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## FreightVision Austria 2050

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**Authors:** Beatrice Rath [Beatrice.rath@ait.ac.at](mailto:Beatrice.rath@ait.ac.at)  
Claus Seibt [claus.seibt@austriatech.at](mailto:claus.seibt@austriatech.at)

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**Organizer:** Austrian Institute of Technology GmbH (project coordinator),  
University of Applied Sciences Upper Austria, Vienna University of Economics and Business  
ProgTrans AG (Switzerland), TRANSVER GmbH (Germany)

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### Purpose

The project Freight Vision Austria 2050 (FVA2050) aimed at providing a foresight study of freight transport and logistics futures in Austria by 2050. The intention was to explore the future of freight transport and logistics in particular, looking at technological progress and future innovation opportunities. A second aim was to outline a shared vision of an Austrian freight transport system by 2050 that would achieve European as well as national environmental and transport policy targets. The project FVA2050 was structured similarly to the European project FreightVision Europe (FVE 2050). FVA2050 was commissioned by the innovation section of the Austrian Ministry of Transport, Innovation and Technology. The objective was to set priorities and give a synopsis of key technologies and future innovation opportunities.

### Coping with Increasing Demand for Freight Transport

Similar to economic growth, demand for freight transport in Europe is expected to double by 2050. As integration of the European internal market progresses and Europe represents one of the most competitive economic regions of the world, export industries all over Europe are expected to grow. This will particularly concern small, export-oriented national economies at the centre of Europe, such as Austria, which are strongly affected by freight transportation.

Experts estimate that freight transport will increase across all transport modes. Rising pressure on infrastructure capacity, an increasing environmental burden and upcoming conflicts over failing to achieve CO<sub>2</sub> emission and noise reduction targets are likely. However, from a regional perspective, increase in transport demand might not affect the overall transport network in Austria apart from the main traffic axes. FVA2050 was informed by the general vision of the European Commission for a most competitive and sustainable transport system in Europe. This includes "growing transport and supporting mobility

while reaching the 60% CO<sub>2</sub> reduction target" (European Commission 2011, p.5). However, priorities from a regional perspective may differ from those defined at the European level. Other environmental policy targets, such as particulate matter or noise and vibration reduction, can be considered equally important.

Most freight transport in ton/kilometres is regional and not long distance freight transport. From a regional perspective, future scenarios revolving around re-regionalisation are thus more feasible than scenarios based on internal market integration and globalisation. From a regional point of view, traffic congestion is a problem of infrastructure bottlenecks and not of the overall European transport network. The main challenge here is to coordinate environmental and transport-related policy targets across different policy levels and policy areas.

### Stakeholder and Expert-driven Approach

The FVA 2050 project pursued an expert-driven, forward-looking approach. Stakeholders and experts from different areas relevant to freight transport in Austria participated. Among them, in particular, demand-side actors



from transport and logistics companies, but also researchers, NGOs and public administration representatives at the national and the state level (*Länder*). The aim of FVA 2050 was to explore possible futures of freight transport and logistics in Austria up to 2050. The participating stakeholders and experts outlined a shared vision and, in the process, blueprinted structural change in the freight transportation system to achieve the European CO<sub>2</sub> emission targets and other transport and environmental policy objectives, such as minimising road fatalities, abating noise and particulate matter pollution and reducing congestion. Ideas and opinions on how to transform the current freight transport system towards this vision were discussed in detail, particularly ideas concerning technology and innovation pathways towards the future.

### Scenarios and Socio-economic Trends and Trend Breaks

In the first workshop, the initial task was to outline framework scenarios describing possible socio-economic futures that reflect the social and economic environment in which freight transport and logistics activities can be imagined to take place in the future. Four framework scenarios came out of this exercise: two scenarios reflecting current socio-economic trends and two scenarios taking potential trend breaks into account. Drivers, trends and trend breaks were jointly investigated. The experts drafted storylines for socio-economic scenarios in group exercises and later developed them into coherent future stories:

- Trend scenario “Growth and liberalisation”
- Trend scenario “Growth and regulation trends”
- Trend break scenario “Oil & energy price shocks”
- Trend break scenario “Regionalisation & shrinking”

In the second foresight forum, the participants identified relevant technology and innovation pathways towards the future from a present point of view and perspective. They assessed options and obstacles of technological progress from the present to the future and opportuni-

ties for future innovations, considering the socio-technical context embedding and the socio-economic conditions shaping them. The final task of the second foresight workshop was to sketch out a shared vision of a structurally changed freight transport system for Austria that would allow to attain the different policy targets by 2050.

