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### Report on Rail Business Scenarios

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<b>Task</b>	2.4	Definition of rail business scenarios

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<sup>1</sup> Dissemination level: **PU** = Public, **PP** = Restricted to other programme participants (including the JU), **RE** = Restricted to a group specified by the consortium (including the JU), **CO** = Confidential, only for members of the consortium (including the JU)

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## 1. Executive Summary

This deliverable focusses on four future rail business scenarios. These scenarios have been developed with respect to the past, the ongoing and potential future development of transport and society.

Technical and economical aspects were considered as well as environmental and societal. Trends and drivers up to 2050 from Deliverable D2.2 *Report on Major Factors and Criteria for Rail Business Scenarios* have been examined and discussed for the scenario development. Strategies, that analysed societal and market needs, the customer perspective, overall railway operations, attractiveness issues, high level trends and operational issues, have also been taken into account as well as aspects like rail in a multimodal supply chain or transport options related to societal development (e.g. public transport supply and demand in a rural environment with respect to the demographic change).

The four scenarios are the basis for the Foster Rail WP2 World Café Workshop, where these scenarios will be further discussed and developed with the project partners and additional experts from rail/transport stakeholders, public bodies and foresight experts towards a reference rail business scenario, which will be delivered in Deliverable D2.5 *Reference Rail Business Scenarios and Update*. This will be the reference for the new Strategic Rail Research and Innovation Agenda.

## 2. Description of the Deliverable

The aim of this deliverable is to create rail business scenarios by exploring existing prognoses and forecasting studies, foresight studies on major trends and drivers, analysing visions and policy strategies and exploiting draft narratives of relevant scenario studies. Based on the outcomes of D2.2 *Report on Major factors and criteria for Rail Business Scenarios* and D.2.1 *Report on the Update Suburban and Regional Rail Market Analysis* respectively the relevant Tasks (2.1-2.4) four scenarios have been created in a narrative form.

Significant information deriving from relevant forecasting and foresight studies, corporate vision and strategic planning was the framework for these four scenarios.

The main chapter of the deliverable on major factors and criteria for rail business scenarios is structured into four sections, one section per scenario. Scenario one is *Single European Rail Area* sketches a strong European and worldwide economic and thus transport growth with a consequent shift to rail for passenger and freight transport in a liberalized European rail market. Section two, *European Interl Rail Market*, expects a rather moderate economic growth in Europe with trade flows dispersing across the world. Economic disparities are rising, White Paper goals are targeted but not as well achieved as in the first scenario. Regional Rail freight is not revitalized, while local and regional passenger rail transit is growing. *Pan-European Rail Network*, Scenario three, is considering a weak federalism within the European Union, a supra-national governance with decision making power in most policy areas shifting back to national and regional authorities. Results are de-liberalization and thus a decrease of cross-boarder and interoperable rail traffic, while regional rail freight increases. The last section *Re-Regionalization of Rail* sees the Union as a Europe of regions and municipalities with no general contractual basis to direct. Long distance travelling is mainly increased amongst main corridors and cities of economic growth, while long distance freight is decreasing because of changing production procedures and consumption behaviours.

The resulting rail business scenario needs to be reviewed and constantly updated, as transport demand prognoses and forecasts do not appropriately reflect potential trend breaks and rather unexpected pathways into the future. Since they are the basis for the four scenarios and therefore also for the reference scenario, this needs to be considered also for the SRRIAs.

### **3. Rail Business Scenarios**

#### ***3.1 Single European Rail Area***

European economies and economies worldwide are growing and thus transport demand is doubling up to 2050. The 21st century is proclaimed as century of trade and trade protectionism is decreasing. After successful negotiation of the free trade agreement with the US, negotiation regarding free trade agreements with other world regions like Mercosur and ASEAN were up-taken and completed.

The 21st century is pronounced as century of Green Economy with European policy driven specifications for environmental, social and climate action standards and labour rights forefront. European ideas and ideals are governing sustainable development worldwide and European knowledge economy is at the centre of this progress. Road transport is electrified. With road electrification the overall transport system is changing with rail at the centre. Strict standards for carbon emissions and internalisation of external costs are driving economic progress.

