FUTRE

FUture prospects on TRansport evolution and innovation challenges for the competitiveness of Europe

Scenario-based assessment of the competitiveness of the European transport sector

The **FUTRE** project developed plausible scenarios for transport in 2030 and beyond, describing mobility needs and how passenger and freight transport demand would be shaped in the future. The scenarios include:

Scenario 1- Unlimited: In this scenario, with the help of technological progress, it is possible to control the crucial environmental and energy problems. Current social practises may continue and even follow a path of increased consumerism and thirst for travel. Global economic competition is the most important driver of societies.

Scenario 2 - Passivity & collapse: This scenario describes a world where society was not able to address the impending environmental and energy problems. Societies ultimately fall economically and politically. The scenario emphasises the consequences of a collapse of every type and the inherent uncertainty and need of quick adaptation in an unstable world.

Scenario 3 - Responsible Growth: In this scenario, the prospect of environmental and economic collapse leads people and countries to cooperate, in order to properly manage the global commons in a responsible way. Since the pace in (responsible) innovation is not high enough to cope with the grand challenges, this necessarily involves drawing back the economic output to a level consistent with sustainability. People consume and travel less, driven by various policy incentives concerted at an international level. Sustainability and safety become overriding paradigms.

These scenarios were enriched with potential key innovations and trends for consumption and travel patterns which were translated into quantitative inputs for an integrated modelling approach using the ASTRA-EC and TRANS-TOOLS toolsets. The latter were used to analyse the dynamics between the key transport innovations provided by the European transport industry and the changing travel patterns for passenger and freight. ASTRA-EC is a dynamic, integrated transport, economic, environmental and technology model based on System Dynamics methodology that can simulate changing travel patterns. TRANS-TOOLS being a network-based transport model was used at the last stage of the analysis to provide a detailed transport network. In order to enable the simulation of congestion effects a linkage between ASTRA-EC and TRANS-TOOLS was developed.

The main results of the ASTRA –EC model regarding how passenger and freight transport will evolve under these three scenarios are available in **FUTRE** Deliverable 5.3. Some indicative results of the TRANS-TOOLS model, related to the "Responsible Growth" scenario, are presented in Figures 1 & 2 (p. 2). Figure 1 presents change in passenger km, while Figure 2 shows the change in tonne km for freight transport.

