHG emissions of electric (EV) and plug-in hybrid vehicles (PHEV) and their benefit compared to average conventional vehicles (CV) depends strongly on the considered grid mix assumptions, the benefit ranges from -38% (coal based energy production) to +81%. [9]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- H2 Fuel Cell Vehicles (H2-FCV)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011e): European Green Cars initiative public-private partnership multi-annual roadmap and long-term strategy; Luxembourg: Publications Office of the European Union [2] European Commission (2011i): Proposal for a Regulation of the European Parliament and of the Council on the sound level of motor vehicles; COM(2011) 856 final [7] Directive 2009/33/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of clean and energy-efficient road transport vehicles [8] PriceWaterhouseCoopers (2007): Impact assessment on a new approach for the cleaner and more energy efficient vehicles directive proposal, Annex 3 - Vehicles technologies performances comparison [9] Hacker et al (2009): Environmental impacts and impact on the electricity market of a large scale introduction of electric cars in Europe - Critical Review of Literature, ETC/ACC Technical Paper 2009/4 [10] Althaus, Gauch (2010): Vergleichende Ökobilanz individueller Mobilität: Elektromobilität versus konventionelle Mobilität mit Bio- und fossilen Treibstoffen, Life Cycle Assessment and Modelling Group, Technologie und Gesellschaft, Empa, Dübendorf [11] Organisation for Economic Cooperation and Development (OECD) / International Energy Agency (IEA) (2012): EV City Casebook. A look at the global electric vehicle movement. **National** [3] German Federal Government (2009): German Federal Government's National Electromobility Development Plan [4] Schill, Wolf-Peter, Deutsches Institut für Wirtschaftsforschung (2010); Wochenbericht des DIW Berlin Nr. 27-28/2010 [5] Bickert, Kuckshinrichs (2011): Electromobility as a technical concept in an ecological mobility sector? An analysis of costs; 9th International Conference of the European Society for Ecological Economics (ESEE 2011): Advancing Ecological Economics - Theory and Practice June 14–17, 2011, Boğaziçi University, Istanbul, Turkey [6] The Senate and House of Representatives of the United States of America in Congress assembled (January 5th, 2010); Pedestrian Safety Enhancement Act of 2010 [12] Fraunhofer-Institut für System- und Innovationsforschung - ISI (2011): Gesellschaftpolitische Fragestellungen der Elekromobilität. Karlsruhe [13] Bundesministerium für Verkehr, Bau und Stadtentwicklung (2012): Zentrale Ergebnisse der sozialwissenschaftlichen Begleitforschung in den Modellregionen - Roadmap zuur Kundenakzeptanz. Referat U43, Innovationen für eine nachhaltige Mobilität. Berlin

FACT SHEET NO: 51 **CATEGORY: 7.1** **PERFORMED BY: ISI**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Technology - vehicle**
A 3	**Transport policy measure (TPM)**	**H2 Fuel Cell Vehicles (H2-FCV)**
A 4	**Description of TPM**	Development and market introduction of road vehicles propelled by hydrogen (H2) as energy carrier by converting the H2-fuel cells into electric energy that drive electric motors is covered by the 'H2 Fuel Cell Vehicles' TPM. Similar as with battery electric vehicles (BEV) the H2-FCV provide the opportunity of road transport to eliminate emissions of local air pollutants and significantly reduce noise emissions. If hydrogen is produced from electricity that in turn is produced from renewable electricity sources H2-FCVs also constitute an option for carbon-free transport. The latter would also reduce fossil energy consumption, thus reducing fossil energy imports and increasing energy security of the EU. However, besides surplus hydrogen from industrial processes the cheapest source of H2 would be from fossil gas, such that pure market forces would lead to usage of hydrogen still based on carbon, i.e. still causing CO2 emissions. Obstacles for market introduction of H2-FCV include the high cost of vehicles, in particular caused by the cost of the hydrogen fuel cell (HFC) and the lack of sufficient refuelling infrastructure for H2. Therefore a TPM 'H2 Fuel Cell Vehicles' involves a bundle of measures to foster R&D as well as to set the right incentives for market introduction at the right point of time.
A 5	**Implementation examples**	At the end of 2007 1.000 fuel cell cars were operated globally. The number of H2 fuelling stations at the end of 2008 amounted to 200 [1]. In the 1990s roadmaps existed in which car manufacturers like Daimler and Toyota had announced to commercialise H2-FCVs by 2004. This date of market introduction was later shifted to 2009 with a target of an annual production of 100.000 H2-FCVs in 2014 by Daimler. In 2013 the large scale production of H2-FCVs was postponed again to the year 2017. This shifting agenda reveals that there exist significant barriers to market ramp-up of H2-FCVs. Until the end of 2012 any of such vehicles in use, i.e. cars and buses, were or are part of a demonstration project or a field test. Examples are: (1) The municipality of London developed a Hydrogen Action Plan in 2009 according to which 150 H2-FCVs and 6 H2 refuelling stations should be deployed until the end of 2012 [9]. The targets have not been fully met, but moderate progress has been made. (2) Industry and the European Commission have jointly set-up the Fuel Cells and Hydrogen Joint Technology Initiative (JTI) which prepared and was converted into the Fuel Cells and Hydrogen Joint Undertaking (FCH-JU) [2]. For the period 2008 to 2013 the JTI/JU disposed of a budget of 1 billion Euro to implement R&D and demonstration projects for both stationary and mobile application of HFC. For the period 2014 to 2020 the FCH-JU estimates to increase the budget for HFC deployment to about 18 billion Euro, of which up to 14 billion Euro should be provided by the industry and about 12 billion Euro should go to transport projects. A variety of projects is currently funded e.g. adding hydrogen supplies to existing fuel stations in Oslo (H2MOVES), putting 26 HFC buses into operation (CHIC) or testing HFC in mail delivery fleets (MOBYPOST) [6]. (3) Activities to deploy hydrogen fuelling infrastructure from the year 2015 onwards are bundled in two national H2-mobility groupings in Germany and the UK. Final remark: application of HFC is also discussed and feasible for stationary applications, as well as for other modes than road. **However, this TPM focussed on road mode.**
A 6	**Objectives of TPM**	Fostering and deployment of H2-FCVs in the European transport system to reduce air pollution and noise, increase energy security, reduce fossil fuel dependency, reduce GHG emissions of transport and increase competitiveness and leadership of the European industry.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Modal-shift is not objective of the TPM. However, limited modal-shift may occur if relative cost of modes is altered by introducing H2-FCV.
A 7.2	Origin and/or destination of trip:	No change
A 7.3	Trip frequency:	No change
A 7.4	Choice of route:	Potential change during phases of limited spatial coverage of H2 fuelling stations to reach one of the few stations. Otherwise no change.
A 7.5	Timing (day, hour):	No change
A 7.6	Occupancy rate / Loading factor:	No change
A 7.7	Energy efficiency / Energy usage:	HFC may slightly improve energy efficiency as compared with fossil fuel driven vehicles. More important is that they enable to reduce fossil fuel consumption in transport and to increase the share of renewable fuel / low carbon fuel in transport.
A 8	**Main source**	[1] [4] [5]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**R**	**I**	**E**	**I,R**

B 1.1	**Summary**	- H2-FCVs provide environmental benefits (reduced pollution, noise, GHG), potentially stimulate the economy through developing a competitive future technology reducing dependency on and imports of fossil fuels. However, as early markets probably have to be developed through public procurement government at different levels has to provide extra funding for the development of the market.
B 1.2	**Summary: Income groups**	- Similar as for electromobility it can be assumed that support for H2-FCVs is favouring higher income groups that can afford the additional cost at the time of introducing the cars. Such an inequality can partly be compensated if also public transport benefits e.g. by H2 FCV buses.
B 1.3	**Summary: Age groups**	- None (apart from very limited intergenerational equity, if H2-FCV public funding would increase long-term public debt).
B 1.4	**Summary: Disabled people**	- None
B 1.5	**Summary: Gender groups**	- None
B 1.6	**Summary: Ethnic groups**	- None

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	➔			➔		➔					➔						**R**	**N**	**E**	**N,R**
B 2.2	Risk of congestion	➔			➔		➔					➔						**R**	**N**	**E**	**N,R**
B 2.3	Vehicle mileage	➔			➔		➔					➔						**R**	**N**	**E**	**N,R**
B 2.4	Service and comfort	➘			➚													**R**	**L**	**E**	**N,R**

B 2.I	**Overall impacts on social groups**	- Usage of H2-FCVs buses could improve comfort (low noise) and image of H2-FCVs (clean and innovative) providing benefits for disadvantaged groups relying more on public transport.
B 2.II	**Implementation phase**	- During implementation comfort for private users is reduced due to limited network density of fuelling stations.
B 2.III	**Operation phase**	- Similar use as with todays fossil fuel based vehicles after a certain density of fuelling network is achieved.
B 2.IV	**Summary / comments concerning the main impacts**	- No main impacts on traffic expected, assuming that variable cost of H2-FCVs will be similar as for fossil fuel based cars, which depends also on taxation of the different fuels.
B 2.V	**Quantification of impacts**	- In the very long-term it is expected that the car market would be dominated by H2-FCVs (70%) as they do not face a range limit as it is expected to prevail for battery electric vehicles, which would be the long-term competitor of H2-FCV cars [6].

B 3 ECONOMIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	➚			➔		➚					➔						**N**	**R**	**E**	
B 3.2	Private income / commercial turn over	➘			➔								➚	➚	➚	➘	➚	**N**	**I**	**E**	
B 3.3	Revenues in the transport sector						➚					➚							**R**	**E**	
B 3.4	Sectoral competitiveness				➚								➚		➚			**N**	**I**	**E**	
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures													➚				**R**		**E**	
B 3.7	Insurance costs	➘																			
B 3.8	Health service costs												➘	➘		➘	➘	**N**	**I**	**E**	
B 3.9	Public authorities & adm. burdens on businesses						➚					➚						**N**	**I**	**E**	
B 3.10	Public income (e.g.: taxes, charges)															➘		**N**		**E**	
B 3.11	Third countries and international relations												➚		➚		➚	**I**	**N**	**E**	

B 3.I	**Overall impacts on social groups**	- Most relevant are the indirect economic impacts of this TPM H2-FCV. These include stimulation of investment into R&D, construction and new manufacturing machinery. This increases employment rather of high-skilled employees in affected sectors. - Macro-economic impacts emerge from reduced imports of fossil fuels, reduced fossil fuel tax revenues and potential lead market gains driving competitiveness and exports. - Reduced adverse environmental impacts can improve general health and quality of life of urban/road residents, the latter usually benefitting disadvantaged social groups.
B 3.II	**Implementation phase**	- Increase of R&D expenditures to innovate H2-FCV as well as increased investment into new vehicle manufacturing sites and H2 fuelling infrastructure. However, for economic assessments the net effects should be conisdered (i.e. stimulated/induced investment minus avoided investment e.g. to improve fossil fuel based vehicles).
B 3.III	**Operation phase**	- Transport cost increases during implementation will disappear after some years of technological learning, leading to reduced vehicle costs (i.e. fuel cell cost, H2 storage cost). Effect of reduced fossil fuel imports and improved environmental quality should remain. Scarcity of metal may play a role, when global deployment of H2-FCV should take place.
B 3.IV	**Summary / comments concerning the main impacts**	- H2-FCV constitute a most promising option for transport energy supply in a post-fossil era. Leaders in the technology would benefit from economic benefits in terms of competitiveness. However, H2-FCV are a technology requiring a coordinated transition to the new technology paradigm affecting fuel supply, vehicle technology, vehicle manufacturing and maintenance, tax and incentive systems.
B 3.V	**Quantification of impacts**	- Micro-economic impact assessment relate to the cost of H2-FCV in relation to their competitors, in particular road vehicles using internal combustion engines fuelled by fossil fuel, but also other kind of electric vehicles (BEV, HEV, PHEV). - Industry studies expect cost parity of H2-FCVs between 2020 and 2025. [4] - Macro-economic analysis of hydrogen introduction based on renewable energy conclude that European GDP (EU25) could be increased by about 0.5% compared to a baseline. [1]

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)	↗			↗	↗								↗			↗	**R**	**L**	**E**	
B 4.2	Safety																				
B 4.3	Crime, terrorism and security														↗		↗	**I**	**N**	**E**	
B 4.4	Accessibility of transport systems	→			→	→											→	**R**	**L**	**E**	
B 4.5	Social inclusion, equality & opportunities													↗				**R**	**L**	**E**	
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets														↗			**N**		**E**	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Impacts on social groups are largely positive, and include job opportunities and reduced environmental impacts of transport. Trade-offs between alternative uses of public funds could provide a reason of potential disbenefit of the TPM. - Migratory pressure on disadvantaged income groups could increase through improved attractiveness of their neighbourhoods along roads due to reduced air pollution and less noise emissions making these neighbourhoods also attractive for higher income groups.
B 4.II	**Implementation phase**	- Possibly larger benefits for better-off and high skilled persons due to job opportunities in R&D and project management.
B 4.III	**Operation phase**	- Benefits also for transport users (e.g. less noise and pollution during travel) and residents (same reasons). Significant increase of national content of transport energy supply i.e. fossil imports replaced by renewable energy.
B 4.IV	**Summary / comments concerning the main impacts**	- In general rather positive social impacts on whole spectrum of social groups, though differing over time. During deployment phase rather high income groups would benefit from job opportunities and support schemes, while during operation phase rather lower income groups could benefit from environmental improvements of road transport. However, the potential trade-off between public spending on H2-FCV introduction and alternative uses e.g. of funding of social policy (e.g. improving the school system, etc.) should be taken into account.
B 4.V	**Quantification of impacts**	- No comprehensive quantification available. Concerning employment studies indicate a potential gain of between 400.000 and 800.000 additional jobs in Europe (EU25) until 2030 in moderate to positive scenarios. [1]

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↑			↑	**L**	**R**	**E**	
B 5.2	Noise emissions													↗			↗	**L**			
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↑	**I**	**N**	**E**	
B 5.6	Renewable or non-renewable resources																↑↘	**I**	**N**	**E**	

B 5.I	**Overall impacts on social groups**	- Improved local environmental impacts, in particular less noise and air pollution, provide the largest incentive to foster H2-FCVs for the benefit of disadvantaged social groups, i.e. low income groups, that most often lives alongside bigger roads in urban areas. Risk of such a policy is that such neighbourhoods get more attractive for better-off groups as well, such that migratory pressure on disadvantaged groups could increase.
B 5.II	**Implementation phase**	- Construction of/at filling stations as well as of manufacturing sites may cause limited discomfort of residents.
B 5.III	**Operation phase**	- Reduced use of fossil fuels, mitigation of climate impacts and reduced local pollution constitute the positive side, while potential increase of demand of scare resources plus impacts during their extraction and processing would be on the negative side.
B 5.IV	**Summary / comments concerning the main**	- Overall the environmental impacts are expected to be strongly positive.
B 5.V	**Quantification of impacts**	- Transport CO2 could be reduced by 4% in Europe compared to baseline. Use of platinum in Europe could increase by about 150% until 2030 as compared to 2010. [7]

C REFERENCES

C 1	**Other TPMs of this subcategory**	Electromobility - road
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Ball M., Wietschel M. (eds.) (2009): The Hydrogen Economy: Opportunity and Challenges. Cambridge University Press, Cambridge. [2] FCH JU - Fuel Cells and Hydrogen Joint Undertaking (2012), http://www.fch-ju.eu/, Predecessor: European Fuel Cells and Hydrogen Joint Technology Initiative (JTI) [3] NEW IG - New Energy World Industrial Grouping (2012), http://www.new-ig.eu/ [4] McKinsey (2010): A portfolio of power-trains for Europe: a fact-based analysis. [5] Zachmann G., Holtermann M., Radeke J., Tam M., Huberty M., Naumenko D., Ndoye Faye A. (2012): The great transformation: decarbonising Europe's energy and transport systems. Bruegel Blueprint 16, Brussels. [6] NEW IG - New Energy World Industrial Grouping (2011): Fuel Cell and Hydrogen technologies in Europe: Financial and technology outlook on the European sector ambition 2014- 2020. [7] Schade W. (2008): Impact on resource use and emissions of transport by using renewable energy and hydrogen as transport fuel. In: Hartard S., Schaffer A., Giegrich J. (eds.) (2008): Ressourceneffizienz im Kontext der Nachhaltigkeitsdebatte, Nomos, Baden-Baden. **National** [8] Wells P. (2013): Converging transport policy, industrial policy and environmental policy: the implications for localities and social equity. Forthcoming. **Regional / Local** [9] Greater London Authority (2009): London Hydrogen Action Plan 2010 - 2012. [10] Elementary Energy Limited (2012): Post-2014 London Hydrogen Activity: Options Assessment. Study on behalf of the London Hydrogen Partnership.