Demographic change has been successfully overcome with well balanced migration policies and progressing education systems addressing life-long learning for all age groups. The age group of the very old is clearing up to 2050 and the pension system was appropriately managed. Ageing population and population in general is expected to be more healthier and travelling more and intermodal with a high share of rail use. Rail users are benefitting of comfortable and customized offers by rail providers. With rising prosperity and increasing household budget available for mobility it is expected, that rising budget shares will be spent for high and premium rail travelling services.

The large technical systems for train control ERTMS/ CBTR have disseminated across Europe and are allowing a fully interoperable European rail system, at least regarding train control and other ICTs. The system is fast progressing up to 2050 allowing major increase in capacity for rail, but as well handling technological threats coming along with expected disruptions in satellite based navigation. Horizontal integration was achieved with the economic division among infrastructure providers and rail operators on a liberalized European rail market. An increase in investment in innovative infrastructure and rolling stock is driven by a political decision to allocate a rising investment budget share and rail policy authority at the European policy level to roll out a Single European Rail Area.

Long distance passenger high speed rail systems (HSR) have evolved across the world. Huge investments were taken to this area, with increasing benefits and revenues for the public as for the private sector Best demonstrated available technologies (BDAT) are established: door to door travelling up to 1000 km and beyond is achieved in 5 to 6 hours

with appropriate seamless service quality for the first and last mile. In case of disruptions, with fully implemented cabotage standards, at liberalized HSR markets, real time alternatives are made available to guarantee travelling in time.

Long distance freight transport for distances up to 300km and above are common in 2050 beyond.

A consequent shift to rail strategy was rolled out sustained by all relevant actor groups. Due to trade agreements intercontinental robust rail connections to Asia are established. Several new port to hinterland rail links were established with new sea routes, particular in the northern territories.

Regional freight rail is revitalized with the roll out of the shift to rail strategy, in particular connecting large interregional freight hubs with regional and local consolidation centers. In a green economy these infrastructures are highly self-sufficient regarding energy and material use and embedded in a smart grid infrastructure. Intermodal transport is institutionalized as main freight transport mode.

Local passenger rail has like half a century ago retained its role as main transport mode for daily commuting, with rail mass transit into inner cities and urban population commuting intermodal. Access restrictions or high charging of individual car travelling to cities are supporting this trend.

### **3.2 *European Internal Rail Market***

European economy is growing moderate with progressing internal market integration. Europe is in 2050 still the largest consumer market worldwide. However, trade flows are increasingly dispersing across the world with growing shares of trade among Latin America and Asia. Economic disparities among regions and districts are rising in Europe despite all cohesion and smart specialisation trends for 278 regions defined. The European socio-economic landscape is diverging into growing and shrinking regions, and growing and shrinking districts within these regions.

Sustainable development goals are targeted at all governance levels. Transition is driven by climate adaption trends and increasing environmental and public health constraints induced by transport. However, transaction costs for transition towards sustainability targets are high and thus policy and planning measures to achieve these aims are not sufficiently ambitious. To internalise externalities regulatory approaches are progressing. Other public and private sector cost burdens are arising with extreme weather events and subsequent environmental disasters at European and world wide scale.

Demographic change is effecting societal change and is stressing social fabric. Disparities and inequalities are rising despite economic cohesion trends. Young people are moving to growing metropolitan areas, where labour markets are still expanding. A fewer younger, elderly and very old are remaining in shrinking districts. Urban and suburban areas are densifying and therefore demand for public transport and rail mass transit is increasing. On the other hand in shrinking districts public transport density and frequency is dropping down along with decreasing local budget for investment.

