EUROPEAN COMMISSION

DIRECTORATE-GENERAL
JOINT RESEARCH CENTRE

Report of the STTP Stakeholder Workshop on Road Transport (Passenger/ Freight)

Participants:

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European Commission: Remi MAYET (MOVE) [Chair], Frederic SGARBI (RTD) [Co-chair], Thomas REIBE (INFSO) [Co-chair], Paola CIELO (MOVE), Rein JURIADO (MOVE), Marcel ROMMERTS (MOVE), Gerhard TROCHE (MOVE), Hugues VAN HONACKER (MOVE), Panayotis CHRISTIDIS (JRC), Panagiota DILARA (JRC), Laura LONZA (JRC), Françoise NEMRY (JRC), Christian THIEL (JRC) [Rapporteur].

Venue: DM028, 08/67, 17 February 2011

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1. SCOPE OF THE WORKSHOP

The European Commission is currently developing a Communication on the Strategic Transport Technology Plan (STTP), which is foreseen for 2011. Its goal is to better align transport research and innovation with EU objectives. The STTP aims at proposing solutions for improved instruments of transport research, innovation and technology deployment processes at all levels of government and among all stakeholders (e.g. private, public, Member States, EU), including the definition of a governance structure for implementing the STTP. Following the approach of the Strategic Energy Technology Plan, the STTP would establish a technology roadmap identifying areas where joint European research and innovation efforts will bring the greatest European added value. The aim of the STTP is to match the most appropriate policy instruments to the needs of different technologies at different stages of the development and deployment cycle. It will address the entire innovation chain, from basic research to market uptake.

The involvement of the stakeholder and public community is crucial to reach a shared European vision on the STTP as the technology pillar of the White Paper.

2. SETTING THE CONTEXT

A presentation on the STTP provided the stakeholders with insights on: rationale, objectives, structure, preparatory phase and indicative planning as well as expectations from stakeholders' hearings. It was emphasised that the term 'technology area' within the STTP is a comprehensive set of methods, practices and technologies with a shared focus of application.

The discussion aimed at establishing (i) a clearer and realistic view on long term advancements in technology in a holistic perspective, (ii) a clearer view on resulting policy requirements including instruments and standards, (iii) suggestions for better management of innovation pathways, (iv) a clearer view on resulting financial implications.

Discussion during the workshop has been structured in accordance with the three main following interlinked transport policy objectives: (i) decarbonisation, (ii) internal market and competitiveness, and (iii) safety and security (see Appendix 1).

Stakeholders' advice is one of the inputs to the process leading to the STTP Communication. Other input including the feedback on a previously circulated questionnaire (see Appendix 2) was used for this hearing report. The hearing report focuses on the aspects of the input that meets the scope of the STTP. A subsequent public consultation will offer the opportunity to the broader public to provide input to the development of the STTP Communication.

3. SUMMARY OF MAIN DISCUSSION POINTS

The Road Transport Sector is the largest corporate R&D (research and development) investor in transport in Europe. European companies are among the world leaders in manufacturing road vehicles and components. R&D investments and more generally innovation are seen as essential to maintain its competitive position. A lot of the R&D investments is directed towards incremental improvements of products and services along the regular product/service renewal cycle. However, some of the R&D contributes to potential market deployment of step-change technologies that could significantly contribute to tackle societal challenges like reducing the climate change and energy impacts of the road transport system, but bear higher deployment risks.

The European Road Transport Research Advisory Council (ERTRAC), in its Strategic Research Agenda (SRA) (published in October 2010), outlines the following quantitative objectives for relevant policy fields for 2030:

Overall goal	Indicator	Objective
Decarbonisation	Energy efficiency in urban passenger transport	+80% (pkm/kWh)*
	Energy efficiency in long-distance freight transport	+40% (tkm/kWh)*
	Renewables in energy pool	Biofuels: 25% Electricity: 5%
Reliability	Reliability of transport schedules	+50%*
Safety/ Security	Fatalities and severe injuries	-60%*
	Cargo lost to theft and damage	-70%*