FACT SHEET NO: 52 **CATEGORY: 7.2** **PERFORMED BY: Panteia/NEA**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Technology - transport infrastructure / system**
A 3	**Transport policy measure (TPM)**	**GALILEO**
A 4	**Description of TPM**	A Global Navigation Satellite System (GNSS) consisting of 30 orbiting satellites, with continuous global coverage. Each location is covered by at least 6 satellites, resulting in highly accurate positioning data also in cities with high-rise buildings ("urban canyons"). Compatible with other GNSS like GPS (from USA), GLONASS (from Russia) and new systems developed by China. GALILEO provides applicable positioning data -- more accurate than GPS -- for all types of civilian applications: including car navigators, mobile phones, maritime, road, rail and air transport. Furthermore, GALILEO makes Europe autonomous and fully independent of the GPS signals. [2] The two first GALILEO satellites have been launched in late 2011. Due to delays and cost overruns, the initial launch plan (30 operational satellites by 2014) has been reduced. The current plan involves launching a total of 24 instead of 30 satellites by 2015.
A 5	**Implementation examples**	Satellite navigation applications have become very important in the European Union. It affects our daily lives. Various services depend on it to save lives (e.g. urgent ambulance calls) or to run their business effiently. GPS signal loss can therefore be disastrous. The GALILEO infrastructure offers (due to superb location coverage) highly accurate positioning, and is very unlikely to have "no signal" available. Services that depend on navigation will benefit from this. GALILEO makes satellite navigation services suitable for safety-critical applications, like flying and landing aircraft or navigating ships through narrow channels. Other suggested implementation examples are: tracking/tracing in the medical sector (e.g. ambulances, organ transport) and/or in security and safety sector (e.g. missing children), road tolling and charging, pay-as-you-drive insurance, unmanned vehicles, precision steering guidance when sowing or harvesting crops, etc. [3] [5] [6]
A 6	**Objectives of TPM**	The aim is a radical improvement of location accuracy and compatibility with other GNSS. Furthermore, enhancing Europe's technological navigation independence through GALILEO's satellite infrastructure, in order to guarantee the provision of services that are nowadays central to our economy and on which our quality of life and safety depend. Another objective is becoming independent of the GPS time signal. GPS satellites generate an accurate time signal. This signal is used by the Synchronous Digital Hierarchy (SDH) network, an overarching network used in Europe for high-speed telecommunications. It provides support for all optical and electrical networks, and is indispensable for all of today's digital electronic communications. A sudden loss of the GPS time signal will be catastrophic to Europe as e.g. GSM, broadband internet, digital television, radio broadcasting, banking systems, pay terminals, security systems rely on the GPS time signal. When this GPS time signal is lost, the services depending on it, will cease to operate or function. Becoming independent of GPS and its time signal is important to Europe's economy. [2] The issue is, besides economic benefits (e.g. job creation due to the development role), to have full control over the system on which our safety and economy depend. These concerns systems that are essential to us. Reliance on systems from non-European countries, will eventually lead to problems of sovereignty and security. Furthermore, Europe should not be at risk from future changes in the provided service, or from excessive future fees. [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	
A 8	**Main source**	[1] [2] [3] [4] [5] [6]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	L	I	S	I

`-GALILEO provides high accuracy positioning data, without signal loss. That is advantageous for many applications, especially for critical navigation applications in e.g. aeronautics, inland shipping in narrow waters and/or foggy circumstances and security tasks. Signal failure can be hazardous. Also residents living in "urban canyons" benefit, as emergency services (e.g. ambulance, security) or delivery vans can now easily locate the address.
- GALILEO also offers accurate time signals necessary for the Synchronous Digital Hierarchy, making Europe also independent of GPS time signals. Networks like GSM, radio broadcasting, banking systems, pay terminals, security systems depend on such time signals. These systems will not operate or function properly without it. Loss of signal can therefore result in chaos.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time																				
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort						↗	↗	↗	↗	↗	↗						L	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- GALILEO provides a higher accuracy than GPS position data, and better location coverage in e.g. cities with high-rising buildings. Route planning will benefit from this. Ambulances and commercials traffic will find their way, even in "urban canyons". - Some transport modes benefit less from the improved location accuracy offered by GALILEO: for rail transport. However, the compatibility with other GNSS systems probably make tracking of train movements more flexible: applications like dangerous goods tracking, collision avoidance, passenger information services might benefit from GNSS compatibility.
B 2.V	**Quantification of impacts**	- Location accuracy up to roughly 1 meter (in contrast to GPS with an accuracy of about 10 meters)

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs																				
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector						↗	↗	↗	↗	↗	↗						L	N	S	I
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Improved location accuracy and the absence of signal loss will, in general, have a positive effect on transport operations. For example, it enables ambulances or commercial trucks to find their way even in cities with many high rise-buildings. Inland navigation can continue under foggy circumstances, etc. [2] - GALILEO also provides time signals, making Europe independent of GPS time signals. Time signals are the base of Europe's Synchronous Digital Hierarchy network. Networks like GSM, broadcasting, banking systems, security systems depend on this time signal and will not operate properly without it, resulting in chaos. [2]
B 3.V	**Quantification of impacts**	- No available details. However, no economic chaos should GPS fail, as GALILEO makes Europe independent of satellites from outside the European Community.

B 4	SOCIAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	L	N	S	I
B 4.2	Safety													↗			↗	L	N	S	I
B 4.3	Crime, terrorism and security																↗	L	N	S	I
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Availability of location data without signal loss, even in "urban canyons", make it certain that e.g. ambulance services reacting to an emergency call can find the accident location. Health and safety will therefore certainly benefit from GALILEO. - As GALILEO also provides time signals, Europe's Synchronous Digital Hierarchy network (forming the base for crucial networks like GSM, broadcasting, banking, security) will therefore not suffer from GPS signal loss. Loss of time signals will lead to network failure, resulting in chaos and creating room for criminal activities.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants																				
B 5.2	Noise emissions																				
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																				
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main**	- Satellite navigation does not have an impact on the environment
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Technological improvements regarding e-mobility charging systems
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Communication from Commission (1999): Galileo involving Europe in a New Generation of Satellite Navigation Services (COM1999/54final) [2] European Union [2011]: Why we need Galileo (ISBN: 978-92-79-19524-2) [3] European Union (2010): Key results of satellite navigation research under the sixth framework programme (ISBN 978-92-79-13756-3) [4] European Commission (2008): Europe's Satellite Navigation Programmes GALILEO and EGNOS (ISBN 978-92-9206-001-5) [5] Galileo Services (2012): Horizon 2020 & Space Research (panel presentation by Axelle Pomies on 5Jun2012, European Parliament) [6] European GNSS Supervisory Authority (2008): Galileo and EGNOS playing a key role in Europe's global monitoring programme

FACT SHEET NO: 53 **CATEGORY: 7.2** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Technology - transport infrastructure / system**
A 3	**Transport policy measure (TPM)**	**Technological improvements regarding e-mobility charging systems**
A 4	**Description of TPM**	The TPM 'Technological improvements regarding e-mobility charging systems' covers the development of charging systems for electric road vehicles. Technological improvements on charging systems are expected to increase the efficiency, reliability and uniformity of charging E-mobility transport. Public and governmental investments will directly lead to more research effort concerning E-mobility charging systems and indirectly, on the long run, result in a rise of the number of efficient E-mobility charging stations. Increasing the amount of efficient E-mobility charging systems is of general importance for widespread acceptance of electric vehicles. Therefore, governments and the European Union try to increase the number of charging stations. At first, the increase of charging systems will focus on urban areas (with a comparably high population density). Improvements on E-mobility charging systems will have effects on private passenger road vehicles, public transport vehicles (buses and coaches) as well as for road freight vehicles. However, long-haul trucks propulsions are expected to remain on internal combustion engines (ICE) for the foreseeable future. [1] This impact assessment focusses on the influences of improvements of e-mobility charging system for private and light commercial road vehicles.
A 5	**Implementation examples**	Standardised charging interface: A mandate for European standardisation bodies will be set in 2010 to develop a standard by 2011 within the framework of Directive 98/34EC. The aim of this directive is to standardise charging infrastructure in order to ensure interoperability and connectivity between the electricity supply point and the charger of the electric vehicle. Smart charging and the possibility for users to take advantage of the use of electricity during "off peak hours" needs to be considered in standardisation. [5] The European automobile manufacturers have defined joint specifications to connect electrically chargeable vehicles to the electricity grid in a safe and user-friendly way. These recommendations should enable the relevant EU standardisation bodies to make rapid progress with defining a common interface between the electricity infrastructure and vehicles throughout Europe. [14] Unfortunately, until now an universal charging solution has not been defined.
A 6	**Objectives of TPM**	The objective is to improve the efficiency, reliability and uniformity of E-mobility charging systems in order to accelerate the expansion of electric vehicles, which means: - Reduce the charging time of E-Mobility charging systems - Improve the reliability of charging systems - Infrastructure must be compatible with vehicles produced by various manufacturers or the development of one matching charging system for all types of vehicles - 'Smart charging' i.e. Bidirectional charging systems (vehicle to grid) instead of unidirectional [4] Combined with these technical improvements, governments will increase the number of charging stations in order to: - Increase travel distance by expanding the network of charging stations - Boost the attraction and acceptance of electric cars [2]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No key changes can be expected, because the impact of better charging systems can not solely improve the attractiveness of electric vehicles.
A 7.2	Origin and/or destination of trip:	Will be adjusted according to the availability of charging systems, which at first will be placed at densed areas within the city center. [1]
A 7.3	Trip frequency:	Increasing number of trips with electric vehicles possible due to faster charging
A 7.4	Choice of route:	According to the availability of charging systems
A 7.5	Timing (day, hour):	Charging times have to be adjusted to grid capacity i.e. charging will take place outside peak energy demand times. Timing becomes more important with an increasing share of electric vehicles. Proffered charging times are during low energy consumption, for instance at night. Later on, with the development of smart grids, a surplus of energy in the battery of electric cars can be used to supply energy to households in order to prevent power grids from overloading. [2]
A 7.6	Occupancy rate / Loading factor:	No changes
A 7.7	Energy efficiency / Energy usage:	Further development necessary to fasten charging times without limiting the durability of electric vehicles batteries. Increased energy efficiency is expected to be reached through development of new charging systems. [3]
A 8	**Main source**	[1] [2] [3] [4] [5]

B IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
B 1	**OVERVIEW ON IMPACTS**	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1 Summary

- The electric car user will benefit from the technical improvements and increasing number of charging stations. An extensive network of charging stations offers electric car users the possibility to make longer trips without changing batteries. Other technical improvements concerning electric vehicles, like batteries which offers an increased driving range, will reinforce the possibility to make longer trips.
- Industries which deliver traditional equipment for gas stations can suffer losses (turn over and employment) due to rising demands for E-mobility charging station and decreasing demand for petrol pumps. But a rising demand for E-mobility charging systems offer opportunities for new enterprises and will lead to a whole new market (for the traditional petrol station industry). [11]
- In the beginning, charging systems will be located at urban areas, whereas rural/peripheral areas will be neglected. This spatial difference will increase inequality between urban and rural areas and is contrary to the cohesion policy of the European Union, which aims to decrease difference between urban and peripheral areas.
- The reduction of air pollutions is beneficial for residents living near busy motorways, the society and the climate at all. In general, the level of air pollutants depends on the production of the electric energy, which depends on the energy mix used (nevertheless the electricity mix also varies widely depending on geography, time of day and season). [7]
- Further effects strongly depend on the electric vehicle as such, and not particularly to the charging systems.
- Uncontrolled charging can significantly increase peak load and thus lead to a high cost burden. If uncontrolled EV (Electric Vehicle) charging is added to the system, this can have a strong negative effect on the grid system, which is not designed (capacity wise) for enormous amounts of electric vehicles. This will require substantial investments of public bodies in power grids [10]

B 1.2	**Summary: Income groups**	- Growing social disparities between urban and rural areas and its inhabitants. Strong economic regions (cities) will become more attractive compared to rural areas.
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
B 2	**TRAFFIC IMPACTS**	Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘																**R**	**N**	**S**	**I**
B 2.2	Risk of congestion																				
B 2.3	Vehicle mileage	↗																**R**	**N**	**E**	
B 2.4	Service and comfort	↗																**R**	**N**	**S**	**I**

