Freightvision

EFP Brief No. 226

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Sponsors: DG TREN, FP7
Type: European – sectoral
Organizer: Austria Tech
Duration: 2008-2010 **Budget:** 4M € **Time Horizon:** 2050 **Date of Brief:** Nov 2012

Purpose

The project goal was to develop a long-term vision and action plan for a sustainable European long-distance freight transport system by 2050, covering both transport policy and research and technology development policy. It aimed at bringing new knowledge (e.g. on climate change), perspectives (including from outside the transport sector) and stakeholder groups into an established field. Creating channels for communication between participants from business, policy, civil society and R&D to overcome sectoral boundaries was an explicit goal from the beginning.

Adjusting Long-distance Freight Transport to Old and New Challenges

The European Union faces the challenge to ensure economic growth and cope with limited transport infrastructure as well as increasing demand for freight transport in the years and decades to come. At the same time the transport system is supposed to become sustainable with a decreasing impact on climate change.

The *Freightvision* foresight focuses on a subset of sustainability aspects that are currently considered the most critical ones with regard to a sustainable European transport system and have failed to meet sustainability standards so far. These aspects are greenhouse gas (GHG) emissions, the share of fossil fuels, road fatalities and traffic congestion. They have been addressed specifically in the mid-term review of the European Commission's 2001 transport white paper.

The Commission's 20-20-20 goal to reduce GHGs and fossil fuel consumption and increase the share of renewable energy sources by 2020 along with the longer-term goal to reduce GHG emissions to 80% of the 2005 baseline by 2050 are tremendous challenges for the transport sector and particularly for freight transport.

DG TREN (MOVE) reacted to the overall goal and elaborated a new white paper. The financial crises and the rapid rise in energy prices led to new perspectives. Forecasts used before were outdated and business as usual scenarios had to be reconsidered.

Aligning Freight Transport with Climate Change Mitigation

The foresight focussed on long-distance freight transport in three modes: road, rail and inland waterways. The time horizon was set to 2050 in order to take into account climate change mitigation goals and the life cycle of infrastructures. Sustainable development should be envisaged in terms of GHG/CO_2 reduction, reduction of fossil fuel use, less congestion and traffic accidents (particularly on roads).

The aim to develop a vision of long-distance freight transport in 2050 was understood in two different ways: (a) in the sense of concrete targets for 2020, 2035 and 2050 and (b) as a visualisation of the future of sustainable freight transport in 2050 based on stakeholders' expectations.

The tangible output of the project was to consist of an action plan with recommendations for transport policy as well as for research, technology and innovation policy.

Complementary Approach to Foresight

The *Freightvision* foresight was designed as a *complementary foresight* process. The process accompanied the whole project and assured that stakeholders' expertise and perspectives were integrated into the support action.

The *complementary approach* genuinely combined methodology, role and task sharing to capitalise on the

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capabilities of transdisciplinary research, foresight expert advisory and (trans-) organisational development counselling for complex projects settings.

The project was to profit from the team's *complementary expertise* on:

- Transdisciplinary research: Expert knowledge about the transport sector as well as the socio-economic and policy issues involved here. In particular, climate-related adaptation and mitigation expertise was brought into the stakeholder fora.
- Foresight methods and techniques: Designing tailor-made foresight processes that encompass a fully fledged foresight process with appropriate techniques for the exploratory and normative phases.
- (Trans-)Organisational development (OD) counselling: Orchestrating knowledge flows and network building in large group settings, such as the fora.

Integrating Modelling into Deliberative Foresight Processes

In *Freightvision*, results from several quantitative models were fed into the participatory foresight processes. The results of energy models informed the oil price scenarios; a congestion model and a CO_2 emission model were used to analyse the impacts of reduction scenarios and assess policy measures.

Because the project provided a strong quantitative evidence base and integrated different strands of evidence by involving practitioners and including scientific expertise, deliberative participation and learning in large group settings led to well-founded results.

Stakeholder participation in this case was defined as invited representatives from research, business, policy and civil society taking part in a strategic dialogue on long-term issues. The stakeholders were explicitly involved as 'experts' based on their practical knowledge. The expertise of participants was treated as deliberative input to shape the content and tangible results of the foresight process, leading to robust scenarios, recommended action plans, visions and background reports.

To accentuate the expert role, attendance was mainly by personal invitation. The foresight process involved more than 100 representatives from the EC, ministries of the member states, advisory councils, technology platforms & ERANETs, freight forwarders and logistics companies, infrastructure operators, industry, trade, cargo owners, vehicle technology and energy suppliers, environmental and other non-governmental organisations (NGOs) as well as trade unions.