The European Union is governing internal rail market integration with soft power policy coordination and economic support instruments. A next rail package, increasing political authority and regulatory power at the European level, is not expected. Main trends up to 2050 are going towards vertical rail market integration. Large and consolidated rail operators networked with national infrastructure providers are expected to lead European rail market integration. Systemic barriers regarding rail market liberalisation are arising with large rail incumbents having a comparative advantage.

Long distance passenger rail has evolved as European network. Due to the continuous renovation of the network and its organization with many train stops, the average speed is lower than on newly build individual HSR infrastructures. High speed rail in a European network allows travelling distances below 1000 km in a door-to-door travelling time of 5 to 7 hours. Due to the network type far better interchange options are allowing to reach several more destinations. A diversity of HSR trains not travelling to inner city centers and others approaching the centers are in trend. Next to the premium segment, low budget train services are diffusing to serve the needs of population with lower income.

Long distance rail freight transport for distance above 1000 km is up to 2050 mostly intermodal with an increasing share of rail. Less shift to rail is achieved at interregional transport relations. In particular at medium distance up to 1000 km road transport is still increasing supported by smart road corridor concepts and new truck systems as well as loading units and capacities rolled out.

Regional freight rail is not revitalized with the shift to rail strategy. Regional freight transport, having a rather high volume, is still mainly on road. The implementation of alternative fuelling infrastructure is progressing. Only in some specific cases investment in revitalization of feeder lines are justified.

Regional and local passenger rail transit is increasing. Populations in urban and suburban areas are increasingly commuting intermodal. Car travelling is restricted or charged for to inner city areas. Rail mass transit systems are spread all over the world with convergence of train/tram to tramtrain systems. However, at a world scale in areas where rail infrastructure is not in stock, competing autonomous driving- and BRT systems are emerging, in particular in the US and Latin America.

### **3.3 Pan-European Rail Network**

Economic growth is decreasing and European economic development is slowing down. Rising inequality and high unemployment rates across Europe are setting European economic integration under threat. Nationalism and national protectionism are returning in Europe and worldwide. Several more European member states went near to national insolvency: the euro rescue fund was not sufficient to secure them all. Different Euro and non-Euro currencies are coming up and therefore national economies reinforcing next to a weakening European economy.

The European Union political federalism is further losing its strength (weak federalism). A common constitution is still far away. The European Union is reshaping into a pan-European, supra-national governance system with decision making power in nearly all policy areas, shifting back to national state and regional authorities. Common budget allocated to the European level is decreasing including budget for research and innovation with less European states associating to the Framework programmes and European Research Area. For the technical system rail this may imply: rail policy authority regarding is shifted back to the national level.

Sustainability strategies are rolled out at the national level. Increasing oil and energy prices are putting heavy burden on national economies as on individual households. Due to lack of European competencies in social market economy and employment strategies, policy authority is taken up at the national level and large national public transport providers may be used again as instrument for labour market (particular youth employment) politics.

Long distance rail travelling is decreasing, like travelling as such, with population having low income and decreasing household budgets for mobility available. There is an increasing civil society enmity against large rail infrastructure projects, not alone due to environment and noise strains, but general opposition against public spending for large infrastructure. High speed rail systems are reshaping to intercity and interregional train systems. With rising energy prices night trains are allowing more affordable travelling than by air. However, night travelling has to be accompanied and secured.

Long distance rail freight is decreasing with the worldwide increase of failing states inter alia at European outer borders. Trade flows are changing with re-arising national protectionism and thus changing production and consumption patterns. Commodities for daily life are manufactured within national frontiers again and national economies are self-



sustaining in energy and resource supply. Thus bulk and single wagon rail freight transport is increasing within national borders.

Regional rail freight is increasing. National freight operation is revitalized by publicly subsidising rail freight, for example implemented by public service contracts (PSC) for freight transport. However, how far this trend takes up strongly depends on national and regional policy engagement in freight rail. Under another perspective: regional freight transportation is expected to disintegrate into an informal sector with self-employed, precarious engaged shippers (“mexicanisation” of transport).