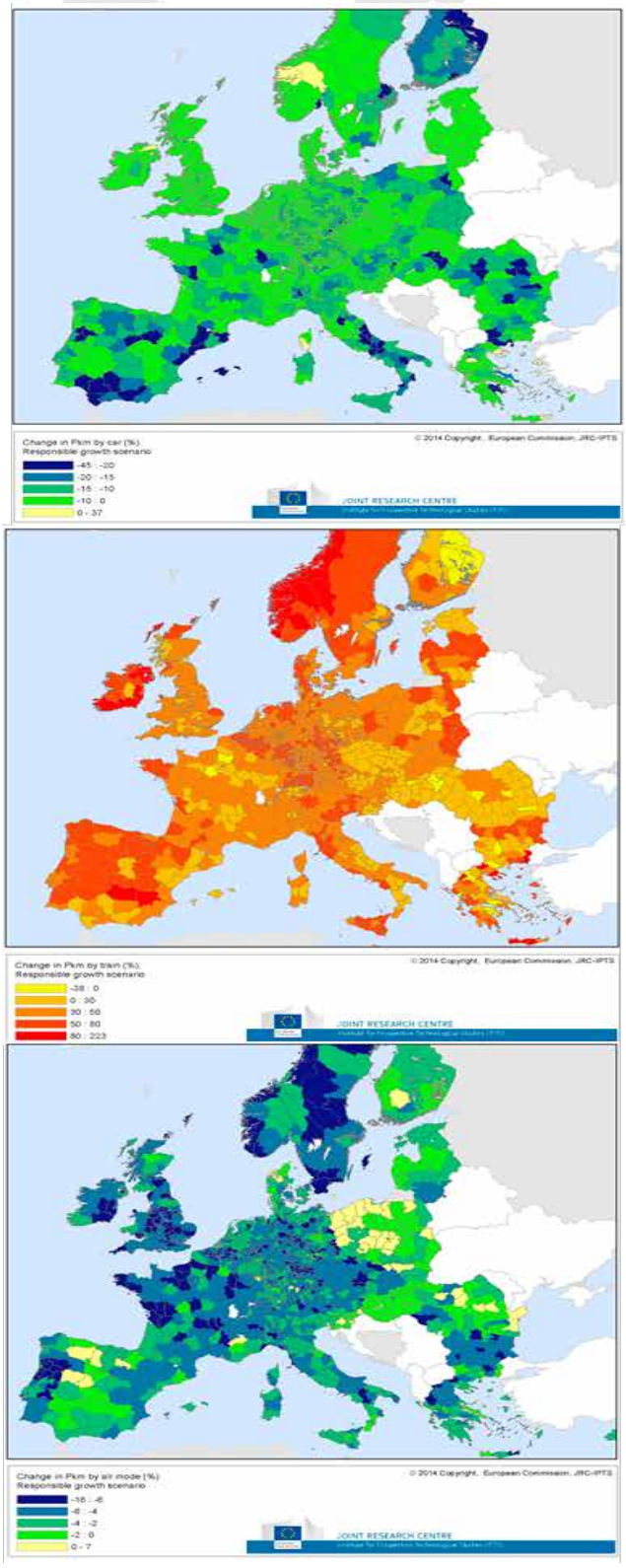


Figure 1: Regional distribution of changes in passenger transport activity levels for the Responsible Growth scenario in year 2030 (% in relation with the Reference scenario) (car-train-air from top to bottom)