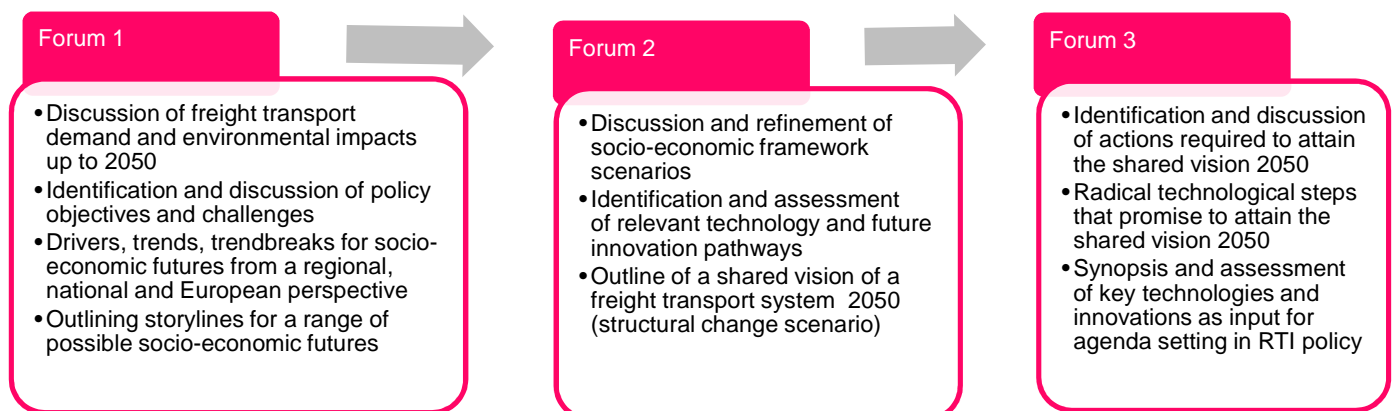
The third foresight workshop was dedicated to further specifying the vision of a structurally changed freight transport system by 2050, including the main actions necessary to achieve it. However, in the end, the focus was mainly on technological steps towards this vision. The main mission of FVA 2050 was to identify relevant priorities for the upcoming process of setting the national technology research agenda for research and innovation funding. A final, rather normative exercise allowed to define more radical technological steps. The incremental key technology and innovation opportunities initially identified by an explorative method were thus complemented by a range of blue-sky and out-of-the-box technology and far horizon innovation opportunities.

The foresight exercise created a vision for a structurally changed Austrian freight transport system by 2050 and drafted a range of socio-economic framework scenarios. Finally, the major outcomes were a synopsis and a prospective assessment of key technologies and future innovation opportunities up to 2050 and beyond.

Around 80 experts and stakeholders of the Austrian freight transport system participated in FVA 2050, an average of 30 participants in each workshop. The foresight was implemented by a consortium of six partners: the AIT Departments Foresight & Policy Development and Mobility, the Department of Logistics at the University of Applied Sciences in Upper Austria and the Department of Production Logistics Management at the University of Economics and Business in Vienna.

ProgTrans AG from Switzerland delivered a transport demand outlook for 2050. Transver GmbH delivered an environmental impact assessment referring to the transport demand trends of ProgTrans AG.

Most partners had already been involved in the European funded foresight FreightVision Europe (2007–2009).



They were thus invited to propose a similar forward-looking and foresight activity for Freight Transport and Logistics 2050 and beyond in Austria. The Ministry of Transport, Innovation and Technology (bmvit), the two

major Austrian funding agencies (FFG, AWS) and the two major national rail and road infrastructure operators (OEBB, ASFINAG) assisted the foresight. They were all involved in an advisory board.

## Shift to Rail versus Electrification of Road Transport

The foresight study Freight Vision Austria 2050 was performed during three large stakeholder workshops. Most of the stakeholders participated in all three workshops, which gave the exercise a particular continuity. Prior to each workshop a discussion paper was drafted by the consortium members and distributed among the participants. This discussion paper was based on desk analyses and outcomes of the preceding workshops.

The future dialogue started with an intensive discussion of the transport demand outlook presented at the first workshop. The prognosis anticipated a doubling of freight transport demand by 2050. This growth in freight transport demand can be expected to lead to a relevant increase in transport activities across all transport modes. An increasing shift to rail transport and even a bigger increase in road transport is estimated. Inland waterway transport is expected to remain at moderate levels due to exterior infrastructure.

The transport demand outlook and the projections of freight transport activities by 2050 were discussed controversially. On the one hand, the experts agreed that a significant increase in transport could be expected to come with economic growth. On the other hand, the experts questioned the anticipated doubling of trans-European freight transport, pointing out that a return to a regionalisation of production networks and supply chains could change the trend. However, the outlook gave definite alert that freight transport is expected to increase until 2050. Particularly on the main axes, transport infrastructure capacities in Austria may not at all be prepared to accommodate such growth.

The rather controversial discussion in the beginning motivated the preparation of four distinct socio-economic framework scenarios. At first, storylines were developed and elaborated into coherent stories of potential socio-economic futures. In a second step, the scenarios were discussed regarding their overall feasibility. For example, the scenario on growth and liberalisation was assessed as less feasible than initially expected. The experts did not perceive it to be an option to leave freight transport futures to liberal markets alone; regulation and public policy were considered just as necessary to cope with increasing freight transport demand. Thus the second trend scenario on growth and regulation was seen as more feasible than the first scenario of full market liberalisation. The experts anticipated a future of European freight transport where the primacy of the "free movement of goods" should no longer be interpreted as free choice among all means of transport along all European

transport infrastructure axes. The Zurich Process for cross-alpine freight transport (CAFT) – a cooperation between the transport ministers of the alpine member states – was an example mentioned in this context. The experts pointed out that they explicitly expect a trans-European initiative to push the road to rail shift in the future.