Like in the 1950ies, before mass motorisation and shift to car regional and local rail travel is the major transport mode. However, fleets are growing older with refurbishment and renovation mainly focused at due to public budget constraints. Rolling stock and infrastructure life-time costs are most important factors. Rail systems being life-time cost-efficient, not costly and straightforward to maintain are asked for. Urban transport may be in future up to 100% funded by the public and offered at no charge to local citizens like in Vilnius or for some days free like recently in Paris.

### ***3.4 Re-Regionalization of Rail***

Re-regionalisation of rail is opening another perspective. The “Europe of regions” is seen not alone as variety of different regional markets within a single European internal market, but as a diversity and disparity of single regional economies in economically growing or shrinking regions and districts. This view is important as it points at a parallel, even contradictory, evolution next to the view of a comprehensive European economic space.

Thinking in terms of regional or local economic areas it is in general not the first priority to focus on international trade or trade at the European internal market. Priority is directed to regional or local economics (“oikonomia”), this means regional economic structures which are to a broad extent self-sustaining and resilient in case of crises in all main sectors of provision like food, housing, health, leisure, energy and mobility and transport. Regional and local economies of tomorrow are expected to be driven by a multiplicity of economic actions based not alone on trade and commodity, but on sharing and barter economies, collective and self-manufacturing, individual and self provision (urban gardening or collective supply). Neighbourhood or citizen corporations are operating energy supply or public transport.

The European Union under this perspective is seen as a Europe of regions and municipalities, European Union public services areas staying in a coordinating and moderating role, but no general contractual basis (like the Lisbon treaty) to direct.

Coordination among cities and city regions is supported by European urban policy (e.g. urban policy package). Coordination among regions is supported by European regional policies (e.g. structural funds). Due to the explicit trend shifting rail authority, at least regarding public procurement and contracting, to the regional (“Länder”) and municipal policy level, it is crucial to follow this perception.

Long distance rail travelling is mainly focusing on relations among economically growing city regions along some main European corridors. However, high speed rail as intercity train is increasingly used to bring commuters from regional metropolis and cities and towns to the growing city and metropolitan areas where labour markets are still expanding. So high speed rail is converging with intercity express train, mainly for daily or weekend commuting.

Long distance rail freight is decreasing driven by changing production and consumption. Mainly data and information is traded and products are further dematerialised. At local manufacturing sites products are 3-D printed and assembled and distributed. The later 21st century is a decade of creative industries and individual customized products and services.

Regional and local rail freight is increasing. Urban consolidation centers are embedded in city logistics concepts as policy and planning measures are shifting some urban freight to rail. Dispersion on the first and last mile is organized by cyclo-logistics or electrified delivery vans to achieve goals and targets for zero emission and CO2 neutral urban freight logistics.

Transit from suburban to urban centres is expected to be fully intermodal, with major shares among rail and cycling and walking. Regional and local climate strategies and action plans are targeting the reduction of car use, in particular fading out of conventionally fuelled cars. Increase in rail mass transit is expected to be enormous with such policy action. Additional to entrainment of bikes, parking- or bicycle sharing infrastructure at railway hubs has to be provided. Rolling stock is expected to be cost efficient and affordable for public budget.

## 4. Conclusions and way ahead for Rail Business Scenarios

The four generic socio-economic and rail business scenarios are covering a range of storylines from “prosperity narrative”, through moderate economic growth and weak federalism to European Union drifting apart by Re-Regionalisation.

While these differencing rail business scenarios are reflecting the Foster Rail WP2 Core group’s analysis of policy documents, longterm planning, corporate visions and strategy documents, they will now undergo an intensive debate about European rail futures and and rail business scenario up to 2050. The FosterRail WP2 workshop with round table World Café character will bring together a representative group of stakeholders, multidisciplinary experts and members of the various aspects of society targeting at a consensus approach for a draft outline of a rail business reference scenario.

Visions, goals, targets and agendas deriving of policy documents: whitepaper, greenbooks, action plans, masterplans and long-term investment plans as corporate vision and strategy documents are contributing to enfold the normative framework the foreseen business scenario is based upon.