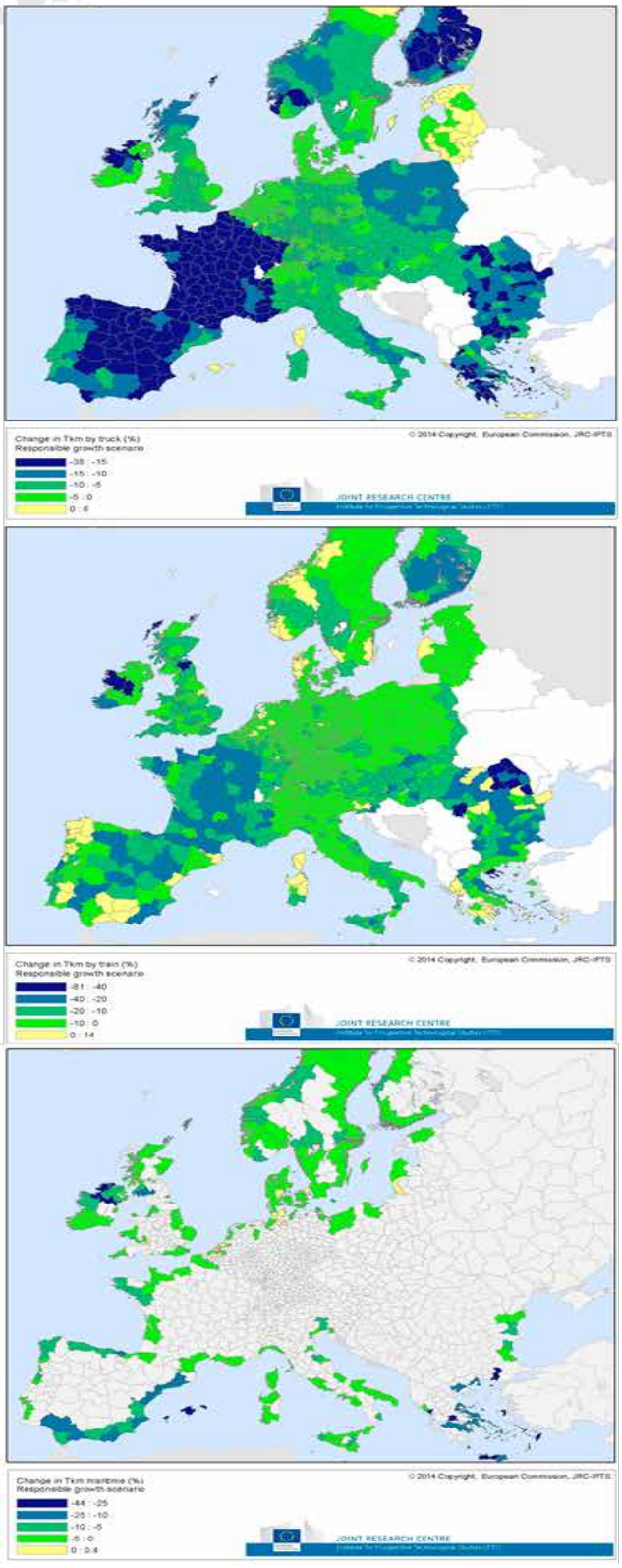


Figure 2: Regional distribution of changes in freight transport activity levels for the Responsible Growth scenario in year 2030 (% in relation with the Reference scenario) (truck-train-maritime from top to bottom)

Options for the EU research policy

In **FUTRE** project, one of the main objectives was to assess the effects of future challenges, demand drivers and upcoming innovations on the competitiveness of the European transport sector. Another objective was to use this information as a basis to develop strategic options for transport-related research activities.

For each scenario, the European transport subsectors (automotive, rail, aircraft manufacturers and the maritime sector) were analysed and categorised in terms of their current global competitiveness and their future prospects of sales under the conditions of each scenario (Table 1). Additionally, several upcoming innovation areas and possible constrains were identified as determinants for the competitiveness of transport sectors in each scenario. Most of the input regarding upcoming innovations and possible constraints came from the experts' workshop "on the competitiveness and innovation policy of the transport sector" that was held in Thessaloniki during the 2nd and 3rd of July 2014 and was further complemented with desk-research.

Table 1: The competitiveness prospects of European transport sector under each FUTRE scenario

	Low prospects of sales	High prospects of sales
Strong industry	***Unlimited***	
	Rail	Private cars Aviation
	Passivity	
	Aviation Private cars Rail	Buses
	Responsible growth	
	Private cars Aviation	Buses Rail
Weak industry	***Unlimited***	
		Private cars: alternative fuels Commercial vehicles Maritime
	Passivity	
	Commercial vehicles Maritime	Cheap and slower modes
	Responsible growth	
	Commercial vehicles Maritime	

Based on the categorisation above, the **FUTRE** project proposed a set of EU transport research policy measures that could potentially help each transport industry sector become more competitive by the year 2050 and overcome the limitations of each scenario. Furthermore, these policy measures aim at improving the industry's competitiveness and sales through mechanisms such as funding, promotion of legislation and technologies, provision of support services for companies such as coaching and mentoring, excellence in education as well as access to information and technology for companies. Table 2 (p. 4) presents some indicative transport research policy measures. The actual automotive industry was divided into sub-categories: private cars, commercial vehicles, buses, alternative fuels, cheap and slower modes. For convenience, the measures related to each subsector were added together. Further details regarding the policy measures can be found in **FUTRE** deliverable D6.2.