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	- The shift to electric vehicles can only be expected when electric vehicles will increase their attractiveness significantly (driving range, price, reliability). The solely improvement of charging possibilities is not sufficient to generate a shift from combustion engines to electric cars. - Furthermore, research determined that only fuel consumption or environmental friendliness of cars is not important to consumers when purchasing a new car. [13]
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- If new technological improvements lead to a shorter charging time (and thus a shorter travel time), without effecting the durability of batteries, it will improve the reputation of electric vehicles and lead to a rise of the number of electric vehicles. [2] - Service and comfort improvements through faster charging systems. [1] - Vehicle mileage for electric vehicles increases according to the number of charging possibilities.
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs																				
B 3.2	Private income / commercial turn over												↗					**N**	**R**	**S**	**I**
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness						↗								↗			**N**	**I**	**E**	
B 3.5	Spatial competitiveness																↗	**R**	**N**	**E**	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↘		**N**	**R**	**S**	**I**
B 3.10	Public income (e.g.: taxes, charges)															↘		**N**		**E**	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Uncontrolled charging demand can significantly increase peak load and thus lead to a high cost burden. If uncontrolled EV (Electric Vehicle) charging is added to the system, this can have a strong negative effect on the grid system, which (capacity) is not designed for enormous amounts of electric vehicles. This will require substantial investments in power grids by public bodies. [10] - The implementation of bidirectional charging systems can ease the pressure of power grids during peak demands. In order to use this technology, public bodies are forced to invest in 'smart grids', which can handle the bidirectional energy flows. [6] - Mainly rural areas, which are not equipped with E-Mobility charging systems due to efficiency reasons (lower demand) face proper disadvantages compared to urban areas with a high population density. This will lead to increasing spatial competition between urban and peripheral areas and growing disparities between economically strong (mostly suburban) and weak regions (mostly rural and sparsely populated areas). - Sectoral competitiveness between transport operators / producers using traditional vehicles and ones using electric vehicles will increase. Electric vehicles will become more favourable compared to traditional petrol and diesel vehicles, thus energy suppliers will benefit from higher demand. - 3rd level impact: Energy efficient vehicles will require less fuel. This will lead to reduced public income for public bodies, because these receive excise taxes on petrol.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety																				
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	↗																**R**	**N**	**S**	**I**
B 4.5	Social inclusion, equality & opportunities																↘	**R**	**N**	**E**	
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets														→			**N**	**I**	**S**	**N**
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Growing social disparities between (sub-)urban and rural areas and its inhabitants. Strong economic regions will become more attractive compared to rural / sparsely populated areas, which will be excluded from the possibility to participate.
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Increasing funds fostering E-mobility charging systems will lead to more employment for companies involved in electric vehicles or charging systems. Due to the strengthened research and innovation industry (through governmental funding), a positive effect on the labour market is expected. Nevertheless, this depends on whether the rise of electric vehicle demand affects the traditional petrol and gas industry. [11] - Governments will stimulate the placement of charging stations which will lead to two main effects : 1. Social inequality will grow between urban and peripheral areas (charging stations will be mainly placed in areas with a high population density).[1] 2. The electric car user will benefit and will have more charging opportunities and increase the driving range (not because of better battery performance, but because of the possibility to charge countrywide in short time). [1]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↓	**L**	**N**	**S**	**I**
B 5.2	Noise emissions													↘			↘	**L**	**N**	**S**	**I**
B 5.3	Visual quality of the landscape																↘	**N**	**R**	**S**	**N**
B 5.4	Land use																↗	**N**	**R**	**S**	**N**
B 5.5	Climate																↘	**I**		**S**	**I**
B 5.6	Renewable or non-renewable resources																↗	**I**		**S**	**I**

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- In general, the implementation of new technologies for charging systems will have an (both positive as negative) impact on the environment when it is combined with an increased usage of electric vehicles. Which means: - The reduction of air pollutions and noise emissions is only on the local level (concerning residents) unambiguous. In general, the level of air pollutants depends on the production of the electric energy, which depends on the energy mix used (nevertheless the electricity mix also varies widely depending on geography, time of day and season). Hence, the emission of CO2 of a electric vehicle depends on the source of energy, which do not emit NOx and PM. Especially in urban areas with a high population density this reduced emissions have a strong impact. [7] Overall, the energy is at least partly produced by renewable energy sources, which result is a reduction of air pollutants positively affecting the climate. - Negative local environmental impacts are expected by the large-scale production of lithium for the lithium-ion batteries, because parts of the battery are extremely toxic.[7] - Depending on the source of energy, the energy production can also have a negative effect on land use (coal) and produce radioactive waste (nuclear power plants). [8] - Reduced oil consumption strengthens the energy security [9] - A widespread use of electric vehicles (> 10 % market share) will lead to a significant increase of energy demand. The current power grids will have to be expanded to meet the higher demand. Expansion of power grids will cause a negative impact on the visual quality of the landscape and demand extra land use [12].
B 5.V	**Quantification of impacts**	- Total CO2 emissions: Conventional ICE (Internal Combustion Engines) car: 145-215 g/km; Electric Vehicle (depending on the source of energy): 8-140g/km. CO2 in g/km/NEDC WTW (NEDC: New European Driving Cycle; WTW: Well-to-Wheel) [1] - The difference of well-to-wheel (energy consumption from feedstock to energy transmission) GHG emissions of electric (EV) and plug-in hybrid vehicles (PHEV) and their benefits compared to average conventional vehicles (CV) strongly depends on the considered energy mix assumptions, the benefit ranges from -38% (coal based energy production) to +81%. [7]

C REFERENCES

C 1	**Other TPMs of this subcategory**	GALILEO
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011e): European Green Cars Initiative: public-private partnership multi-annual roadmap and long-term strategy, Luxembourg: Publications Office of the European Union [3] European Commission (2010d): Challenges for European Market for Electric Vehicles, Brussels: Policy Department Economic and Scientific Policy [4] European Commission (2010h): European Green Cars initiative: European Roadmap Electrification of Road Transport, Luxembourg: Publications Office of the European Union [5] European Commission (2011l): 2010-2013 Action Plan for European Standardisation, Luxembourg: Publications Office of the European Union [6] CE Delft (2011): Impact analysis for market uptake scenarios and policy implications, Delft: CE -publications [7] Hacker et al (2009): Environmental impacts and impact on the electricity market of a large scale introduction of electric cars in Europe - Critical Review of Literature, ETC/ACC Technical Paper 2009/4 [8] Althaus, Gauch (2010): Vergleichende Ökobilanz individueller Mobilität: Elektromobilität versus konventionelle Mobilität mit Bio- und fossilen Treibstoffen, Life Cycle Assessment and Modelling Group, Technologie und Gesellschaft, Empa, Dübendorf [10] CE Delft (2011): Impacts of Electric Vehicles, Delft: CE-Publications [14] ACEA (2010): Auto manufacturers agree on specifications to connect electrically chargeable vehicles to the electricity grid, available at: http://www.acea.be/index.php/news/news_detail/auto_manufacturers_agree_on_specifications_to_connect_electrically_chargeab **National** [2] German Federal Government (2009): German Federal Government's National Electromobility Development Plan [9] Bickert, Kuckshinrichs (2011); Electromobility as a technical concept in an ecological mobility sector? An analysis of costs; 9th International Conference of the European Society for Ecological Economics (ESEE 2011): Advancing Ecological Economics - Theory and Practice June 14–17, 2011, Boğaziçi University, Istanbul, Turkey [11] Draper, M., et al. (2008): Economic Impact of Electric Vehicle Adoption in the United States, California: U.C. Berkeley [12] Nationale Plattform Elektromobilität (2010): Zwischenbericht der Arbeitsgruppe 3 - Lade-Infrastruktur und Netzintegration, Berlin: Gemeinsame Geschäftsstelle Elektromobilität der Bundesregierung (GGEMO) [13] ADAC (2012): ADAC Pkw-Monitor: Was entscheidet beim Autokauf? Berlin: ADAC/Auto-Reporter.NET

FACT SHEET NO: 54 **CATEGORY: 7.3** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Technology - Transport information systems, management and service**
A 3	**Transport policy measure (TPM)**	**E-Freight**
A 4	**Description of TPM**	Currently, there are different documents being used for freight transportation within Europe according to the different modes of transport. This procedure is expensive and entails administrative costs for multimodal transport. Hence, the enhancement of multimodal freight transport is one of the main objectives of the European transport policy which should be supported by the introduction of E-freight, as a procedure of handling all processes related to the movements of goods by all modes in real time and paperless. Moreover, the improvement of freight transport management will simplify the identification and location of freight regardless to the transportation mode. As a transport policy measure within the frame of multimodal transport of goods, the 'development of E-freight' supporting technologies (RFID, DSRC – Dedicated short range communication) overall aims to simplify the information exchange of freight and transport in general. This will be possible by the provision of information for economic operators to address/control the goods and vehicles only at one place, which requires the connection and completion of networks between administrations and businesses. Hence, the vision of 'tracking and tracing' can be build on a paper-free (electronic) information, which associates the physical flow of goods and its total journey for all modes of transport, also covering the exchange of content-related data for regulatory and commercial purposes (single transport document (electronic waybill)). In this respect, the necessary condition for E-freight is the implementation of standard interfaces within the various transport modes and the securing of intermodality across modes. One of the main technologies being essential for the successful implementation of E-Freight is the deployment of the RFID (Radio Frequency Identification) technology and the GALILEO satellite positioning systems. [1] Whereas the definition of "E-freight" is partly different compared to "intelligent cargo", both concepts are almost equal and have the same objectives. In addition, E-freight addresses the following inefficiencies of freight transport information: - lack of interoperability - duplication of information submission - lack of multimodal booking tools - lack of integration of information.
A 5	**Implementation examples**	The EURIDICE project (European Inter-Disciplinary Research on Intelligent Cargo for Efficient, Safe and Environment-friendly Logistics), funded by the European Commission, intends to fill the gap between the technical feasibility and adoption of ICT (Information and Communication technology) services platforms for goods mobility. In the EURIDICE vision "Intelligent cargo" connects itself to logistic service providers, industrial users and authorities to exchange the specific transport related information. Expected benefits will be available for logistics stakeholders at all levels: Carriers and logistic operators, industry and supply companies, public organizations and citizens.[6] SafeSeaNet and VTMIS (Vessel Traffic Monitoring and Information Systems) for maritime transport RIS (River Information Services) for inland waterways, ERTMS (European Rail Traffic Management System) and TAF-TSI (Telematics Applications for Freight) for rail.
A 6	**Objectives of TPM**	- Capability to view and compare online information on the services provided by the freight transport operators. - Administrative simplification across transport modes: administrative data can also be used for B2B communication. - Standardisation of information exchanges relating to location and other cargo information. - Development of secure ways of making supply chain information available on-line to customs, other regulatory authorities and businesses. - Development of practical ways of using positioning and communication technologies (e.g. RFID, DSRC - Dedicated short range Communication). - Improved integration and interoperability of computer applications used by different stakeholders involved in freight transport. - Synergies with e-Customs, e-Maritime and other related EU initiatives. [all 4]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Increasing the multimodal transport of freight by optimal management of transport and better information support to operators, carriers and customers.
A 7.2	Origin and/or destination of trip:	No change.
A 7.3	Trip frequency:	No change.
A 7.4	Choice of route:	No direct change. Likely that measure will positively influence the choice of route (optimisation).
A 7.5	Timing (day, hour):	No change.
A 7.6	Occupancy rate / Loading factor:	Measure does not directly aim to affect the loading factor, but an increase of loading factor is likely.
A 7.7	Energy efficiency / Energy usage:	Measure will improve the multimodal transport of goods and strengthens rail and inland waterway transport (Road freight load factor is expected to increase). Hence, the energy usage for the freight transportation will decrease and the energy efficiency to transport the same volume of goods will increase.
A 8	**Main source**	[6]

B IMPACTS

B 1	**OVERVIEW ON IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**															
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																				

B 1.1	**Summary**	- Strengthening of the overall freight transport sector due to lower costs and higher productivity within all freight transport modes for carriers, operators and customers. - Improvement of multimodal transport, security level, service level and overall organisation of supply chains, because of more accurate, real-time monitoring of freight movements trough ubiquitous and open connectivity of cargo, systems and users. [6] [5] - Investment / Implementation costs should not be disregarded. [EE]
B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2	**TRAFFIC IMPACTS**	**AFFECTED SEGMENTS**																	**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time						↘	↘	↘	↘	↘							I	N	E	
B 2.2	Risk of congestion						↘	↘	↘	↘	↘							I	N	E	
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort						↘	↘	↘	↘	↘							I	N	E	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Increasing level of service [6], but not generally valid. [EE] - Faster, and more automated operations and the reduction of delays and errors means less congestions and lower transport times. [6]
B 2.V	**Quantification of impacts**	- "A widespread application of typical ITS-linked e-freight measures is expected to result in time savings of 10% and financial savings of 8%, while productivity rates should increase by 3-10% and freight logistics costs would decrease by 2-3%." [5]

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs						↘	↘	↘	↘	↘							I		S	I
B 3.2	Private income / commercial turn over														↗			I		S	I
B 3.3	Revenues in the transport sector						↗	↗	↗	↗	↗							I		S	I
B 3.4	Sectoral competitiveness						↗	↗	↗	↗	↗										
B 3.5	Spatial competitiveness						↗	↗	↗	↗	↗									E	
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses														↘	→		I		E	
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	- Workers in the transport sectors needs to be educated on improved / new technical systems.
B 3.II	**Implementation phase**	- During the implementation phase public authorities and businesses are facing significant additional administrative burdens due to construction, organisation and integration into network, which influence the transport and administrative costs. [EE]
B 3.III	**Operation phase**	- The operation of an e-freight network (intelligent cargo network) will decrease the costs of administrative burdens. Until now, it is unclear to what extent
B 3.IV	**Summary / comments concerning the main impacts**	- In general, more accurate, real-time monitoring of moving goods, through ubiquitous and open connectivity of cargo, systems and users. - More efficient and effective logistic operations. Increasing operational speed and the reduction of delays and errors will positively impact the transport costs within all modes of transport for transport operators and increase its revenues. - Increasing information support will enhance the multimodal transport of freight ("one stop shop" for complex multimodal transport) . This will lead to an increase of load factor of road freight vehicles and favour environmental low-impact transport modes. - Improving customer relationships (more accurate pricing, higher productivity) and hence higher business revenues. [all 6] - Sectoral and spatial competitiveness will overall increase, but finally the impacts depend on the overall system configuration and implementation (geographic scope).
B 3.V	**Quantification of impacts**	- "A widespread application of typical ITS-linked e-freight measures is expected to result in time savings of 10% and financial savings of 8%, while productivity

B 4	SOCIAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)																↗	I		E	
B 4.2	Safety																↗	I		E	
B 4.3	Crime, terrorism and security						↗	↗	↗	↗	↗				↗			I		S/EE	I
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↘					N		E	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Security improvements across the supply chain; extended and highly automated security checks. [6] Although the level of security is already quite high. [EE] - Safety reinforcement due to less truck traffic. - Health of society is positively affected because of rising safety and security level. 3 level impact: - Increased efficiency and automatisation of freight transport could lead to fewer jobs in transport/logistics.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants													↘			↘	I		E	
B 5.2	Noise emissions													↘			↘	I		E	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I		E	
B 5.6	Renewable or non-renewable resources																↘	I		E	