### Rising Oil Price as Moderate Driver towards New Technologies

Even more interesting was the dialogue regarding the two trend-breaking scenarios. The first of these socio-economic scenarios was rather similar to trend break scenarios in other transport-related foresight exercises. None of the experts rated an oil price increase as a shock event but as a moderate driver towards technological alternatives such as the electrification of road transport or alternatively fuelled vehicles. Another discussion focussed on a return of regionalisation and local production networks. Instead of more European market integration, the shrinking of the internal market was seen as a potential socio-economic future triggered by increasing global protectionism and global economic conflicts. By comparison, in 2009, such a socio-economic framework had not at all been envisioned in FreightVision Europe 2050.

In the second foresight workshop, the discussion focussed on relevant environmental and transport policy targets for freight transport futures. It was difficult to come to a conclusion. Although there are strong trends toward harmonising environmental and transport policy targets in the European multilevel governance system, there is obviously still an open debate whether these objectives ought to be seen as a planning horizon or as guidelines for the future. Policy targets at one policy level may conflict with policy targets at other levels. The involved stakeholder and expert group decided to take European policy targets in addition to national targets as a frame of reference while addressing this frame in a rather general way based on a shared vision of how to shape the Austrian freight transport system by 2050 (structural change) by taking into account an increase in freight transport demand by 30-40% by that time.

### Towards a "Network of Networks"

As the core of this foresight process, a shared vision of the Austrian freight transport system in 2050 was blue-printed. The participants illustrated their ideas and visions in a group exercise and further discussed their ideas and expectations for the future. All illustrations were integrated in a single shared vision scenario.

A European transport network will be achieved by 2050. European legislation will serve to drive and harmonise environmental and transport regulations. However, a single European transport network is expected to be achieved as a network of networks with a European main axes infra-

structure network at its core, but tightly connected with inter-regional, regional and urban mobility networks. Communication and information technologies will progress and allow to more closely connect these networks while allowing for many alternative mobility patterns for travelling and transporting goods. In a far-distant perspective, private sector mobility and transport might decline since European industries can be expected to more strongly revolve around knowledge-based services.

In 2050, freight transport at medium (up to 300 km) and long distance (above 300 km) will be fully intermodal, with a considerable shift to rail transport. European infrastructure axes for all transport modes will be integrated into one single corridor network. Road transport (below 300 km) will be widely electrified with large numbers of charging stations providing the necessary infrastructure. However, electrification of road transport may not be feasible for heavy duty transport. Last-mile transport will still be mainly road-based and rely on individual transport modes. Automated systems and pipe networks are expected to be deployed in urban areas.

Logistics in 2050 will be organised rather centrally under strict rules and requirements set at the European level. Third parties are going to organise logistics in cross-regional or regional and urban distribution networks. Large interregional distribution centres will be established on a European scale. Tri- and bimodal hubs will be situated along the main transport corridors near manufacturing sites and will profit from information and communication concentration and renewable energy clusters (smart grids). Significantly improved freight demand management will reduce empty and half-full trips; this will include alternative modes of operation, for instance so-called milk runs for circular distribution.

Another main exercise in the foresight FVA2050 was to sketch a list of technology trends in the near (2020),

medium (2035) and distant future (2050). The main areas discussed in the transport-related technology and innovation debate were:

- Intelligent transport systems
- Green freight and logistics
- Intermodal freight transportation
- Innovative infrastructure technologies

In these areas, particular technology and innovation pathways were assessed. Communication and information technologies as well as alternative vehicles and new materials were introduced as enabling technologies.

### **Smart Technologies to Improve Capacity, Greening and Safety**

From 2020 to 2035, supply and transport chains will be further “smartened” by ICT. Information management systems will enable systems that calculate ecological impact. Between 2035 and 2050, most infrastructure and freight vehicles will be equipped with communication modules enabling real-time multimodal transport information. Autonomous and semi-autonomous vehicle systems are expected to increase capacity and safety by platooning.

A similar revolution like the container will provide new opportunities for intermodal transport with swap bodies to serve the European internal market. Automated harbour and hinterland transport, including vertical and horizontal loading systems, is expected to allow 24-hour operation. A European transport network will include a Europe-wide network of intermodal transport hubs. Transport infrastructure will be connected to energy infrastructure as a smart mobility/energy grid. In a distant perspective, from 2035, distributive intelligence in command and control will give rise to decentralised robot systems: smart objects, pipe networks and other simple track systems.

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## **New Alternatives for Distances above 300 km**

One of the key questions raised in FVA 2050 was if electrification of road freight transport might also be viable at medium and long distances in the future – a measure that is thought to play a significant role in achieving future European CO<sub>2</sub> emission reduction tar-

gets. Experts believe that a shift to rail freight transport for distances above 300 km and even below 300 km for regional distribution will be a significant option in the long term. However, additional measures are required, for instance, regional rail/road distribution centres serving the first and last mile by an electric fleet. This has direct implications for future mobility and transport as well as transport-related technology and innovation policies.

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