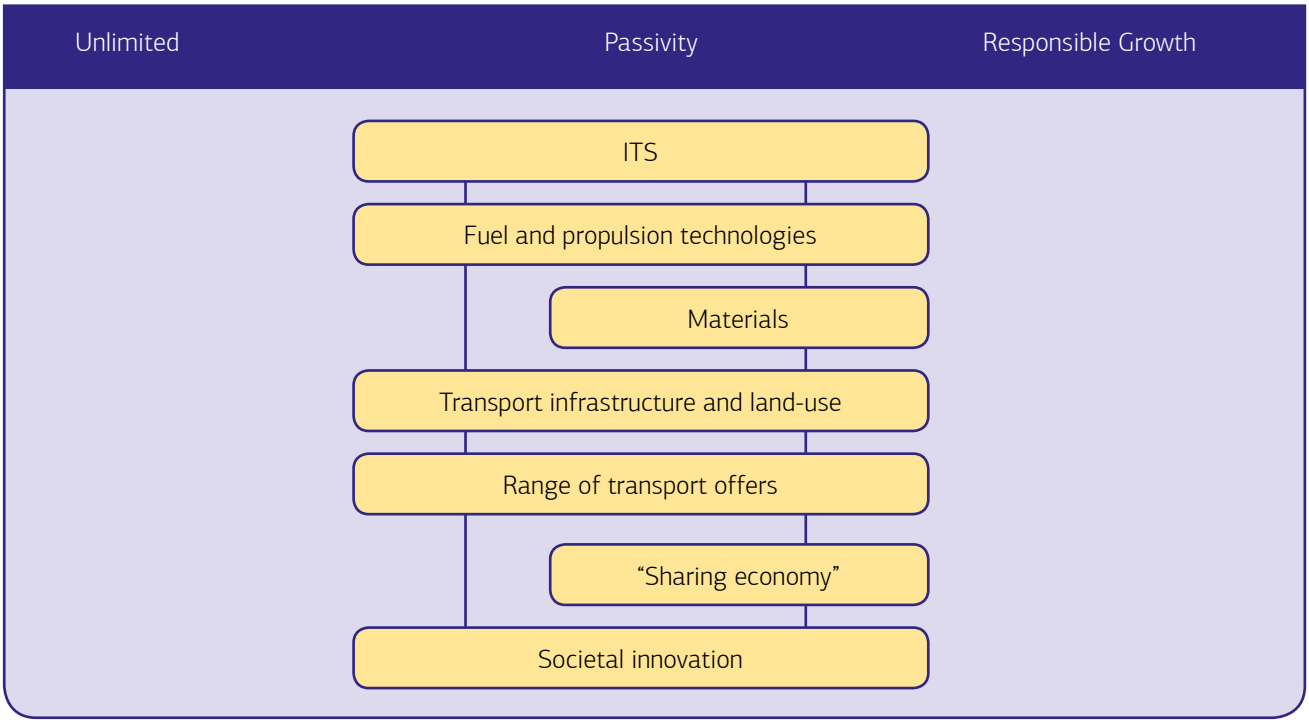
Table 2: Indicative EU transport research policy measures for FUTRE scenario.