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Decrease of air pollutants and noise emissions are positively affecting the society and residents (near congested / heavy loaded roads). - Less emissions positively impact the climate. - Strengthening of multimodal transport will save resources.
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	Provision of real time traffic and travel information (RTTI)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011n): Commission Staff Working document . Accompanying the White Paper - Roadmap to a single European transport area. SEC(2011)391. Brussels [2] European Commission (2007l): Commission Staff Working document . Accompanying document to the the Communication from the Commission. Freight transport Logistics Action Plan. Impact assessment. SEC (2007)1320 [3] European Commission (2007a): Action Plan on freight logistics. COM(2007)607. Brussels [4] E-FREIGHT is an Integrated project within the EU's 7th Framework programme. Online: http://www.efreightproject.eu (15.01.2012). [5] European Commission (2008c): Accompanying document to the Action Plan of the deployment of intelligent transport systems in Europe. Impact assessment. SEC(2998)3083 [6] European Commission - EURIDICE project (2009): European Inter-Disciplinary Research on Intelligent Cargo for Efficient, Safe and Environment-friendly Logistics. Funded by the EC under FP7. available at http://www.euridice-project.eu/ [7] DG Move (2012). Communication on e-freight. http://ec.europa.eu/governance/impact/planned_ia/docs/2013_move_001_e_freight.pdf

FACT SHEET NO: 55 **CATEGORY: 7.3** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Technology - transport information systems, management & service**
A 3	**Transport policy measure (TPM)**	**Provision of real time traffic and travel information (RTTI)**
A 4	**Description of TPM**	Traffic participants are more and more confronted with traffic problems like congestion, delays, road works and accidents. The mobility of people and goods is growing and the rising demand cannot be fully supported by transport infrastructure investments. Furthermore, road works, traffic accidents and congestion hamper traffic flows cause delays which lead to significant extra costs for transport operators and society. In order to meet future mobility demands it will be crucial to find new ways to improve the current traffic network. Increase efficiency, by distributing traffic participants on the basis of real time mobility network loads, can fulfil traffic participants in their need to travel, without substantial investments in new transport infrastructure. This TPM, on the provision of real time traffic and travel information (RTTI), is designed to do so. [4] Currently, transport users and transport operators do not have the ability of making truly informed decisions before and during their journey. This TPM focuses on decision making just before and during a journey. This means, that e.g. the purchase of a vehicle will not be taken into account. The availability of real time traffic and travel information will not solely lead to changes (in travel behaviour); furthermore user behaviour plays a determing role in the success or failure of RTTI [1] [5] [6] [7] [9]. Basically, there are two kinds of RTTI: 1. Informing transport users before making their journey. This so-called pre-trip information will help traffic participants to choose between different transport modes (or combinations of transport modes) and avoid possible delays (and therefore be able to better predict travel times). Whether traffic participants will switch between transport modes is doubtful and requires significant changes in behaviour and preferences [7]. 2. Provide information during a journey. On-trip information informs traffic participants on the latest traffic conditions (accidents, congestion, weather, departure times, etc.). A fully functional on-trip information system demands a flexible attitude of traffic participants. Real time information will lead to less delays, but this can only be achieved by last-minute switching of routes and transport modes [1] [4].
A 5	**Implementation examples**	The National Data Warehouse for Traffic Information (NDW) is a partnership between several Dutch authorities (mostly local governments), which are working closely together to develop a traffic database and aim to effectively use this data for traffic management and traffic information [2]. - DATEX II aims to provide a standardised way of communicating and exchanging traffic information between service providers, traffic centres, traffic operators and media partners [3].
A 6	**Objectives of TPM**	The main objectives of the TPM are: - Promote environmental friendly behaviour under transport users. Information on carbon- and environmental footprint of transport services and journeys enables passengers and transport operators to make more environmental friendly choices. - Meet future mobility demands without huge investments in additional transport infrastructure. When the entire mobility network is being used more efficiently by distributing traffic between different modes and routes, mobility demands can be fulfilled without major investments on traditional (road) infrastructure. - Promote multimodality by increasing the awareness on the availability of alternative modes and possible combinations of modes for single routes. - Increase safety by allocating traffic to less loaded parts of the network. Congestion and overloaded roads increase the possibility of accidents which can be reduced by distributing traffic flows. [1]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Multimodal transport will become more attractive, but is uncertain whether this will encourage people to switch between transport modes [6] [7] [9].
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Will be more flexible and can be changed last-minute due to RTTI.
A 7.5	Timing (day, hour):	No key changes. Pre-trip information will not lead to different (daily) timing, but can generate changes in hourly timing.
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Indirect impact: Energy efficient modes of transport will become more visible and energy use of transportation will be transparent for all users and operators.
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	N		S	I/N

- By far the most important, the success or failure of RTTI will largely depend on changes in user behaviour. If traffic participants, despite the availability of RTTI, will not significantly change their behaviour (by keep choosing the same routes and modes as they used to do), the impact of the TPM will be moderate. The effectiveness of vehicle labelling shows that consumers are not changing their purchase behaviour (concerning passenger cars) after labelling passenger cars (environment friendliness label). Information on sustainability of modes of transport may not have the desired effect (switching modes, more sustainable behaviour). [5] [6] [7] [9]
Despite the (uncertain) effect of RTTI for the behaviour of traffic participants, other major impacts are:
- Road passengers and road transport operators will benefit from the information provided by RTTI. They will be able to avoid congestion and decrease their delays due to pre- and on-trip traffic information [1].
- Railway passengers and rail transport operators will be better accessible due to extensive information on multimodal transport routes. The same counts for public transport passengers. This will probably lead to more users (how much will depend on the change in behaviour, e.g. how many people will switch from private vehicles to public transport).
- Slow modes will become part of the end-to-end transport chain for traffic participants. To encourage multimodality RTTI will aim to promote all modes of transport and multimodal transport routes, including slow modes.
- Residents near busy motorways will suffer less from environmental pollution (PM, NOx, Noise), because these parts of the network will be less loaded. Nonetheless, traffic will be distributed over a wider area which will lead to more hinder over a larger area. The advantage of RTTI is that traffic loads can be distributed according to changing preferences.
- Public bodies will need to invest in RTTI infrastructure, but will save money in the long run because of less expenses in new road infrastructure (although vehicle mileage rises, routing will optimised which leads to less capacity problems on road infrastructure).

B 1.2	**Summary: Income groups**	- Improved access to information will be advantageous for especially those people who have little or no access to transport. Still, just more information will only be advantageous for those who lack information. Multimodal transport (promoted by RTTI) will have a positive effect on income groups if multimodality will lead to lower prices. [7]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS															Geographical level		Source	
		Passengers					Transport operators													
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	↘		↘		↘					↘						L	R	S	I
B 2.2	Risk of congestion	↘			↘		↘					↘						L	R	S	I
B 2.3	Vehicle mileage	↗	↗		↗	↗	↗	↗				↗						R	N	S	I
B 2.4	Service and comfort	↗	↗		↗	↗	↗	↗				↗						R	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	- Frustration or disappointment under traffic participants due to possible technological failures during implementation phase.
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Travel or transport time will become more predictable but not necessarily shorter. Due to RTTI it will be possible to plan your time of arrival without choosing a fixed route or mode of transport. RTTI will tell you before and during your journey which route or mode an traffic participant should take to reach the destination in time. Without additional infrastructure investments (objective of TPM), RTTI mainly will improve efficiency by distributing traffic participants all over the network. This will lead to smoother, well distributed traffic flows. This distribution (based on RTTI) is designed to prevent congestion and delays, not to shorten existing travel time (measured without congestion). Transport and travelling will not become faster (compared to a current situation without congestion or delays), but smoother and more predictable. [8] - Risk of congestion will clearly decrease due to RTTI. Traffic participants will be warned when certain parts of the transport network are nearly overloaded and forecasted to get congested. This information and information on alternative routes or modes, will provide enough options for traffic participants to anticipate, and therefore decrease the chance on congestion. [1] [4] - Vehicle mileage will increase for road transport (RTTI will lead to a different routing and hence increase the vehicle mileage) and rise in rail transport and slow modes. RTTI promotes multimodality and offers a smooth transport chain covering all modes of transport. This will increase the attractiveness of public transport and slow modes [1]. RTTI is designed to improve service and comfort for all traffic participants. [1]
B 2.V	**Quantification of impacts**	- Up to 25 % reduction in travel time/congestion. [8]

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	↘					↘											R	N	E	
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness	→	↗		↗	↗	→	↗				↗						N		S	I
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															→		N		S	N
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- A reduction in transport time will lead to reducing transport costs. This effect will be strongest for road transport due to less congestion on motorways. - RTTI enables traffic participants to switch easier between different modes of transport. The problem of public transport used to be that it failed to provide a fully frictionless 'end-to-end' journey. With the help of RTTI this will no longer be a major disadvantage of public transport. A a result, public transport will become more competitive compared to road transport. However, RTTI will also be beneficial for road transport (more predictable and less congestion). The success or failure will mainly depend on the number of traffic participants which will switch modes. [1] - Public bodies will have to invest in RTTI in order to install, maintain and operate traffic information systems and data centres. However, expenses on traditional infrastructure (mainly new roads) will decrease (assuming that traffic will be shifted to other modes). In the long run, RTTI will probably save public income. Still, the net effect of savings is unclear at this time. [2]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	N		S	N
B 4.2	Safety	↗					↗										↗	N		S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems	↗			↗	↗	↗					↗					↗	N		S	I
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets												↗					N		E	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Safety will increase by dynamic traffic management systems because their ability to display danger warnings, speed regulation and re-route traffic to lesser loaded parts of the network. [4] - Accessibility of all transport modes will improve through RTTI. Information will become transparent and accessible for all traffic participants. [1] 3 level impact: - As indicated, vehicle mileage of passenger vehicles can increase without an increased chance of congestion. This could make travelling by car more popular and increase the sale of cars which will increase employment in the car industry.
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													→			→	N	L	S	N
B 5.2	Noise emissions													→			→	N	L	S	N
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																→	N	I	S	N
B 5.6	Renewable or non-renewable resources																→	N	I	S	N

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Although different modes of transport will become more attractive, it is questionable whether more information will encourage people to switch from car to public transport. For example, to optimise travel costs, a combination of walking, cycling, public transit and rented cars is favourable. Instead, motorised individual mobility by car is favoured by society, not at least because of its status. In other words, people do not decide rational when its comes to choosing between transport modes. [6] [7] [9]. - Commuters: The decision to drive rather than use other modes is based more on symbolic than on functional motives. [9] - Air pollutants, noise emissions and greenhouse gases emissions (like CO2 emissions) will decrease in highly congested regions (through traffic management) and will increase in other areas. - Promote awareness of the availability of alternatives to individual transport and information on carbon- and environmental footprints of transport modes. This information will raise transparency, but will not be a reason to switch modes. An study (ADAC) shows that labelling does not influence buying preferences for private vehicles. [1] [5]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Use of speed limitation devices in lorries and coaches - Compulsory safety standards in road vehicles (Driver assistance systems, seat belt reminder, eCall, vehicle-infrastructure interface etc.) - European Rail Traffic management system ERTMS
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011c): Commission Staff Working document . Accompanying the White Paper - Roadmap to a single European transport area. SEC(2011)391. Brussels [3] European Commission (2011): DATEX II - CEN TS 16157 - The key to successful information exchange, Brussels [4] SafetyForum (2007): Report of the eSafety Working Group on Real-Time Traffic and Travel Information (RTTI), Brussels [6] Steg, L., Gifford, R. (2005): Sustainable transportation and quality of life, Journal of Transport Geography 13: 59–69 [8] European Commission (2008c): Action Plan for the Deployment of Intelligent Transport Systems in Europe, SEC(2008) 3083, Brussels [9] Steg, L. (2005): Car Use: Lust And Must. Instrumental, Symbolic And Affective Motives For Car Use, Transportation Research A, Vol. 39 **National** [2] National Data Warehouse for Traffic Information (2012): The database – explained, Utrecht: NDW [5] Gärtner, A. (2005): Study on the effectiveness of Directive 1999/94/EC relating to the availability of consumer information on fuel economy and CO2 emissions in respect of the marketing of new passenger cars, München: ADAC e.V. [7] Litman, T. (2011): Mobility As A Positional Good - Implications for Transport Policy and Planning, Victoria Transport Policy Institute

FACT SHEET NO: 56 **CATEGORY: 7.4** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Framework - Transport safety**
A 3	**Transport policy measure (TPM)**	**Use of speed limitation devices in lorries and coaches**
A 4	**Description of TPM**	Speed limitation devices allow a certain maximum speed for lorries and coaches. The device interacts when a lorry or coach reaches a pre-programmed maximum speed. With the speed set at an optimum level, it increases safety (for drivers and other road users) and reduces fuel consumption and maintenance costs. Heavy vehicles like lorries and coaches (over 3.5 tonnes) are at a higher risk to road users than other vehicles involved in a crash. Research proved that speeding contributes to about one third of all fatal accidents [3].
A 5	**Implementation examples**	EU Directive 1992/6 and 2002/85 prescribe speed limiters (90 km/h limit) for heavy lorries (>12t), coaches (>10t) and light lorries (< 3.5t) to improve safety and reduce environmental impacts.
A 6	**Objectives of TPM**	An optimal pre-programmed maximum speed has certain benefits. The main objectives of this TPM are: - Increase safety level on roads by slowing down (large) trucks and coaches. Reduced maximum speed decreases the number of collisions and mitigates the severity of those occurring [1] [2] [3]. - To reduce fuel consumption (which is significantly lower by limited speeds) and CO2 emissions [4] [5]. - Speed limitation devices will also help to reduce air pollution, noise and congestion. Mainly while higher engine loads (meaning the power needed to run at certain speed) cause more NOX emissions. Furthermore, speed limitation provides a more homogeneous traffic flow which reduces air pollution, noise and congestion. The latter will not count when the difference in speed between light weight and heavy weight vehicles increases. Congestion will certainly be reduced due to fewer accidents [4] [5].
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	Fuel consumption decreases due to lower speeds of lorries and coaches.
A 8	**Main source**	[3]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	R	N	S	I