The project intended to take a holistic approach that addressed all aspects of the future challenges, i.e. infrastructure, ITS, propulsion systems, vehicles, fuels, interoperability etc., and considered all types of criteria in the solution: research, technologies, policies and pricing. The invitations were issued so as to ensure that a balanced mix of participants represented all relevant areas and that no group of stakeholders or mode of transport was over- or underrepresented.

The *Freightvision* process was organised in four highly interactive stakeholder expert meetings (fora) with up to 90 participants in each one. Given the large group settings, the goal of encouraging deliberation and the network-building function of the fora, the foresight relied on an overall architecture that had to be tailored to purpose. The methods applied in the group process were borrowed from the field of organisational development (OD) research, which focuses particularly on changes in the thinking and action of stakeholders. Applying OD concepts and instruments throughout all phases of the foresight aimed to maximise interaction, collaboration, deliberation and learning among stakeholders.

The four fora took place during a 12-month period from 2009 to 2010. They were designed around participative sessions where a maximum of 10 participants were seated at a table and each table discussed specific questions under the auspices of trained moderators. The stakeholders discussed project results, refined, adjusted, integrated and assessed the work of the project consortium, and collectively developed scenarios, visions and an action plan.

Modelling was used in four cases:

(A) Long-term development of energy prices were taken from the Primes and PROMETHEUS model.

(B) Forecasts from the Progtrans European Transport report were used to predict transport demand.

(C) The TRANS-TOOL model was used for a congestion trend forecast for 2035. Making certain assumptions for the shorter term, the model was not flexible enough to properly capture longer-term developments as it was restricted to a limited network infrastructure of roads and railways.

(D) A model for long-distance freight transport emissions and energy consumption was developed by the Finnish partner, SYKE. The model helped estimate the emissions and energy consumption of future transport systems described in the business-as-usual forecast and the backcasting exercise. The model maintained flexibility in accounting for different combinations of vehicles, technologies and fuels.

The model results – although often described as "forecasts" – were never used in the sense of predictions since such forecasts are most likely to be wrong. Instead, the results were used as a basis for discussions and a means of becoming clear about dimensions and relations (e.g. the emission reduction potential of transport modes). Awareness was raised that while model assumptions have to be made explicit, they are necessary to come to a manageable amount of scenarios in the process.

Foresight Toolbox

The projects led to a fully fledged foresight process including methods and techniques such as desk research, modelling, visioning workshop, scenario development, backcasting, wild card analysis and impact assessment. Figure 1 illustrates how the methodologies and particularly how modelling was integrated into the foresight process. Modelling was a part of each step of the project. The foresight forum meetings took place after each project step, and the modelling results and other findings were used and discussed in the fora. Apart from publishing research results in detailed work package reports, more comprehensive briefing documents (management summaries) were sent out to the participants prior to the fora to make knowledge flows more effective and transparent.

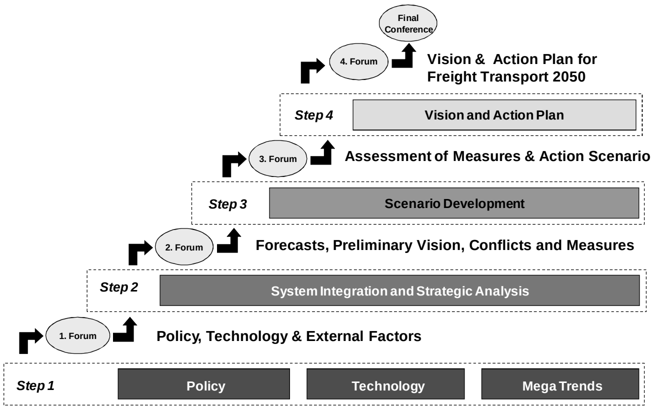

Figure 1: Integrated foresight design linking fora and project steps

Reducing Greenhouse Gas Emissions as Major Driver

The process resulted in three stylised projections for each of the four sustainability criteria *GHG emissions*, *the share of fossil fuels*, *congestion* and *accidents* by 2050. The project proposes a long-term vision and a robust and adaptive action plan, developed in a joint effort by the project team and relevant stakeholders, for both transport and technology policy for sustainable long-distance freight transport in Europe.

Reaching the GHG reduction targets when taken seriously will have a tremendous impact on freight transport. It became clear that the EC goals for reducing GHGs will be the most important driver of freight transport policy over the coming decades and can be expected to dominate other EU-level transport policy issues, such as congestion and accidents. Containing GHGs from road transport will require the most efforts in the process. The modelling exercise showed that, even if volume could be doubled and electricity is produced by low carbon sources, rail freight transport would only contribute to reduction targets to a rather small extent.