*versus 2010 baseline

It is widely acknowledged that the internal combustion engine will remain the dominating propulsion technology in the vehicle market at least until the 2030 time-horizon and potentially beyond in particular for heavy vehicles. R & D activities in the internal combustion engine, transmissions, auxiliaries, hybridisation, lightweight design, will continue to provide incremental improvements in the efficiency of vehicles. In the safety field, R & D in passive safety can help to incrementally improve the safety properties of the vehicles. The following large technology areas that have the potential to significantly contribute to reaching the European policy goals of decarbonisation, internal market, safety/security, as well as competitiveness and seamless mobility including the above mentioned quantified objectives are identified: (i) electrification of road transport including hydrogen fuel cell applications (Electrification), (ii) biofuels, (iii) intelligent transport systems (ITS), (iv) improvement of internal combustion engines. Continuous efforts are needed in further improving conventional vehicle designs and technologies. Additionally, non-technical measures can complement the above listed technology

improvement efforts. In the following sections the main options of technological and non-technological nature and their potential contribution to decarbonisation, the single market and competitiveness, and safety and security are described.

3.1. Decarbonisation/ Energy Security

The technology areas that can mainly contribute to the decarbonisation and energy security objectives are electrification, biofuels and further improvements of conventional vehicle designs and technologies. Improved logistics and non-technical innovation can also play a key role.

Electrification

Electrification of road transport is a potential step change technology, due to the much higher efficiency of electric motors compared to internal combustion engines, the absence of any tail-pipe emissions, as well as the potential to decarbonise the well-to-tank pathway via a parallel decarbonisation of the electricity generation mix. This path will also open the possibility to use alternative energy paths to secure mobility and make road transport more independent from crude oil (security of energy supply). The electrification of road transport is synergistic to the deployment of renewable electricity generation as demand management for vehicle charging could facilitate an increase in intermittent electricity. Full electrified road transport will probably be limited to passenger cars, light duty trucks, urban buses, as well as scooters for the medium term. For long distance freight transport on roads, electrification is not seen as a viable option for the short to medium term. Projections for the deployment of battery electric vehicles (BEV) and plug-in hybrid electric vehicles (PHEV) cover a large bandwidth, ranging from 0.5 to 2.5 million annual sales in Europe in the 2020 to 2025 timeframe.[1] A number of large automotive manufacturers have recently launched or have announced to launch BEVs and PHEVs in the 2010 to 2012 timeframe. Hybrid Electric Vehicles (HEVs) without plug-in capability are seen as a bridging technology towards further vehicle electrification (e.g. PHEVs, BEVs). Various levels of hybridisation are already commercially available and contribute now and in the future to the decarbonisation of road transport. For the foreseeable future, BEVs are considered to be limited in range as the energy density of batteries is low and is expected to stay low when compared with other energy carriers (gasoline, diesel, biofuels, hydrogen). Electrification of road transport especially for longer range requirements can also be achieved via fuel cell vehicles (FCV) and FCVs are seen as a complementary technology to BEVs. A small number of FCV prototype vehicles is currently operated in field tests. Market launch of fuel cell vehicles is envisaged for 2015 and beyond. A positive contribution of FCVs to decarbonisation is not a given, but requires large scale production of hydrogen via low-carbon pathways.

[1] SETIS (2010): Final report of the SET-Plan workshop on Electrification of Road Transport (see http://setis.ec.europa.eu/)

The following key barriers remain for electrified vehicles: (i) high cost of energy storage system leading to high cost penalty for the vehicles, (ii) customer education and willingness to adapt to new usage patterns or to accept range limitations, (iii) adequate standardised charging infrastructure. Further work on areas such as drivetrain optimisation, vehicle system integration, and vehicles to grid integration is needed in order to reach future full competitiveness of electrified vehicles. Within the Public Private Partnership (PPP) "European Green Car Initiative" (EGCI) these barriers and challenges are addressed through a mix of R&D funding and other instruments. Hydrogen fuel cell vehicles are part of an electrified road transport system and primarily considered to potentially contribute to the decarbonisation of passenger road transport especially for larger passenger cars that are typically used for longer distance trips and for fleet applications (buses, utility vehicles). For long distance road freight transport, fuel cells could be used as auxiliary power units. Before hydrogen fuel cell vehicles can achieve market maturity, major technology and cost related challenges need to be overcome. A positive decarbonisation effect can only be reached, if hydrogen production is predominantly done via low carbon pathways. Furthermore, a larger scale deployment of hydrogen fuel cell passenger vehicles requires an adequate widespread hydrogen refuelling infrastructure in Europe. The PPP "Fuel Cells and Hydrogen Joint Technology Initiative" has been created to tackle these challenges.