B 1.1 Summary:
- First of all, reduced speed limits for lorries and coaches lead to significant decreasing environmental impacts. Summarised, these benefits are: reduced air pollutants, less noise, decreasing CO2 emissions and less fuel consumption. Mostly, society and residents near motorways will benefit from this improved environmental conditions. [3] [4] [7]
- Furthermore, road users, transport operators and public transport operators will profit from increased safety on roads. Speeding leads to accidents and speed limiters will decrease the number of casualties and injuries on roads. [1] [3] [4] [5]
- Nevertheless, the economic costs and benefits are rather unclear so far. Lower speeds will lead to longer transport times, but reduced fuel consumption, less congestion and decreasing costs for maintenance will be beneficial for transport operators. The net effect for light weight vehicles is positive (see B 3.V). [1] [8] [9]

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time	➔			↗		↗					↗						N	R	S	I
B 2.2	Risk of congestion	↘			↘		↘					↘						L	R	S	I
B 2.3	Vehicle mileage																				
B 2.4	Service and comfort																				

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Direct effect: Longer travel time due to limited speeds for trucks and coaches. [5] - Reduced risk of congestion due to fewer accidents. It depends on the speed limit of other road users if there will be a more homogeneous traffic flow. Differences in speed between road users hamper the traffic flow. The net effect concerning the more homogeneous traffic flow is unknown. [5]
B 2.V	**Quantification of impacts**	- Speed limiters can reduce the speed of Light Goods Vehicles by 10% which may lead to a significant reduction in the accident rate and the congestion rate. [10]

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs	➔			➔		➔					➔						N	I	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs	↘				↘											↘	N		S	I
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)															↘		N		E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- The purchase and installation costs strongly depend on whether the device is installed during manufacture or at a later date (retrofit). [5] - The transport costs will increase due to a longer travel time, but the fuel and maintenance costs will decrease due to the lower speeds . The cost-benefit ratio for light weight vehicles turned out to be positive (see quantification of impacts) [8] [9] [10]. For lorries and coaches this ratio is unclear. - Reduced speeds for lorries and coaches improves road safety for all road users (including slow modes). This will lead to fewer accidents and reduced health service costs for road users and society. [1] [8] 3 level impact**:** - Public bodies will receive less excise tax because of lower speeds (=energy efficient). Furthermore, speed limitation devices can prevent vehicles from exceeding speed limits which will reduce the number of speeding tickets (and thus reduce public income).
B 3.V	**Quantification of impacts**	- Countries with a good safety record, such as Norway, Great Britain, Sweden and the Netherlands, assign a high monetary value to the prevention of a traffic fatality (when using a Cost-benefit analysis). [8] - Installing intelligent speed adaptation (ISA-systems) in Norway found out to have a benefit/cost ratio 1.95. This means that the benefits for this measure are higher than the costs. [8] - The IMPROVER study concluded that the benefits (mainly due to more economical driving behaviour) of speed limiters for light weight commercial vehicles outweigh the costs with a factor of 1.65 for the existing vehicle fleet. [9] - Another study on light good vehicles concluded B/C ratios greater than 1 for the speed limiter set at 100 km/h. [10]

B 4	**SOCIAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)													↗			↗	L	N	S	I
B 4.2	Safety	↗			↗	↗	↗					↗						N	L	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets						→											N	I	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- CO2 emissions, air pollutants and noise will decrease when speed limitation devices will be obligatory. This will improve the well-being of residents near motorways and the entire society [4] [5]. - The level of safety will increase substantially for all road users. Lower speeds reduce stopping distances, give a greater time to recognize hazards, increase the ability of other road users to judge vehicle speed and time before collision and reduce the likelihood that a driver will lose vehicle control [1]. - The labour market for road transport will not be affected. The installation costs of speed limitation devices will be flatten out by maintenance costs savings [3].
B 4.V	**Quantification of impacts**	- A 1% reduction in the average speed of traffic (all traffic modes) leads to a 2% reduction in injury accidents [3]. - If road the average speed decreases from 120 to 119 km/h, the number of road fatalities is estimated to be reduced by 3.8% and the serious road injuries by 2.9% [1]. ' - Speed limiters can reduce the speed of Light Goods Vehicles by 10% which may lead to a significant reduction in the accident rate. [10]

B 5	**ENVIRONMENTAL IMPACTS**	**AFFECTED SEGMENTS**																**Geographi-cal level**		**Source**	
		Passengers					**Transport operators**														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	L	R	S	I
B 5.2	Noise emissions													↘			↘	L	R	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																↘	N	R	E	
B 5.5	Climate																↘	I		S	I
B 5.6	Renewable or non-renewable resources																↘	I		S	I

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	Speed limitation devices will reduce maximum speeds which will lead to several positive impacts for the environment, such as: - Reducing air pollution (mainly NOx, but also PM10) through lower engine loads of lorries and coaches. This will be beneficial for the entire society and for especially for residents living near motorways. [4] - Noise will decline through lower speeds and less congestion [3], which counts mainly for residents near motorways. - CO2 emissions will be reduced with the introduction of speed limitation devices which is desirable for the entire society and in accordance with the EU policy to reduce C02 emissions by 20% in 2020. - Fuel consumption reduction of lorries and coaches through the introduction of speed limitation devices. Especially because driven speeds on motorways are above the optimum level for fuel efficiency. [7] - In addition, as potential indirect effect speed limitation devices can lead to even more significant CO2 reductions. For example, if lower top speeds and their resulting safety benefits would incentivise the market for lighter and less powerful trucks and coaches. This potential development reduces significant additional carbon savings over the long run. [7] - Indirect effect: Decline of additional land-use due to lower demand for new road infrastructure based on to higher road capacities.
B 5.V	**Quantification of impacts**	- Practical experiments in the Netherlands showed that speed limiters (limited to 110 km/h) in vans and light trucks resulted in 5% fuel savings. [3] - A study in the UK showed that a new 60mph (96 km/h) speed limit (for cars) will reduce CO2 emissions by an average of 1.88 million tonnes of carbon per year. [7] - Decreasing speed limits around Rotterdam (NL) from 100 to 80 km/h resulted in a reduction of 25% in NOX emissions from traffic. [4]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Provision of real time traffic and travel information (RTTI) - Compulsory safety standards in road vehicles (Driver assistance systems, seat belt reminder, eCall, vehicle-infrastructure interface etc.) - European Rail Traffic management system ERTMS
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Global Road Safety Partnership (2008): Speed Management - A road safety manual for decision-makers and practitioners, Geneva: Publications of GRSP [3] European Transport Safety Council (2008): Managing Speed - Towards safe and sustainable road transport, Brussels: European Transport Safety Council [4] European Federation for Transport and Environment (2005): Road transport speed and climate change, Brussels: Transport & Environment [5] Boer, E. den., et al. (2010): Speed limiters for vans in Europe - Environmental and safety impacts, Delft: CE Delft [6] Boer, E. den., et al. (2009): Are trucks taking their toll? The environmental, safety and congestion impacts of lorries in the EU, Delft: CE Delft [8] SafetyNet (2009): Cost-benefit analysis, Brussels: Directorate-General Transport and Energy [9] European Commission (2006): IMPROVER - Impact Assessment of Road Safety Measures for Vehicles and Road Equipment, Luxembourg: Publications Office of the European Union [10] Toledo, T.; Hakkert, S.; Albert, G. (2007). Evaluating the benefits of active speed limiters and comparison to other safety measures. Proceedings of the European Transport Conference 2007, Noordwijkerhout, NL **National** [2] Commercial Truck and Bus Safety Synthesis Program (2008): Safety Impacts of Speed Limiter Device Installations on Commercial Trucks and Buses - A Synthesis of Safety Practice, Washington D.C.: Transportation Research Board [7] Anable, J. Mitchell, P. Layberry, R. (2006): Getting the genie back in the bottle: Limiting speed to reduce carbon emissions and accelerate the shift to low carbon vehicles, London: Lowcvp

FACT SHEET NO: 57 **CATEGORY: 7.4** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Framework - Transport safety**
A 3	**Transport policy measure (TPM)**	**Compulsory safety standards in road vehicles (Driver assistance systems, seat belt reminder, eCall, vehicle-infrastructure interface etc.)**
A 4	**Description of TPM**	In 2009, more than 35.000 people died on the roads of the European Union and about 1.5 million persons have been injured. Road safety is a major societal issue and causes huge costs (approximately 130 billion EU in 2009) for society. Although significant improvements concerning road safety have been made, there still has to be done much more to reach the European 'zero vision' target (zero fatalities on European roads by 2050). [3] Technology is expected to contribute substantially to reach the 'zero vision' target for road transport. Road safety technologies are: - advanced driver assistance systems - (smart) speed limiters - seat belt reminders - 'eCall'. This is a device which alerts rescue services automatically when a road crash occurs. - cooperative systems such as congestion warning systems and travel time prognoses based on current traffic and road conditions. - vehicle - infrastructure interfaces and - improved roadworthiness tests = vehicle inspection (including for alternative propulsion systems) [1][2]. This TPM focusses on technical safety systems, with special regard to: driver assistance systems and vehicle-infrastructure interface. - Advanced driver assistance systems (ADAS) are designed to support the driver in the driving process by taking over some vehicle control responsibilities. Prior to full automation there will be a stage of partial automation where technology will take over some vehicle control tasks. This means the driver is still responsible for driving, but some tasks will be managed by the ADAS. Examples are: lane departure warning, anti collision warning or pedestrian recognition systems.[4] - Vehicle-infrastructure interface (V2I = Vehicle-to-infrastructure) is a technology designed to directly linking road vehicles to their physical surroundings (infrastructure). Through a wireless exchange of safety and operational data between vehicles and (road) infrastructure the system is intended primarily to avoid or mitigate motor vehicle crashes. Furthermore, it will also lead to a wide range of other safety, mobility, and environmental benefits. Examples are: speed advice for green wave at traffic lights, routing to avoid congestion and area wide traffic information provision.[5]
A 5	**Implementation examples**	Applicable implementation examples of ADAS [9]: - Fuel efficiency advisor - Lane departure warning system - In-vehicle navigation system with typically GPS and TMC for providing up-to-date traffic information. - Adaptive cruise control (ACC) - Collision avoidance system (Precrash system) - Intelligent speed adaptation or intelligent speed advice (ISA) - Night Vision - Adaptive light control - Automatic parking - Traffic sign recognition Examples of V2I [8]: - Speed warnings in relation to curves, school zones and work zones, poor weather conditions - Pedestrian protection system
A 6	**Objectives of TPM**	Road accidents cause huge economic and human costs to society. Reducing the number of fatalities and injuries is one of the priority actions of the European Commission [1]. Furthermore, technical safety systems can help optimising traffic flows and reduce the risk of congestion.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	No key changes
A 7.2	Origin and/or destination of trip:	No key changes
A 7.3	Trip frequency:	No key changes
A 7.4	Choice of route:	V2I systems provide real time traffic information which will lead to different choices of routes adjusted to congestion, accidents, available parking and other traffic information [6].
A 7.5	Timing (day, hour):	No key changes
A 7.6	Occupancy rate / Loading factor:	No key changes
A 7.7	Energy efficiency / Energy usage:	Slightly more energy efficient driving can be expected, but is no key change concerning fuel consumption.
A 8	**Main source**	[1]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	R	N	S	I

- In general, ADAS and V2I systems have the potential to deliver major positive impacts on road users, residents and society. But before these systems can be successfully implemented it will be essential to improve acceptance under private vehicle users. Currently, privacy issues and the feeling of losing control of driving restrains ADAS and V2I systems from being totally embraced by private vehicle users. [6]
- There are clear benefits for slow modes, residents near motorways and society. Most vehicle technology systems (including ADAS and V2I systems) will improve road safety for all road users, shorten travel time and reduce traffic pollution and emissions [1][3]
- Public bodies will be responsible for the construction of the needed physical infrastructure, its maintenance, and operating costs. This will lead to substantial financial burdens on public bodies over a long period of time. [6]

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘					↘											L	R	S	I
B 2.2	Risk of congestion	↘					↘											L	R	S	I
B 2.3	Vehicle mileage	→					→											L	R	S	I
B 2.4	Service and comfort	↗					↗											N		S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Travel time for road vehicle will decrease through V2I and ADAS. Mainly, because these technology systems will increase efficiency of road use [6]. - V2I and ADAS technology will not only be beneficial for road safety, but will also create a more homogeneous traffic flow. Besides, V2I will provide road users with real time traffic information which will enable drivers to adjust their routing and be able to avoid congestion. [3] - Vehicle mileage will be less consistent as it used to be. Road users will be able to adapt their routing based on real-time traffic information. This will lead to additional vehicle mileage when V2I systems suggest a longer route to avoid congestion or free parking spaces. But, this will not lead to substantial changes, because ADAS and V2I will reduce the risk of congestion and accidents. Which means, that alternative (longer) routing will be limited. Altogether, vehicle mileage will stay more or less the same. [6] - Service and comfort will increase through reduced congestion, predictable journey times and lower vehicle operation costs (due to more economical driving behaviour caused by ADAS and V2I) [9]. These clear benefits will go hand in hand with some minor disadvantages of the safety systems: First, privacy is a big issue for private car users. A systems which demands private car users to build a black box in their vehicle which saves data all the time will encounter heavy resistance from users. Second, public acceptance is currently low as drivers do not want to feel that they are losing control of their vehicle. [6] - Optimizing the road usage, e.g. by minimizing the distance to vehicles in front and minimizing brake actions that lead to sudden braking (causing accidents and congestion). This will lead to a more homogeneous traffic flow. [7]
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	→					→											L	R	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector																				
B 3.4	Sectoral competitiveness																				
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs	↘				↘											↘	N		S	I
B 3.9	Public authorities & adm. burdens on businesses															↗		N	L	S	I
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Shorter travel and transport times will reduce transport costs. Furthermore, reduced maintenance and insurance costs will be flatten out by purchase costs of road safety technology systems (related to ADAS systems). The net effect is not clear at this moment. [6] - Health service costs will decline through decreasing number of fatalities and injuries through road accidents. [1] [3] - Public bodies will be faced with costs for the construction of needed infrastructure. Additionally, they will be responsible for maintenance and operating costs of technology systems (related to V2I systems). [6]
B 3.V	**Quantification of impacts**	- For trucks, the use of ACC (adaptive cruise control) combined with FCW (forward collision warning) has a very positive benefit-cost ratio between 3.9 and 5.2. It is therefore clearly beneficial from the societal point of view. For cars, the attainable benefits are not sufficient to compensate for the costs. The benefit-cost ratio ranges between 0.5 and 0.7; the system is either too expensive or users on average drive too less km to pay off the "investment". The ACC+FCW system represents foremost a comfort system. These effects are however not subject of monetisation in a transport-focused cost-benefit analysis. [10]