- Whitepaper and other relevant EU level policy transport related actions
- National, regional, local sustainable transport and climate action plans
- Public infrastructure masterplans and long term investment plans
- Corporate visions and strategies (as business intelligence)
- 

During the dialogue forum visions, strategies, goals and targets deriving from these documents will be specified. This approach will guide a review process of the storylines of the socio-economic framework scenarios to draft a business reference scenario. Conflicts of goals may arise in the debate, thus joint understanding is crucial, acknowledging not alone a business intelligence perspective, but as well other perspectives, e.g. a public and commons perspective. We are aware that joint understanding among a range of diverse actors cannot be resolved in a half day dialogue. However, the forum can be conceived as kick off for an intense debate about European rail futures and a rail business scenario up to 2050 and beyond. It is foreseen to update this reference scenario after half of the duration of the FosterRail project. The future dialogue forum in Brussels is designed to gain informed consent on a first draft of such a rail business reference scenario. This draft can be further debated, and will be further refined during the duration of FosterRail.

The future dialogue forum with some 40 members will be split into two sessions as outlined in the Agenda (refer to Annex I). In the morning session, after a short reception and introduction round, the mission of the participants is to jointly re-developed the scenarios above by introducing additional storylines, in particular what consequences may derive for rail futures against the background of the different socio-economic futures.

The dialogue in the morning is organized at eight round tables. At each table a particular trend and driver area is focused at. Rotation is planned after half of the discussion time to allow each participant to participate in two dialogue rounds. The dialogue at the round tables will be structured by a guiding questions; the outcome will be documented on a flip chart. The morning session will close with a plenary, where each round table moderator will shortly report about the outcome of the discussion at the table. During lunch the organisation team will summarize the additional storylines and integrate them into the respective socio-economic framework scenarios.

After lunch break, in a first round, the extended socio-economic scenario narratives will be discussed and finally consolidated. Participants will stand in this exercise in front of boards with the scenarios pinned on and discussing them. A rotation scheme will allow participants to get involved in discussion and consolidation of each of the four socio-economic framework scenarios.

The second half of the afternoon is devoted to achieve a draft for a rail business reference scenario. In a first session at four round tables major normative corner stones for a business reference scenario will be consented. This discussion allows as well debate regarding potential conflict of goals, which can only be solved by political negotiation and not in the framework of a coordination action like FosterRail. However, the aim of this exercise is to come for the first to a provisional consent regarding a normative framework for a Rail business reference scenario (vision) up to 2050 beyond for the European rail system. The outcome of the discussion will be presented by the moderators and finally discussed and consolidated in a plenary round.

After a coffee break the dialogue will proceed. At each of the four round tables the consented normative framework (visions, goals and targets) for European rail towards 2050 will be discussed against the background of the four socioeconomic framework scenarios. Each round table will focus to contrast the normative framework (reference future) with one of the four socio-economic scenarios (future contingency). Following this approach the storylines of each of the socio-economic scenarios can be discursively tested, if and how they are compliant with the normative reference. Subsequently the storylines can be reviewed; arguments for changing storylines will be documented. After half of the discussion time is over a rotation is foreseen to allow each participant to get involved at least in two round table discussions. In a plenary round the outcome of the debate at the four tables will be presented by the table moderators, in particular revisions of storylines and potential additional storylines deriving from the round table discussion.

After a final coffee break, in this break the organisation team will summarize the reviewed storylines into a first draft outline for a business reference scenario, this outline is presented to all participants and consented. It will serve as draft outline of rail business reference scenario; it is planned to further refine and update this scenario. The scenario outline coming out of this process can be characterized in terms of forward looking practices as a so called thick description of a potential future: it was coming out of a procedure to dialogue and gain informed consent among a multiplicity of actors relevant for rail business and the system in Europe. In our opinion this is the most advanced approach we can achieve in a project like FosterRail, being a coordination and support action and not a public consultation process. And will disseminate the outcome

accordingly to the FosterRail philosophy.