Biofuels

Biofuels could have a positive impact on the entire vehicle fleet by the introduction of low blending grades. The introduction of lower blending grades is promoted by the Directive on Renewable Energy Sources (2009/28/EC) and supported by the Fuel Quality Directive (2009/30/EC). While low blend biofuels can be used by current internal combustion engines, higher blend fuels or multiple fuels can be used in specifically adapted new vehicle engines/drive trains, only. Several manufacturers offer already selected engine variants that are adapted to higher blend fuels or multiple fuels. Higher blend biofuels are currently a niche market in Europe. For long distance road freight transport, biofuels are probably the most important option for decarbonisation. It needs to be noted that biofuels are also a realistic medium to long-term option for other transport modes, notably air transport. The currently available first generation biofuels are controversial from a sustainability point of view because of their impact on the environment, biodiversity and water resources, land use changes, real GHG emission reductions and cost of avoided CO2 emissions. More promising from an environmental perspective are second generation biofuels, for which small scale prototype production facilities exist. These fuels can be produced from agricultural and other wastes.

Apart from the technical challenges that remain for the production of 2nd generation biofuels, their cost competitiveness is a key barrier. Within the SET-Plan the recently launched "European Industrial BioEnergy Initiative" aims amongst others to bring to commercial maturity the most promising technologies, in order to permit large-scale, sustainable production of advanced biofuels. A separate stakeholder hearing focusing on Fuels and Energy for transport, held on 15 February 2011, covered biofuels in more detail.

Improvements of conventional vehicle designs and technologies

This area remains a key priority for long distance freight road transport for the future. For passenger vehicles, the further improvement of the internal combustion engine should continue to be encouraged. Adaptations of powertrain technologies need to ensure capability to use future fuels such as high blend biofuels. Work to further reduce the resistance to motion as well as to increase recovery of waste energy can support incremental improvements in the energy efficiency and hence carbon footprint of vehicles. R&D activities on these technologies are also supported by the EGCI. Some potential innovations such as longer heavy duty trucks up to 60t GCW (Gross Combined Weight) or aerodynamic optimisation of heavy duty trucks could be supported by adapting the Weights and Dimensions Directive (96/53/EC).

Logistics, ITS and non-technical innovation

More energy efficient logistic chains can contribute to reaching low carbon society objectives, including through optimised vehicle loading, cross-modal optimisation of freight transport, and better functioning of distribution centres as interface between long distance goods transport and door-to-door delivery. ITS technologies can contribute to such a goal. They can also contribute to reduce congestion in roads through improved infrastructure management. While relatively simple ITS devices are currently installed in cars and trucks, truly cooperative systems could enhance the impact of ITS on reducing the carbon footprint of road transport in the future. These are described in more detail in section 3.3. Non technical innovation can play an important role. For instance eco-driving is seen as a cost efficient measure to reduce the carbon intensity of the entire vehicle fleet both for passenger and commercial road transport. This can be enhanced through driver and vocational training. For the logistics sector, an increase in the load factor as well as cross-modal optimisation of goods transport are a promising way to reduce GHG emissions. The cross-modal aspects have been addressed in more detail in a dedicated stakeholder hearing on logistics, urban mobility and intermodality, held on 28 February 2011. In the logistics sector, the scattered market and in average small size of logistics operators can hamper market take-up of new technologies. To spur innovation in this sector, an EU programme for small hauliers on the use of best available technologies to improve the energy efficiency of their vehicles, fleets and logistic processes could support decarbonisation in commercial road transport while establishing a level playing field in this sector across the EU.