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)	→				↗	→							↗			↗	N		S	I
B 4.2	Safety	↗				↗	↗							↗			↗	N		S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets																				
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Well-being for residents and society will benefit from vehicle technology systems like ADAS and V2I. Mainly because of environmental benefits for residents living near heavy congested motorways and societal benefits because of less fatalities through road accidents. - A clear negative impact on well-being is caused by the poor acceptance of vehicle technologies among private vehicle users. Primarily private vehicle users are sceptical when it comes to privacy issues and the fact that they will lose some driving tasks to technology which they do not completely trust. [6] - The contribution of technology to the improvement of the safety record of road transport is uncountable. Technologies like ADAS and V2I systems will decrease the number of accidents because they can interfere at times and point were drivers lose concentration or fail to see dangerous situations. [3]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													↘			↘	L	N	S	I
B 5.2	Noise emissions													↘			↘	L	N	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	N	I	S	I
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Innovative ADAS and V2I systems will encourage changes to more sustainable driving styles and behaviour which enhance sustainability and will help reduce traffic pollution emissions (NOx, PM and CO2). [7]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Speed limitation devices in lorries and coaches - Use of speed limitation devices in lorries and coaches - European Rail Traffic management system ERTMS
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2011c): Commission Staff Working document . Accompanying the White Paper - Roadmap to a single European transport area. SEC(2011)391. Brussels [2] European Transport Safety Council (2011): Towards a Vision Zero for Road Safety in Europe, News Release, Brussels: ECTS [3] European Commission (2010i): Towards a European road safety area: policy orientations on road safety 2011-2020. COM(2010) 389 final. Brussels [4] International Harmonized Research Activities (2010): Design Principles for Advanced Driver Assistance Systems - Keeping Drivers In-the-Loop, Working Group on ITS [6] CVIS - Cooperative vehicle-infrastructure systems (2010): Exploring the possibilities offered by next generation infrastructure vehicle communications in tackling urban transport challenges, Brussels [7] European Commission (2010j): Definition of necessary vehicle and infrastructure systems for Automated Driving, SMART 2010/0064, Brussels: DG Information Society and Media [8] Federal Highway Administration (2011). Research for V2I Communication and Safety Applications. 2011 ITE Technical Conference, Orlando, Florida. [9] euroFOT (2012). European Large-Scale Field Operational Tests on In-Vehicle Systems. Final deliverable. 7th Framework programme. [10] euroFOT (2012). European Large-Scale Field Operational Tests on In-Vehicle Systems. Overall cost-benefit study. http://www.eurofot-f **National** [5] U.S. Department of Transport (2010): Roadway Geometry and Inventory - Trade Study for IntelliDrive Applications, Georgetown Pike: Turner-Fairbank Highway Research Center

FACT SHEET NO: 58 **CATEGORY: 7.4** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Framework - Transport safety**
A 3	**Transport policy measure (TPM)**	**European Rail Traffic management system ERTMS**
A 4	**Description of TPM**	More than 20 (national) signalling and speed control system in rail operation existed throughout Europe in the past. These technical barriers should be removed by the ERTMS (European Rail Traffic Management System), which aims to increase the competitiveness and dynamism of the rail sector. Further, it aims at promoting the integration of rail freight and passenger market. The ERTMS aims to harmonise the signalling and speed control system throughout the EU rail transport infrastructure. The ERMTS system consists of two core components: 1. GSM-R (Global System for Mobiles - Railway): This component is based on standard GSM but using various frequencies specific for rail as well as certain advanced functions. It is a radio system used for exchanging voice and data information between the track and the train. 2. ETCS (European Train Control System): The European Train Control System makes it possible not only to transmit permitted speed information to the train driver, but also constantly to monitor the driver's compliance with these instructions. The ETCS consists of two modules, one trackside and the other on board. The trackside module transmits information which enables the on-board computer to calculate, at any given moment, the maximum permitted speed. The on-board computer slows down the train automatically if this speed is exceeded. The ETCS guarantees a common standard that enables trains to cross national borders and enhances safety. There are key prerequisites for a successful implementation of ERTMS, which are: the specifications needed to be widely accepted and applied, the establishment of an central management and the strict compatibility of the system. [EE] There exist three levels of the ETCS system: Level 1 contains the most "simple" information exchange system, which transmits information from radio beacons along the track to the train driver regarding maximum speed. In Level 2 the information for trains is transmitted by GSM-R, the position is still detected by track. The line side signals are not longer necessary, which allows a reduction of investments and maintenance costs. At level 3 the trains are able to submit their position and speed themselves which allows an optimisation of capacity and further reduction of track equipment.
A 5	**Implementation examples**	- Rotterdam - Geneva rail freight corridor [4] - Germany: Berlin – Jüterbog –Halle/Leipzig [9] - UK: Cambrian Coast Line, a single track line of 215km, between Shrewsbury (Sutton Bridge Junction), Aberystwyth and Pwllheli in Wales. [10]
A 6	**Objectives of TPM**	- Increase rail safety by an effective signalling system with automatic train speed control - Ensure the technical interoperability of rail system throughout Europe - Increase competitiveness and dynamism of the rail sector - Stimulate the European rail equipment market - Optimisation of distance between running trains and capacity increase - RAMS: Reliability, Availability, Maintainability, Safety
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	ERTMS will facilitate an increase in the market share of European rail transport. This in turn is expected to create a more competitive market of suppliers, and to reduce the costs of railways in the long term. [3] More international (rail) freight services.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	The capacity of rail infrastructure will increase due to less distances between trains. Capacity gains in terms of infrastructure usage. [1]
A 7.4	Choice of route:	
A 7.5	Timing (day, hour):	
A 7.6	Occupancy rate / Loading factor:	Capacity gain in terms of infrastructure use [1]
A 7.7	Energy efficiency / Energy usage:	Circulation of freight trains will be smoother: less variations in speed and indirectly affected by modal shift.
A 8	**Main source**	[4] Obrenovic et al. (2006); European Transport Conference: Proceedings of the ETC; Migration of the European Train control system (ETCS) and the impacts on the international transport markets

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 1.1	**Summary**																	I		E	

- Main impacts will positively affect the the rail sector and the overall society.
- Significant improvements of rail safety (operators, passengers, employees, society).
- ERMTS /ETCS will will be able to reduce transport time and increase punctuality on international relations significantly.

B 1.2	**Summary: Income groups**	
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 2.1	Travel or transport time		↓					↓										I		S	I
B 2.2	Risk of congestion							↘										N	I	S	I
B 2.3	Vehicle mileage		↗					↗										N	I	S	I
B 2.4	Service and comfort		↗					↗										N	I	E	

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Service and comfort improvements because of less delays and higher track capacity (also on local regional level). - Less risks of delay because of standardised technical systems (also on local / regional level). - Modal shift towards railway (primarily freight) due to a harmonised railway control system which increases the vehicle mileage. [4] - ETCS/ERTMS will not be able to improve the performance significantly, combined with other measures the operational structure can be optimised. [4] - ERMTS /ETCS will will be able to reduce transport time and increase punctuality on international relations significantly. [4] - Travel time benefits for cargo operators & clients, in some specific cases also for travellers [8]
B 2.V	**Quantification of impacts**	- ECTS gains capacity of 20% compared to the existing less efficient system. [1] - Increase of rail market share (example Rotterdam - Geneva) from 22% to 28%, travel time from 22h to 18h, punctuality from 70% to 85%. [4]

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs							↘										N	I	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector							→										N		S	
B 3.4	Sectoral competitiveness							↗							↗			I	N	S	I
B 3.5	Spatial competitiveness							↗							↗			N	I	E	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs							↘													
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses															↗		N	I	S	
B 3.10	Public income (e.g.: taxes, charges)															↗		N	I	E	
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	- High investments/asset costs for railway operators. [4] - Need for parallel coexisting signalling systems on train and/or track (old system and ETCS systems) due to impossible simultaneous ETCS installation on all trains and tracks. Maintenance costs will increase in short terms. [4] - Reduction of costs for implementing traditional and obsolete systems and maintenance of these. Potential cost savings for operators (benefit): - Lower project costs (small); - Lower procurement costs (small) Potential cost savings for infrastructure owners / managers: - No line-side signals (level 2,3) (strong); - Lower project costs (small); - Lower procurement costs (small) Cost drivers for operators: - Inadequate overall planning (small); - Sunk costs for premature disinvestment of existing control command (CC) systems (small); - Retrofit of existing vehicles (medium); - Specific transfer modules (STM) or other parallel equipment for existing CC-systems (small) Cost drivers for infrastructure owners (here public bodies): - Inadequate overall planning (small),- Sunk costs for premature disinvestment of existing control command (CC) systems (small); - Additional costs for fall back CC systems to be built (medium) [all 6]
B 3.III	**Operation phase**	- Reduction of investments for trainsets - Potential cost savings for operators (benefit): - Synergy in use of GSM-R (level2) (medium); - Increase of safety (small);- Reduced number of international trainsets (medium); - Reduction of on board equipment (small); - Potential costs savings for infrastructure owners / IM (here public bodies): - No track occupancy detection (level 3) (strong); - Synergy in use of GSM-R (level2) (medium); - Less maintenance on trackside (small); - Better use of infrastructure (medium); - Increase of safety (small).
B 3.IV	**Summary / comments concerning the main impacts**	- ERTMS will facilitate an increase in the market share of European rail transport. This in turn is expected to create a more competitive market of suppliers and to reduce the costs of railways in the long term. [3] [4] [8] Thus competitiveness of railways (freight and passengers) will increase on spatial and sectoral level. - The costs of ETCS, used on its own, are appreciably lower than those of conventional systems [1] . After implementation the ERTMS will have lower maintenance costs and thus positive impact for public income (if infrastructure management financed by public body). [4] - Increase of cost efficiency / lower asset costs for train operating company (TOC) because of rising competitiveness on supply markets (one system for several markets) and lower access barriers. Lower operation (asset) costs for infrastructure managers (IM). [4] - Improved planning of rolling stock operations [7] - Complicated and cost- intensive certification process of ECTS result in higher asset costs and product prices [4]
B 3.V	**Quantification of impacts**	- Reduction of costs for trainset of Thalys by 60%. [1] - Retrofitting of tracks would cost up to 80% extra due to difficulties of installation of system during operation. [1] - Train costs will increase by up to factor 3, if ETCS is not integrated in traction unit from the outset. [1] - Investments costs of about €5bn for equipping trains and part of infrastructure by EU. [1] ERTMS / ETCS ROI savings (in M€ per year) in Europe: - safety of the railway: > 200 (strong impact) and at level crossings: >300 (strong impact) - maintenance of signalling: >2000 (strong impact) - productivity of the rolling stock: >1000, (medium impact) - energy savings of signalling: >200 (small impact) - maintenance saved on rolling stock: >600 (medium impact) - savings on track works: >200 (strong impact) - increase in freight traffic: >1000 (small impact) - increase in passenger traffic: >1000 (small impact) [all 5, based on 7 (published 2003] - The cost of the on-board module depends on the type of locomotives or train sets. In terms of an order of magnitude, this cost would be around €100 000 for new equipment, prices vary between €200 000 and €300 000 when existing equipment has to be adapted. Infrastructure: The range is rather wide, and estimates vary between €30 000 and €300 000 per kilometre. [2]

B 4	**SOCIAL IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)																↗	I	N	E	
B 4.2	Safety		↑					↑					↗				↗	I	N	S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems		↗																		
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)												↗					N		S	I
B 4.7	Employment and labour markets												↗					N		E	
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- In consideration of safety, current trends suggest that the costs of the European train control system will decrease sufficiently, allowing many non-signalled lines to be gradually equipped with ETCS. Such progress is vital, as unfortunately signalling-related accidents still occur far too frequently on lines without speed-control systems. [3] - Increase of health (safety; less air pollutants due to strengthening of rail sector) - Simplification of train operation for train driver [1] and less training costs [4]. Especially level 2 has advantages for drivers as it means an interoperability regarding harmonisation of displays and ergonomics. [5] - Improvement of track workers safety [8] 3 level impact: - If the attractiveness of rail transport increases and vehicle mileage increases, then this could positively affect employment within the rail transport sector. - Improvements within rail freight system will positively impact the whole rail system, thus rail passenger transport and its accessibility (availability, punctuality) will also improve
B 4.V	**Quantification of impacts**	

B 5	**ENVIRONMENTAL IMPACTS**	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants																↘	I	N	S	
B 5.2	Noise emissions																↘	L		E	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																↘	I	N	E	
B 5.6	Renewable or non-renewable resources																↘	I	N	E	

B 5.I	**Overall impacts on social groups**	
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	Less negative external impacts (like noise and energy consumption), assuming that noise emissions produced by rail are comparably lower than road.
B 5.IV	**Summary / comments concerning the main impacts**	- Less air pollutants because of strengthening the rail sector and thus higher demand. [8] - Positive impacts for the climate by modal change. - Possible reduced use of non-renewable resources by modal shift (depending on the source of electricity in the rail sector)
B 5.V	**Quantification of impacts**	

C	REFERENCES	
C 1	**Other TPMs of this subcategory**	- Provision of real time traffic and travel information (RTTI) - Use of speed limitation devices in lorries and coaches - Compulsory safety standards in road vehicles (Driver assistance systems, seat belt reminder, eCall, vehicle-infrastructure interface etc.)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] European Commission (2005d): Communication from the Commission to the European parliament and the council on the deployment of the European rail signalling system ERTMS/ETCS. COM(2005)298 final [2] European Commission (2005g): The ERTMS in 10 questions. MEMO/05/235, Brussels [3] European Commission (2006b): ERTMS – Delivering flexible and reliable rail traffic. - A major industrial project for Europe. Brussels 2006 [4] Obrenovic et al. (2006); European Transport Conference: Proceedings of the ETC; Migration of the European Train control system (ETCS) and the impacts on the international transport markets [5] de Tilière; Interoperability in Europe: Case of the ERTMS development in the new European rail market; Association for European Transport 2004 [6] International Union of railways - UIC (2003): Implementing the European Train Control System ETCS: Opportunities for European Rail Corridors; [7] Institution of railway signal engineers (IRSE) (2003): Proceedings 2002/2003 **National** [8] Ministry of transport, public works and water management of the Netherlands (2010): Social Cost Benefit Analysis of implementation strategies for ERTMS in the Netherlands [9] European Commission (2009): Nationaler Umsetzungsplan für die TSI Zugsteuerung, Zugsicherung und Signalgebung des konventionellen transeuropäischen Eisenbahnsystems im Rahmen der Richtlinie 2001/16/EG in der Bundesrepublik Deutschland". [10] Department for Transport (2007): ERTMS National Implementation Plan.