Visioning Quantifiable Targets

Quantifiable targets for the sustainability criteria (Tab. 1) were formulated in correspondence with the models where available. Targets were set for GHG emissions, the share of fossil fuels, congestion and accidents. Preliminary targets were assessed based on the action scenario (developed in a backcasting exercise), a conflict and feasibility analysis and a wild card analysis.

Sustainability Criteria	2020	2035	2050
GHG Emissions (compared to 2005)	-20%	-70%	-80%
Fossil Fuel Share (reduction to this level)	80%	60%	40%
Congestion (compared to 2005)	-17%	-33%	-50%
Road Fatalities (compared to 2005)	-40%	-65%	-80%

Table 1: Targets for reducing GHG emissions, the share of fossil fuels, congestion and road fatalities

Solution Strategies and Controversies

Greenhouse Gas Emissions Dominates Debate on Policy Measures

GHG-reduction goals are tremendously challenging and dominated the debate about policy measures. Some of the most important conclusions were:

- A modal shift from road to rail would have a limited effect only. The relative importance and potential remedy of shifting freight from road to rail transport was heavily discussed. Quantitative modelling showed low potential for increasing the currently relative small portion of rail traffic substantially.
- Gigaliners, praised by some as highly efficient, can play only a small role in reducing GHG emissions effectively.
- Road transport is the main producer of GHG emissions and demands substantial action.

Solutions for GHG Reduction in Freight Transport

The normative part of the foresight produced 36 measures related to road transport, rail transport, inland waterways and maritime transport, supply chain, energy supply and vehicle suppliers. Some of the most important solutions for the reduction of GHG based on the SYKE model were:

- Improved aerodynamics of trucks was identified as a very effective technological measure although existing norms hinder the dissemination of such improvements in road transport.
- More efficient logistics has to contribute 25% to GHG reduction if targets are to be met.
- Electrification of long-distance road transport would be necessary to reach the required reduction targets, which is a very challenging task in the light of the present absence of appropriate technologies, particular in storing non-fossil energy for trucks.

Table 2: Key characteristics and the most effective policy actions

Transport Performance
• Network optimisation
• E-freight
• Transport route planning & control
Vehicle Energy Demand
• Aerodynamics and rolling resistance
• Best available technologies
Low Carbon Electricity
• CO_2 labelling
• Taxation of fossil fuels
Electric Energy in Road Transport
• Improved batteries
• Taxation of fossil fuels
• Investment in road infrastructure
Biofuels
• Clean vehicle technologies II – biofuels
• Taxation of fossil fuels
Efficient Usage of Vehicles
• Transport consolidation & cooperation
• Training for eco-driving
• Liberalisation of cabotage
Engine Efficiency
• Integration of CO_2 standards into HGV regulations
• Best available technologies
Modal Split
• ERTMS
• Intermodal transport
• Internalisation of external costs
Electrification of Rail
• Electrification of rail corridors
• CO_2 labelling
• Taxation of fossil fuels
Truck Weights & Dimensions
• Modification of HGV rules Weights & dimensions
• Investment in road infrastructure
Infrastructure Capacity
• Investment in ITS
• Investment in road infrastructure
Transport Costs
• Internalisation of external costs
• Congestion charge
Fatalities per Vehicle km
• Investment in ITS
• Harmonised speed limits
• Training for eco-driving
• Enforcement of regulations

Controversial Issues Laid Open

Given the challenging but feasible reduction targets for GHGs, all of the above-mentioned policy actions would have to be implemented within a four-decade time span. Obviously, this has a number of critical implications both in terms of single actions as well from a systemic perspective.

The advantage of a large group in a foresight process is the involvement of a broad range of policymakers and stakeholders, who are key players in shaping the future. To reach a shared vision for the future is probably the most critical factor for a transition to take place. Participation of key players increases the potential to reach consensus and form new networks or link existing ones to face new challenges.

At the same time, working in large groups increases dissent. Necessary changes might threaten established positions and networks. However, carefully planning each forum can limit the threat of conflicts that might undermine the success of the foresight process.

In *Freightvision*, controversies between stakeholders and within the Commission went beyond what would be expected for a FP7 project that has no direct influence on formal stakeholder consultation processes. Some stakeholders of the rail mode were particularly critical as the role of rail transport in reducing GHGs turned out to be less important than expected. However, the detailed process design, its transparency and the clear communication of the results of the qualitative and quantitative research helped to keep controversies at a constructive level during the project.

Sources and References

Freightvision website **http://www.freightvision.eu/**

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