3.2. Internal Market and competitiveness

Innovation is a key factor for maintaining the competitiveness of the European road transport manufacturing industry on the global markets. For commercial road transport undertakings which operate in the internal market, innovative ITS applications can also support more cost-effective enforcement policies which are crucial to create a level playing field and reduce administrative burden.

Competiveness on the global markets

Innovation and deployment need to be supported by regulatory framework conditions through standardisation or regulation, including at international level, to avoid technological fragmentation, ensure interoperability, but also to enable European businesses to fully benefit from the entire European market, and to create worldwide market opportunities. In order to maintain its competitive position, the European transport manufacturing industry also needs to work on improving its logistics and supply chain management in a global perspective, seek ways to modularise and make more flexible its production processes in order to be prepared for a future more diversified product and powertrain mix.

ITS

Interoperable ITS devices can foster the single market through automation of control checks and law enforcement. In logistics, they can furthermore support deproliferation of components such as automatic tolling devices, reduce administrative burden through the e-Freight concept and increase efficiency in long distance goods transport. ITS could play an important role for overcoming modal barriers and enabling a seamless cooperation between various transport modes. While logistics operators currently suffer from a variety of non-harmonised road tolling devices in the EU, this should be overcome by the implementation of the Directive on the Interoperability of Electronic Road Toll Systems (2004/52/EC). Further studies on the legal and technical aspects to use ITS in automated control and enforcement through a harmonised EU wide approach in the single market are needed. More integrated cooperative ITS devices are described in section 3.3.

3.3. Safety and security

Improving safety and security on European roads is addressed through a systemic approach that includes users, vehicles and infrastructure. It combines measures such as regulations, standards, technology R&D and deployment, and training and education. In particular, measures that aim at enforcing compliance to safety relevant rules as well as driver training can have a considerable effect on further reducing road accidents.

In terms of technologies, ITS is seen as a main enabler to enhance safety and security as well as reliability on European roads while also contributing to the decarbonisation objective. Further improvement of vehicle designs and infrastructure management must continue to play a role.

ITS

Specific ITS functions could positively contribute to the EU road safety objectives through enabling active safety systems but also supporting law enforcement. In the logistics sector, ITS can facilitate tracking of goods, also addressing security aspects. ITS can enable infrastructure capacity management. GALILEO can further add value to

promising ITS functions. Ultimately, as a long term vision and through full exploitation of potential future advancements in cooperative systems, vehicle platooning could massively improve road safety, transport efficiency and infrastructure throughput. While stand-alone intelligent communication technology based safety features are commonplace in today's vehicles (e.g. ABS, ESP), advanced environment sensor based technologies like lane departure warning, traffic sign recognition, or blind spot detection are beginning to be deployed by a number of manufacturers. Truly cooperative systems like vehicle to vehicle or vehicle to infrastructure communication could magnify largely the societal benefits of ITS. They are still in an R&D stage.

For a broader deployment of ITS, technical challenges remain as well as cost and infrastructure issues. The fault tolerance and reliability of safety critical sensors, actuators, controllers, and communication devices needs to be improved in order to reach more autonomous driving functions and vehicle systems. Research in Human Machine Interface (HMI) aspects and design is an important field in the context of increased ITS use as driver distraction is a potential issue. Data security and privacy issues need to be addressed. Liability aspects and other legal aspects of systems with higher autonomy need to be studied. Adequate business models for technically promising ITS applications and functions need to be found. International standardised communication interfaces between infrastructure, vehicles and other modes would be needed. The EU "Intelligent Car Initiative" addresses many of the above listed issues and aims at accelerating the deployment of intelligent vehicle systems on European and international markets, using a mix of policy, research and communications instruments. The PPPs ENIAC (European Nanoelectronics Joint Undertaking) and ARTEMIS (Embedded Systems Joint Undertaking) both support, amongst others, the development of enabling technologies for ITS. A dedicated stakeholder hearing, held on 14 February 2011, covered ITS applications across modes. Another dedicated stakeholder hearing, held on 28 February 2011, covered in more detail logistics, urban mobility and intermodality.