FACT SHEET NO: 59 **CATEGORY: 7.6** **PERFORMED BY: ProgTrans**

A GENERAL INFORMATION

A 1	**Category**	**Research and Innovation**
A 2	**Subcategory**	**Framework - Technology and infrastructure**
A 3	**Transport policy measure (TPM)**	**Deployment of rail freight transport corridors COM(2008)852**
A 4	**Description of TPM**	The European Commission intends to establish a European railway network where freight trains are prioritized over passenger trains. Nowadays, passenger and freight trains both operate side by side on the European railway infrastructure (a so-called mixed operation). The mixed operation leads to a number of difficulties which can be partly explained by the limited capacity available for freight trains. This capacity restriction, combined with several other issues mainly concerning the lack of interoperability of international rail freight transport, hinder the competitiveness of rail freight transport (mostly compared to road freight transport) [3] [4].
A 5	**Implementation examples**	- The Dutch 'Betuweroute' is a 160 kilometres railway track specially build and dedicated for freight transport. The Betuweroute connects the Rotterdam harbour directly to the Dutch-German border and is designed to improve the attractiveness of railway transport (mainly compared to road transport). Furthermore, it is constructed to provide additional freight transport capacity for the expansion of Rotterdam harbour (new 'Maasvlakte 2') [2]. - Dedicated Freight Corridor Corporation of India Ltd. (DFCC). The Minister of Railways made the announcement in 2005 to establish dedicated freight tracks to meet future transport needs. The over 3300 kilometres 'eastern and western corridor' are currently under construction and will be ready for operation in 2017 [5].
A 6	**Objectives of TPM**	- The European Commission intends to establish dedicated rail freight corridors to improve the competitiveness of rail transport compared to other modes of freight transport (road, air and waterway). The main concern for rail freight transport is to improve reliability (meet scheduled arrivals), capacity, information management, average speed and flexibility [3] [4]. - Corridors running through several different countries are mainly hindered by the lack of their interoperability. To achieve a competitive railway network it is important to harmonise freight train transport by creating matching infrastructure, railway equipment and energy systems. Furthermore, bording crossing bottlenecks need to be removed. Not only technical bottlenecks (like the mentioned differences in infrastructure), but also the administrative burdens restrain the competitiveness of international rail freight transport [7]. - In addition, rail freight transport is more environmental friendly compared to road freight transport. In order to achieve the European 20 % CO2 emission reduction target it will be vital to increase environmental (freight) transport. The dedicated rail freight corridors state the attempt to initiate a modal shift to rail freight transport [3] [4].
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	One of the main objectives is to improve the competitiveness of rail freight transport. Implicitly, this means that rail freight transport has to increase its market share compared to road transport.
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	
A 7.4	Choice of route:	Dedicated rail freight tracks will be favourable for rail freight transport than mixed operation tracks.
A 7.5	Timing (day, hour):	The duration of rail freight transport will be more predictable and delivery times will be more reliable.
A 7.6	Occupancy rate / Loading factor:	
A 7.7	Energy efficiency / Energy usage:	A modal shift from road freight transport to rail freight transport will lead to a decreasing demand for petrol because rail freight transport is more energy efficient than road freight transport.
A 8	**Main sources**	[3] [4]

B IMPACTS

B 1 **OVERVIEW ON IMPACTS**

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	I	N	S	I

B 1.1	**Summary**	- Road passengers will benefit when the TPM will be implemented. Reduced road freight traffic will lead to less accidents and thus improve road safety for all road users (including slow modes). [6] - Railway passengers will be negatively affected by dedicated rail freight corridors. The existing railway network is not suitable for reserving tracks for freight transport without causing delays for passenger transport. [1] - Rail freight operators will benefit considerably due to: shorter transport times, improved reliability, increased capacity, better information management and more flexibility. [3] [4] - Reduced road freight vehicle mileage will have a negative effect the road freight sector. [7] - The environmental impact is both positive (significant reduction of air pollutants, fewer CO2 emissions, reduced fuel consumption, less noise pollution near motorways) and negative (increasing noise emissions near railroads, more land use). Altogether, dis-benefits due to the increase of noise emissions and land use are about 2/10 of the benefits achieved by reducing the emission of pollutants (NOx, PM, CO2) expressed as external costs. This means that residents and society will benefit in the end. [6] - On condition that necessary speed control systems will be conducted, the road safety level will significantly increase (1:25 – 1:40). [EE]
B 1.2	**Summary: Income groups**	No specific social groups are affected by the TPM. However, residents near busy road freight corridors will benefit most from reduced NOx and PM emissions and by less noise pollution. In contrast, residents near future dedicated rail freight corridors are negatively affected. [6]
B 1.3	**Summary: Age groups**	
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	
B 1.6	**Summary: Ethnic groups**	

B 2 **TRAFFIC IMPACTS**

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time		↘					↘										I	N	S	I
B 2.2	Risk of congestion	↘					↘														
B 2.3	Vehicle mileage						↘	↗										I	N	S	I
B 2.4	Service and comfort							↗										I	N	S	I

B 2.I	**Overall impacts on social groups**	
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- The dedication of rail freight corridors will lead to a disruption of the railway system and therefore will have a negative impact on passenger rail transport. The current European railway network capacity is not suitable to make individual decisions for freight trains. The reservation of train paths for freight transport reduces the number of train paths available to passenger rail transport. New tracks will not restrain passenger trains, but will demand for extra terminals to fully disconnect freight transport from passenger transport. [1] - Transport times for rail freight transport will be reduced due to the dedication of freight transport corridors. A smooth and free movement of freight trains in the internal borders of the European Union will reduce transport times significantly. [7] - The aim of the dedicated rail freight corridors policy is to reduce vehicle mileage of road transport and create a modal shift from road to rail. Mainly, because of rail transport's higher energy efficiency (especially compared to road transport) which will result in fewer CO2 emissions. [6] - Service and comfort will increase due to less administrative burdens for international freight train transport. Besides, the reservation of dedicated tracks will give rail transport operators more possibilities to improve their flexibility and reliability. [7] - A modal shift from road to rail transport will lead to a reduction of congestion risk on roads and in particular motorways. This will be advantageous for road passengers and road transport operators.
B 2.V	**Quantification of impacts**	

B 3	ECONOMIC IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 3.1	Transport costs							↘										N	I	S	I
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector						↘	↗										N	I	S	I
B 3.4	Sectoral competitiveness							↗										L		E	
B 3.5	Spatial competitiveness														↗			N	R	S	I
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses							↗													
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Transport costs will decrease for rail freight transport. Dedicated freight tracks will not only reduce transport times, but also improve reliability. This enables transport operators to optimize their planning and improve rates for on-time delivery [8] - Revenues of rail transport operators will increase due to an increasing demand for rail freight transport. A more harmonised market, with decreasing fixed costs (increasing interoperability), the more (small) companies are able to deliver their cargo by rail transport. Hence, rail freight transport will become a possibility worth considering for more and more companies. Due to the improved attractiveness of rail transport, road freight transport operators will be faced with decreasing demands and will loose freight transport market share. [7] [9] - Spatial competitiveness for countries (or regions) will increase with dedicated rail freight corridors and will lead to an improvement of the attractiveness of certain regions. [7] - Increased administrative costs for rail operators. [11] 3 level impact: - If an existing railway track (with mixed operation: passengers and freight) is going to be transformed into a dedicated track, then this will increase the competition between passenger and freight services. Rail passenger services will become less attractive due to reduced operations.
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 4.1	Health (incl. well-being)																				
B 4.2	Safety	↑				↗												N		EE / S	I
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems							↗										I		S	I
B 4.5	Social inclusion, equality & opportunities																				
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets						↘	↗					→					N	R	S	I
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- The modal shift generated by the implementation of the TPM has a direct effect on road safety. Heavy duty / commercial vehicles (trucks) have a substantial contribution to the number of road accidents, casualties and the severity of injuries. Reducing the number of trucks will improve road safety for all road users (including slow modes). [6]. - On condition that necessary speed control systems will be conducted, the road safety level will significantly increase (1:25 – 1:40). [EE] - Technical barriers for international rail freight transport can be eliminated by creating European rail freight corridors. This will improve the simplicity of access. [7] - Employment in transport will be affected both positive and negative. On the one hand, rail transport operators will see increasing demands for rail freight transport and will benefit from their improved competitiveness as transport operator. This may lead to an increase in administrative staff employment [11]. On the other hand, road transport operators will lose a certain amount of cargo to rail transport operators. It is uncertain to what extent the modal shift from road to rail will occur and therefore difficult to forecast the net effect on employment in the transport sector [3] [4] [6] [7] [11]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	Geographical level: 1st level	Geographical level: 2nd level	Source: Source of assessment	Source: Spatial level of source
B 5.1	Air pollutants													↓			↓	L	R	S / EE	I
B 5.2	Noise emissions													↗			↗	L	R	S	I
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																↗	R	N	E	
B 5.5	Climate																↓	N	I	S	I
B 5.6	Renewable or non-renewable resources																↘	N	I	S	I

B 5.I	**Overall impacts on social groups**	Residents near busy road freight corridors will benefit; while residents near future dedicated rail freight corridors are negatively affected. [6]
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- A modal shift from road to rail transport will have several benefits for the environment. Less road freight transport will increase air quality in terms of reductions of NOx and PM emissions. Residents near busy road freight corridors will benefit most. [6] [11] - The impact on climate change, estimated through the emission of CO2, will also be positive because of less road transport. [6] - Furthermore, fuel consumption will be reduced, because rail freight transport is more energy efficient compared to road freight transport. [6] - The contribution of rail transport to noise pollution (especially freight trains) is considerable. This counts mainly for residents near future dedicated rail freight corridors [6]. On the contrary, residents being currently negatively affected by road freight noise emissions will benefit from the modal shift from road to rail. - The construction of new dedicated rail freight tracks (like the 'Betuweroute') will ask for land to build on. A modal shift from road to rail will not implicitly lead to decreasing needs for motorways, because passenger traffic on motorways will keep growing. - There will be an approximate reduction of 75% of CO2 emission if the shift from road to rail occurs. [EE]
B 5.V	**Quantification of impacts**	

C	REFERENCES
C 1	**Other TPMs of this subcategory**	
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	**International** [1] Centrum für Europäische Politik (2009): EU Regulation - Freight Corridors, Freiburg: CEP [3] European Commission (2007m): Towards a rail network giving priority to freight, COM(2007) 608 final, Brussels [4] European Commission (2008h): Regulation concerning a European rail network for competitive freight, COM(2008) 852 final, Brussels [6] European Commission (2010k): Accompanying document to the Proposal - Establishing a single European railway area, SEC(2010) 1042 final, Brussels [7] European Commission (2009p): Thematic Research Summary - Freight Transport, Luxembourg: Publications Office of the European Union [8] European Commission (2008j): Report of the Group - Strategic Group of experts - Rail Freight Oriented Network, Luxembourg: Publications Office of the European Union [9] European Commission (2010l): On track to a sustainable future - EU-funded research for a safe and efficient European rail system, Brussels: Directorate-General for Research [10] European Commission (2008k). Commission staff working document accompanying the Proposal for a Regulation of the the European Parliament and of the Council concerning a European rail network for competitive freight. Summary of the Impact Assessment. http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2008:3029:FIN:EN:PDF [11] PWC and NEA (2008). Preparatory study for an impact assessment for a railnetwork giving priority to freight. Final report. **National** [2] Ministerie van Verkeer en Waterstaat (2008): Rail transport in the Netherlands - The current state and the future developments, Den Haag: Ministerie VenW [5] Dedicated Freight Corridor of India Limited (DFCCIL) (2012): Public Information Brochure, New Dehli: Ministry of Railways

FACT SHEET NO: 60 **CATEGORY: 8.1** **PERFORMED BY: TRT**

A GENERAL INFORMATION

A 1	**Category**	**Other**
A 2	**Subcategory**	**Alternative commute solutions**
A 3	**Transport policy measure (TPM)**	**Promotion of flexible working hours (and opening hours)**
A 4	**Description of TPM**	The promotion of flexibility of working time refers to the length and distribution of working time (e.g. flexitime, compressed work week, staggered shifts, etc.). A variety of goals are comprised: - enterprise competitiveness, to respond to sudden changes in demand, adapt to new technologies and be in a position to innovate constantly; - family orientated working times, to improve the balance between company and private life; - education orientated working times, to promote life long learning; - age orientated working times, to support the extension of gainful activity; - 'transport' orientated working times, to prevent congestion and support an efficient use of transport services. In many countries, this kind of policy is applied during parental leave and for parents and carers during a limited period of time; nevertheless, alternative work arrangements for all employees may be introduced also for the purposes mentioned above and are the objective of the TPM under analysis. So far, this approach has been introduced only in a minority of countries. [2] [7]
A 5	**Implementation examples**	Germany, Netherlands, Denmark, Norway, Finland: Legislation on Flexibility / organisation of working time UK: Oxfordshire County Council / Balfour Beatty Civil Engineering Major Projects / Nationwide Building Society Canada: City of Edmonton / Royal Bank USA: Southern California Association of Governments / City of Avondale
A 6	**Objectives of TPM**	- In a 'transport' orientated view, the TPM aims at reducing congestion (at least spreading the traffic over a longer period of time around peak periods), and promote an efficient use of public transport services. [4] [7] - From a social point of view, the objective is mainly to improve the balance between company and private life, in the view of increasing quality of life. [4] [7] [8] - From the employer point of view, the TPM might increase productivity and competitiveness. [4] [8]
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	Possible change, depending on availability and choice during the selected time period. [5] [6] [7]
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	Possible change, depending on the possibility of 'compressed working week. [4] [7] [8]
A 7.4	Choice of route:	Possible change, depending on choice during the selected time period.
A 7.5	Timing (day, hour):	Major changes [3] [4] [5] [6] [7] [8]
A 7.6	Occupancy rate / Loading factor:	Possible change, depending on choice during the selected time period. Both on private and public transport modes. [4] [8]
A 7.7	Energy efficiency / Energy usage:	Possible change, depending on mode choice during the selected time period.
A 8	**Main source**	[4] [7] [8]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	**L**	**R**	**S**	**L**

B 1.1	**Summary**	- Main impacts will affect the distribution of trips over time on private/public transport mode, resulting in reduced traffic congestion [4] [5] [6] [7] [8] - An increased job satisfaction and quality of life is expected: individualised working hours can help employees to reconcile their work obligations and personal life.[3] [4] [7]
B 1.2	**Summary: Income groups**	- Some groups might have more benefits as their job is more suitable for flexibility, while other might be excluded. It might be the case of high-income jobs (flexible because mainly based on working on a computer) or low-income jobs with flexible schedule. On the other hand, some disadvantaged workers have jobs with inflexible schedules (i.e. factory staff) and cannot benefit from this policy. [7]
B 1.3	**Summary: Age groups**	- Ageing employees might have more interest to adopt a flexible working policy, especially when approaching their retirement.
B 1.4	**Summary: Disabled people**	
B 1.5	**Summary: Gender groups**	- People with children might have more interest to adopt a flexible working policy (but the TPM should be addressed to all employees).
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators														
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport	**Employees in transport**	**Residents**	**Economy**	**Public bodies**	**Society**	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	→		→	→	→	→				→						**L**	**R**	**S**	**L**
B 2.2	Risk of congestion	↘			↘	↘	→											**L**	**R**	**S**	**L**
B 2.3	Vehicle mileage	→	→		→	→		→				→						**L**	**R**	**S**	**L**
B 2.4	Service and comfort		→		→			→				→						**L**	**R**	**S**	**L**