	Unlimited	Passivity & Chaotic collapse	Responsible Growth
Automotive	– Financial support (competitive R&D support or credit guarantees) to innovative companies that will develop solutions on alternative fuels. – Promoting excellence and educational skills in promising innovation areas (i.e. electromobility). – Support in the improvement of refuelling infrastructure taking in consideration sustainable production and storage (i.e. for hydrogen). – Financial support and risk sharing for innovative companies creating joint ventures in non EU countries i.e. competitive grants, direct support. – Creation of an EU Platform for battery technology platform bringing in all industry stakeholders.	– Support through financing and coaching for the creation of platforms for car pooling and sharing, with the automotive industry taking considerable part as an added value services provider. – Public procurement of more efficient ICE, fuel blends & multifuel engines. – Financial support through direct funds or credit guarantees for companies researching on efficiency of ICE, fuel blends and multifuel engines or any other energy efficient technologies. – Financial support for research related to the design of new or adaptation of existing infrastructure to the needs of slower modes i.e. bike lanes, rest and parking areas.	– EU support in the creation of design & development centres aiming at the collaboration of consumers, universities, research centres and automakers aiming at redesigning vehicles to be: bigger, more economical and ecological than the conventional types. – Mechanisms of generating consumer demand through incentives or innovative marketing techniques for the purchase of new vehicles utilising alternative propulsion systems. – Promotion and use of ITS to assist in creating demand responsive transport and help improving efficiency of public transport operations.
Rail	– Investment in research for design and development of innovative systems that will enable intermodal/ comodal integration of the rail mode into seamless transport systems in order to create sales by making the mode more attractive (ITS and integrating ticketing).	– Investment in research for design and development of innovative systems that will enable multimodal/intermodal integration of the rail mode with buses and other modes.	– Investment in research for design and development of innovative systems that will enable comodal/ intermodal integration of the rail mode into seamless transport systems in order to create sales by making the mode more attractive
Aviation	– Promotion and support to aviation special interest groups with the focus on bringing in together customers (airlines), consumers (passengers) and policy makers in order to design future aircrafts meeting everyone's needs.	– Support of aerospace clusters with the aim of sharing technology, information or even patents.	– Platforms to promote commercial agreements between air and rail carriers for intermodal/comodal services.
Maritime	– Direct financial support to companies through the creation of pool funds between member states or credit guarantees.	– EU support on the creation of design and development centres aiming at the collaboration of experts, universities, research centres and ship builders aiming at finding optimum solutions for the design and manufacturing of new vessels that will meet the scenario's needs.	– Promotion of short sea shipping within the EU member states that are easily accessible by sea or IWW. – Improve resource efficiency through the creation of quality assessment scheme for shipyards at world-wide level.

Future EU R&D strategy

The EU transport industry's analysis and categorisation in terms of current competitiveness served as a platform for making recommendations for the future R&D strategy based on the assessment of the scenarios and the strategic options for European transport research policy that were presented earlier. These recommendations would specify the need for R&D investment in different transport modes and innovation fields in order to improve the competitiveness of the European transport sectors under certain conditions. Table 3 summarises the main innovation fields that will require higher need for EU public R&D support. Some innovation fields are crucial in all scenarios, despite the fact that their application may differ depending on the demand preferences of future societies.

Table 3: Innovation fields with higher need for public R&D support



Additionally, the following recommendations should be considered in a future EU R&D strategy for transport:

1. Research funding should be aligned with societal challenges and policy objectives.
2. Research priorities should be discussed in a broad context of stakeholders. These fora could follow the logic of the quadruple helix model, engaging academia, industry, government entities and citizens.
3. Promote road-mapping on different innovation fields, ensuring the involvement of different stakeholders. These road-maps should identify funding instruments and actors, and foresee monitoring and governance mechanisms.
4. Invest in more advanced transport research, especially in those areas with the following characteristics:
   a. Innovation areas that are of public interest and require the coordination between different actors and sectors, such as ITS.
   b. Areas with innovation gaps. This is the case of areas where investments are considered too risky or where other market factors limit private sector investment in more advanced research. These market failures are usually related with benefits occurring far in the future, risks that are too high for non-public participation or benefits that could not be appropriated by a single entity.
   c. Areas that directly support government infrastructure or services.
5. Promote more international collaboration in transport research in topics that are of strategic importance for the EU. This collaboration could be envisaged in different form, such as collaborative research or PPPs.
6. Advance on standardized reporting metrics, coupled with clear strategic goals, to prove the effectiveness of the funding programs.
7. Ensure the correct dissemination of results, spreading the benefits of public funded innovation to the whole society.
8. Improve the workforce skills of the European transport industry, with a special focus on revitalizing traditional sector and promoting those skills that will fulfil future industrial needs.
9. Expand the participation of private sector, especially SMEs. Provide better access to public activities, technology and infrastructure; and engage the private sector in setting the R&D priorities, programs and research planning.
10. Provide support to attract and maintain research and innovation of private companies within the EU boundaries, reversing the trend to delocalize innovation investments towards emerging countries.
11. Foster a vibrant, innovative academic community in transport by improving the research capabilities of academic institutions, promoting partnerships between academia, government and industry and engaging academics in the establishment of R&D priorities, programs and planning processes.

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