Improvements of conventional vehicle designs and technologies

Besides the above described technologies that focus on active safety features, further improvements of passive safety features are expected through materials research and further progress in research on restraint systems. Deployment of seat belt reminders can complement enforcement of mandatory seat belt use. The protection of vulnerable road users including two-wheelers has gained high attention in Europe. Analyses of accident data and traffic safety as well as the use of crash models including improved biomechanical model components are an important enabler to further steer R&D work in passive and active safety systems.

Infrastructure

Infrastructure in the form of roads and multi-modal interfaces are an enabler for a more efficient and safer road transport system, but also a current and future bottleneck in the light of the future transport demand projections on the one hand and the limited funding for infrastructure investments on the other hand. Besides the above outlined infrastructure aspects of vehicle to infrastructure communication and vehicle to grid integration, a

number of dedicated infrastructure related measures exist. These focus on increasing the durability and reducing the necessary maintenance efforts for European roads. Safety related features include self-explaining roads and forgiving infrastructure.

3.4. The way forward

Overall, a system approach that takes into account the full R, D & D (research, development and demonstration) cycle including innovation aspects is necessary to advance the main identified technology areas towards deployment. The set-up of PPPs such as the EGCI is seen as a successful way to implement R, D & D work at European scale. Aligning the long-term vision as expressed in the main policy fields with R, D & D programmes is important. An adequate balance needs to be found in the case that policy goals are not synergistic. Financing and risk are perceived as main barriers for R, D & D and consequently innovation. Appropriate consideration of market drivers and competitiveness is fundamental and can be supported through a system approach covering the full innovation chain. Standardisation is an important measure in this context as it can reduce proliferation and related costs, support the single market and hence critical mass. Public procurement can help to establish lead markets for innovations.

4. CONCLUSIONS AND NEXT STEPS

The envisaged approach of the STTP as a European research framework for transport, aligning transport research and innovation with EU objectives, namely decarbonisation, the single market and competitiveness, and safety and security, was reinforced by the stakeholder feedback. Continuation of R & D efforts in incremental improvements of conventional vehicle technologies is needed as market maturity and penetration of promising step-change technologies will take time. The following promising large step-change technology areas for road transport are identified: electrification, biofuels, ITS, improvements of internal combustion engines together with support to innovation in the field of logistics. A number of non-technical measures such as standardisation, public procurement, user information, and education and skills have been suggested. They address typical deployment challenges and could foster innovation in road transport.

The input of this stakeholder hearing will be used by the Commission Services as one of the inputs for the preparation of the STTP communication and its related Staff Working documents. More stakeholder hearings on various other topics will be held in February and March. The public consultation will offer another opportunity for the broader public to give input in the preparation of the STTP. The STTP communication is foreseen for 2011 and will be the start for the subsequent STTP implementation.

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APPENDIX 1

AGENDA

Stakeholder Hearing
Road Transport

Thursday, 17 February 2011, 09.30 – 13.00
Meeting Room DM28 08/67

Chairpersons: *R. Mayet*, DG MOVE
F. Sgarbi, DG RTD
T. Reibe, DG INFSO

09.30 – 09.40	Welcome and introduction of the participants (*Chairs, All*)
09.40 – 10.00	Objectives of the STTP, purpose of the hearings (*M. Rommerts,* DG MOVE)
10.00 – 11.30	Stakeholder feedback on how technology, research and innovation can help achieving § Decarbonisation § Single market (*All*)
11.30 – 11.45	*Coffee break*
11.45 – 12:30	Stakeholder feedback on how technology, research and innovation can help achieving § Safety and security (*All*)
12.30 – 12.50	Discussion of innovation obstacles, barriers and the potential role of EU intervention (*All*)
12.50 – 13.00	Summary and concluding remarks (*Chairs*)

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APPENDIX 2

QUESTIONNAIRE

These questions are designed to facilitate the exchange of views with the independent scientific review board regarding key technology and research areas. We would appreciate, if you could send us your answers to the questions 1 week before the meeting. Please answer them in the way you consider most appropriate to convey your key messages. It would be helpful, if you could identify to which mode/technology area your answer relates to. To help answering the questions some suggestions are given regarding what could be explained under each question.