B 2.I	**Overall impacts on social groups**	- Reduced stress related to congestion or crowded public transport modes, mainly during peak hour. Change of distribution of trips during the day. [3] [4] [5] [6] [7] [8]
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Less congestion and reduced transport time for road transport, mainly during peak hour. [4] [5] [6] [7] [8] - Change of distribution of trips during the day, depending on the individual working schedule. [3] [4] [7] [8] - Possible mode shift resulting from different time distribution and congestion level: from private to public (if less crowded) or from public to private (if significant less congestion and PT service not adequate). [5] [7] - Indirectly road freight transport might benefit from less congestion and reduced transport time - Compressed Work Weeks may provide modest reductions in total vehicle travel, because participants make additional trips during their non-work days. [4] [7] - Public transport service might need to be adjusted according to the new distribution of trips during the day (smooth peak hour service, improvement during off-peak)
B 2.V	**Quantification of impacts**	Total vehicle-miles (work and non-work trips) decreased by 15% in Denver, Peak period travel time was reduced up to 18% in Honolulu [4], automobile commutes reduced by 7-10% (CUTR), vehicle-miles reduced by 0.6% and vehicle trips by 0.5% (Apogee). [7]

B 3	ECONOMIC IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	→						→				→						L	R	S	L
B 3.2	Private income / commercial turn over																				
B 3.3	Revenues in the transport sector							→				→						L	R	E	
B 3.4	Sectoral competitiveness														→			L	R	S	L
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	**Overall impacts on social groups**	
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Public transport operators might face a slight increase of cost due to the adjustment of the service during the day. - Revenues for public transport operator might be slightly affected, depending on mode choice. - Competitiveness of enterprise might be increased, responding to sudden changes in demand, adapting to new technologies and innovating. [4] [5] [8] - Possible saving of car operation and maintenance costs, in case of reduced use (Compressed Work Week or as consequence of mode shift). [4] [5] [6] [7] - Possible additional cost for employers: Time must be spent planning the program and explaining it to employees, Increased security and utility expenses should be considered if the building's operating hours are extended. Additionally, there are potential costs associated with the disruption of work because some employees are unavailable. [4]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 4.1	Health (incl. well-being)	↗	↗		↗	↗								↗				L	R	S	L
B 4.2	Safety	→												→				L	R	S	L
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities													↗			→	L	R	S	L
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets														→			L	R	S	L
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Increased job satisfaction and quality of life expected [3] [4] [8]; slight increase of safety for road modes in case of reduced congestion [7]
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Increased job satisfaction and quality of life expected. [2] [3] [4] [5] [7] [8]; - Slight increase of safety for road modes in case of reduced congestion. [7] - Increased equality treatment (currently working flexibility for parental leave only) [8], even though the TPM is not appropriate for some jobs. [7] - Possible positive impacts on employment and productivity. [3] [4] [7] [8]
B 4.V	**Quantification of impacts**	- +3% of productivity in San Rafael, USA. [4]

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society				
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport						1st level	2nd level	Source of assessment	Spatial level of source
B 5.1	Air pollutants													→			→	L	R	S	L
B 5.2	Noise emissions													→			→	L	R	E	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use																				
B 5.5	Climate																→	L	R	S	R
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	- Impacts on air pollution [4] [7] [8], climate change [8] and noise emission.
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Positive impacts might be obtained in terms of reduced pollutant emissions, GHG emissions and noise at local level. Nevertheless, the environmental benefits strongly depend on the number of people involved and switching between modes of transport. The reallocation of traffic will reduce impact during peak hours, but increase impact during other parts of the day: therefore, the 'net' effect is probably unclear (as reported in the table).
B 5.V	**Quantification of impacts**	-1.9% of CO emissions if 20% of employees involved in Phoenix, - 16% of average CO and HC emissions in Denver. [4]

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Teleworking (often applied in combination)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	see below

International
[1] EC DG EMPL (2009): Flexible working time arrangements and gender equality - A comparative review of 30 European countries
National
[2] House of Commons All-Party Parliamentary Small Business Group (2009): Flexible Working: Challenges for Business, UK
[3] A. Ilsøe (2009): Decentralisation of working hours in Denmark – a win-win situation for employers and employees?, DK
[4] EPA (1998): Transportation Control Measures: Work Schedule Changes, USA
[5] Ministerie van Verkeer en Waterstaat (2006): Nota Mobiliteit. Deel IV - Na parlementaire behandeling vastgestelde PKB, NL
[6] Ministerie van Infrastructuur en Milieu (2011): Ontwerp Structuurvisie Infrastructuur en Ruimte, Den Haag, NL
Regional / Local
[7] Victoria Transport Policy Institute, Alternative Work Schedules (http://www.vtpi.org/tdm/tdm15.htm), CA
[8] Transport for London (2011): Smarter Working guide, London (UK)

FACT SHEET NO: 61 **CATEGORY: 8.1** **PERFORMED BY: TRT**

A GENERAL INFORMATION

A 1	**Category**	**Other**
A 2	**Subcategory**	**Alternative commute solutions**
A 3	**Transport policy measure (TPM)**	**Teleworking**
A 4	**Description of TPM**	Teleworking can be defined as a method of organising and/or performing work in which a considerable proportion of an employee's working time is: - away from the firm's premises or where the output is delivered; and - when work is done using information technology and technology for data transmission, in particular the Internet. It includes various forms of telework: home-based, mobile, teleconferencing, tele-centers.
A 5	**Implementation examples**	Germany: LVM in Münster Belgium: Alcatel UK: AA call centres / British Airports Authority, Heathrow France: DANEL Group USA: First Interstate Bank / Washington State Department of Transportation / City of Redmond
A 6	**Objectives of TPM**	- In a 'transport' orientated view, the TPM aim at reducing commuting trips (and therefore congestion and related pollutant emissions). - From a social point of view, the objective is mainly to improve the balance between company and private life, in the view of increasing quality of life. - From the employer point of view, the TPM might reduce cost, increase productivity and competitiveness. - Full-time and part-time teleworking may produce different impacts in terms of size: impacts may be smoothed (or even negligible) in case of part-time option, depending also on the work schedule. The impacts also depend on the amount of employees adopting a teleworking policy.
A 7	**Key changes concerning:**	
A 7.1	Choice of transport mode / Multimodality:	
A 7.2	Origin and/or destination of trip:	
A 7.3	Trip frequency:	Major change. [2] [3] [5] [6] [8] [9]
A 7.4	Choice of route:	Possible change
A 7.5	Timing (day, hour):	Possible change. [2] [5] [6] [8] [9]
A 7.6	Occupancy rate / Loading factor:	Possible change, depending on choice during the selected time period. [6] [9]
A 7.7	Energy efficiency / Energy usage:	Possible change, depending on mode choice during the selected time period and on the original situation. [2] [3 [5] [8]
A 8	**Main source**	[2] [5] [6] [8] [9]

B IMPACTS

B 1 OVERVIEW ON IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 1.1	**Summary**																	L	R	S	L

- ;ain impacts will affect the amount of commuting trips, resulting in reduced traffic congestion, especially during peak hour [2] [6] [9];
- An increased job satisfaction and quality of life is expected: employees reconcile their work obligations and personal life. [2] [8] [9]

B 1.2	**Summary: Income groups**	Some groups might have more benefits as their job is more suitable for tele-working, while other might be excluded
B 1.3	**Summary: Age groups**	Ageing employees might have more interest to adopt a tele-working policy (part-time or full-time), especially when approaching their retirement.
B 1.4	**Summary: Disabled people**	Disabled employees might have more interest to adopt a tele-working policy, reducing the need for travelling [6] [8] [9]
B 1.5	**Summary: Gender groups**	Female might have more interest to adopt a tele-working policy (part-time or full-time) [6]
B 1.6	**Summary: Ethnic groups**	

B 2 TRAFFIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 2.1	Travel or transport time	↘	→		→	→	→	→				→						L	R	S	L
B 2.2	Risk of congestion	↘			↘	↘	→											L	R	S	L
B 2.3	Vehicle mileage	↘	→		→	→		→				→						L	R	S	L
B 2.4	Service and comfort		→		→			→				→						L	R	E	

B 2.I	**Overall impacts on social groups**	Reduced stress related to travelling, less congestion or crowded public transport modes, especially during peak hour [6] [9].
B 2.II	**Implementation phase**	
B 2.III	**Operation phase**	
B 2.IV	**Summary / comments concerning the main impacts**	- Less congestion and reduced transport time for road transport, especially during peak hour [2] [3] [6] [7] [8] [9] - Less commuting trips, especially during peak hour [2] [3] [5] [6] [7] [8] [9] - Teleworking might generate more trips for non-commuting purposes, eroding the reduction of total travel [2] [3] [5] - Indirectly road freight transport might benefit from less congestion and reduced transport time - Public transport service might need to be adjusted according to the new demand (reduced for commuting trips and peak hours) - Telework tends to be particularly attractive to longer-distance commuters, so vehicle-km reductions tend to be relatively high [5] [8]
B 2.V	**Quantification of impacts**	- Commuting vehicle-miles decreased by 2.3% to 4.2%, total commute travel reduced by 10% in UK, total household travel reduced by 0.6-1.1%. [5] - If 10% of the workforce telecommutes on any given day, total vehicle travel would decline by 1% to 4% in US study. - Net reduction is 0.6% of household travel if 6.1% of the California workforce may currently telecommute 1.2 days a week on average. [8] - -0.9% of the total commuting distance travelled, and -0.2% to -1.6% (or +2.5% with rebound effect) of all passenger kilometres. [2]

B 3 ECONOMIC IMPACTS

		Passengers: Road	Passengers: Rail	Passengers: Air	Passengers: Public transport	Passengers: Slow modes	Transport operators: Road	Transport operators: Rail	Transport operators: IWW	Transport operators: Air	Transport operators: Maritime	Transport operators: Public transport	Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
B 3.1	Transport costs	→						→				→						L	R	S	L
B 3.2	Private income / commercial turn over													→	→			L	R	S	L
B 3.3	Revenues in the transport sector							→				→						L	R	E	
B 3.4	Sectoral competitiveness														→			L	R	S	L
B 3.5	Spatial competitiveness																				
B 3.6	Housing expenditures																				
B 3.7	Insurance costs																				
B 3.8	Health service costs																				
B 3.9	Public authorities & adm. burdens on businesses																				
B 3.10	Public income (e.g.: taxes, charges)																				
B 3.11	Third countries and international relations																				

B 3.I	Overall impacts on social groups	Possible reduction of transport costs for passengers, in case of reduced use.
B 3.II	**Implementation phase**	
B 3.III	**Operation phase**	
B 3.IV	**Summary / comments concerning the main impacts**	- Sectoral competitiveness of enterprise might be increased (mainly for service related jobs - IT based jobs), resulting from efficient and effective staff utilisation [9] - Possible saving of car operation and maintenance costs, in case of reduced use [7] [8] - Revenues for public transport operator might be slightly reduced, depending on mode choice - Possible additional private investment to set up home / mobile equipment, planning program, security and utility expenses [8] - Possible saving for the company due to decreased absenteeism, tardiness and turnover, and increased productivity [2] [8] [9]
B 3.V	**Quantification of impacts**	

B 4	SOCIAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 4.1	Health (incl. well-being)	↗	↗		↗	↗								↗				L	R	S	L
B 4.2	Safety	→												→				L	R	S	L
B 4.3	Crime, terrorism and security																				
B 4.4	Accessibility of transport systems																				
B 4.5	Social inclusion, equality & opportunities													→				L	R	S	L
B 4.6	Standards and rights (related to job quality)																				
B 4.7	Employment and labour markets														→			L	R	S	L
B 4.8	Cultural heritage / culture																				

B 4.I	**Overall impacts on social groups**	- Increased job satisfaction and quality of life expected [2] [4] [9]
B 4.II	**Implementation phase**	
B 4.III	**Operation phase**	
B 4.IV	**Summary / comments concerning the main impacts**	- Increased job satisfaction and quality of life expected. [2] [4] [9] - Slight increase of safety for road modes due to reduced congestion, if rebound effects are not there. [8] - Some employee categories may be excluded: equality not increased. [8] - Can improve employment opportunities for some disadvantaged groups. [8] - Possible positive impacts on employment. [2] [8] [9] - Improved employee productivity by reducing stress related to commuting. [8]
B 4.V	**Quantification of impacts**	

B 5	ENVIRONMENTAL IMPACTS	AFFECTED SEGMENTS																Geographical level		Source	
		Passengers					Transport operators						Employees in transport	Residents	Economy	Public bodies	Society	1st level	2nd level	Source of assessment	Spatial level of source
		Road	Rail	Air	Public transport	Slow modes	Road	Rail	IWW	Air	Maritime	Public transport									
B 5.1	Air pollutants													→				L	R	S	L
B 5.2	Noise emissions													→				L	R	E	
B 5.3	Visual quality of the landscape																				
B 5.4	Land use													→				L	R	S	R
B 5.5	Climate																→	L	R	S	R
B 5.6	Renewable or non-renewable resources																				

B 5.I	**Overall impacts on social groups**	- Impacts on air pollution [2] [3] [5] [6] [7] [8] [9]
B 5.II	**Implementation phase**	
B 5.III	**Operation phase**	
B 5.IV	**Summary / comments concerning the main impacts**	- Teleworking might impact on air pollution [2] [3] [5] [6] [7] [8] [9] - Climate change [3] [6] [8] and noise emission, in case of an overall reduction of trips. - It might encourage more dispersed land use (sprawl) [8]
B 5.V	**Quantification of impacts**	

C REFERENCES

C 1	**Other TPMs of this subcategory**	- Flexible working hours (often applied in combination)
C 2	**References** (detailed references are included in an alphabetical list placed in "List of References")	see below

International
[1] European Commission DG EMPL (2009q): Flexible working time arrangements and gender equality - A comparative review of 30 European countries
[2] European Commission (2003c): DEESD project: Telework and sustainable development A case study with the Global eSustainability Initiative (GeSI)
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[8] Victoria Transport Policy Institute, Telework (http://www.vtpi.org/tdm/tdm43.htm), CA
[9] Transport for London (2011): Smarter Working guide, London (UK)