1. TRANSPORT VISION AND ACTIVITIES

1.1. Current state of play within transport?

Indicate: market readiness/penetration of the different technologies within the activity area for each mode or cross-modal issues; on-going or planned public, public-private or private initiatives relevant for the STTP; type and scale of initiatives at which level - International/EU/MS/Regions

1.2. Likely evolution of transport?

Indicate: major trends in the transport sector (technology and actors); evolution of transport needs (volume and quality); likelihood of structural changes as a result of new business models, globalisation, competition; influence of the market structure on future market potential; possible effects of legislation etc

1.3. Key technology penetration targets (2020, 2030, and 2050)? What are the main assumptions underlying these estimates? What are the main barriers to overcome to achieve them?

Indicate: main constraints and showstoppers, risks, needs for technological breakthroughs, resource/feedstock availability, consequences for the current infrastructure, etc

1.4. If these targets are met, what will be the contribution to EU policy goals?

Indicate: Contribution to (1) greenhouse gas emissions reduction (e.g. CO_2 reduction), (2) security of supply (e.g. imported fuel savings), (3) competitiveness (e.g. future market sizes for a given technology, European share of new market, additional jobs, export revenues), (4) safety, (5) other policy goals (such as reduction of congestions, local/urban pollution, damage to cultural heritage)

1.5. Contribution to the overall (‘well to wheel’) energy efficiency?

Indicate: Effects on energy efficiency in electricity and fuels supply, as well as in use; evolution over time and depending on market penetration, etc

1.6. Are there any interactions with other community policies and initiatives?

Indicate*:* Potential contribution of the technology to other EU policies; need for measures and initiatives in other policy areas to support the market penetration of the technologies

1.7. Which are the main competing or synergetic technologies within the activity area? (in relation to the indicated market penetration targets)

2. ACHIEVING THE VISION

2.1. Is your vision achievable under a 'business as usual' scenario?

Indicate*:* Current support programmes and policy measures and their expected impact

2.2. Are there barriers to innovation? Is there a need for change in the innovation system?

Indicate*:* For the mode in question any weaknesses in the current system

2.3. Does the considered mode/sector already benefit from or plan to set-up initiatives to bridge the gap between the current state of technology and a cost-effective market entry? What would be the critical mass (e.g. investment) needed for such initiatives? What new approaches could be considered to accelerate innovation?

Indicate*:* i.e. how could the STTP help the sector; which actions of it would be most effective; what impact could be expected with respect to 'business as usual (i.e. No STTP)?

2.4. What actions need to be carried out at European level? What actions would be better implemented at national and or regional level? Is there a need, or a potential benefit, to integrate or to better coordinate action carried out at different levels?

2.5. International Dimension - Is there a potential for international cooperation? What type of cooperation?

Indicate*:* Major initiatives in other countries; assessment of specific opportunities for international cooperation

3. SECTOR SPECIFIC QUESTIONS:

Road transport:

1. Do you see for road transport the need for additional initiatives at European level beyond the European Green Cars Initiative, the FCH JU, ARTEMIS, ENIAC, the Bioenergy Initiative, and the Electricity Grids Initiative? If yes, then please describe what kind.
2. Is there a need for road transport to establish overarching coordination with other modes/ sectors in ITS to overcome barriers and to leverage the full potential of ITS related services and functions?
3. For freight transport, is there a need for coordination or guidance of innovation activities? Which would be the suitable instruments?

APPENDIX 3

List of respondents

- ACEA - European Automobile Manufacturers' Association
- CEDR - Conference of European Directors of Roads
- CLECAT - European Association for Forwarding, Transport, Logistic and Customer Service
- ERTRAC - European Road Transport Research Advisory Council
- EUCAR - European Council for Automotive R&D
- FIA – Fédération Internationale de l'Automobile
- IMPACTS
- IRU - International Road Transport Union
- POLIS - European cities and regions networking for innovative transport solutions