SEVENTH FRAMEWORK PROGRAMME

THEME [7]

Theme Title: Transport (including Aeronautics)

SuperGreen

SUPPORTING EU'S FREIGHT TRANSPORT LOGISTICS ACTION PLAN ON GREEN CORRIDORS ISSUES

Grant agreement for: <Coordination and Support Actions (coordination)>

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Table of Contents

List of Figures

List of Tables

0 Executive Summary

SuperGreen is a project that aims to promote the development of European freight transport logistics in an environmentally friendly manner. Among other tasks, SuperGreen evaluates a series of corridors covering some representative regions and main transport routes throughout Europe. The project's web site is www.supergreenproject.eu.

The White Paper on Transport (2011) elaborates on a number of challenges faced by the European community, while also laying out corresponding strategies and remedial goals. Known and interrelated challenges such as increasing congestion, growth in trade volumes, energy consumption, and emissions are to be met by improved traffic management systems, infrastructure development, and developments within ICT and technology. These are key areas of focus if the target of reducing emissions from transport by 60% within 2050[1], and shifting 30% of cargo transports beyond 300 km from road to rail or sea by 2030 (and more than 50% by the year 2050), are to be achieved.

In this respect, this first version of D5.2 aims to identify a set of initial recommendations for future R&D efforts by intensifying the focus on existing activities, while also going beyond what already has been recognised. A number of sources have been reviewed, including Strategic Research Agendas from relevant Technology Platforms, initiatives for R&D result dissemination, and selected funding mechanisms. The results are further based on input from D5.1 and structured according to transport mode and the below SuperGreen common development needs developed in Work package 2:

Although much work within the project remains before a set of final and detailed recommendations can be presented, the initial SuperGreen results presented do show that

[1] With 1990 emission levels as the baseline

there are still room for broadening existing and defining new areas for R&D activities. The SuperGreen common development needs are as such an effort to advance and initiate intermodal activities supporting the improvement of more sustainable intermodal operations on a corridor and Pan-European basis. When summarising the results from the analysis, the following generic points can be noted:

- A further strengthening of efforts securing integration and implementation of harmonised ICT solutions, also developing new ones.
- Increased focus on corridor and case-by-case specific analysis, both in terms of requirements and tailored solutions.
- Performance of impact studies for assessing potential environmental and cost savings when introducing new ICT and technology solutions
- Further development of freight flow optimisation and traffic management tools
- Efforts to enhance cargo interchange between transport modes, including expansion of technology uptake by industry.
- Actions to improve the energy efficiency among transport operations and reducing dependency on fossil fuels.
- Development of harmonised transport documents

As this is the initial version of the D5.2 (M24), it should be noted that the various recommendations for future R&D calls vary in level of detailing. This also rests upon the fact that the project is still on-going, and much work is still to be carried out within different WPs being of critical importance to WP5. Hence, more detailed and targeted recommendations for future R&D activities will be presented in the second and final version of D5.2 (M36).

1 Introduction - Purpose of this document

The overall purpose of this document is to describe the work done in SuperGreen Work package 5 (WP5), under Task 5.2 "Define and submit R&D call recommendations". This will be a two-stage process, the current report being the initial version while the second and updated version will be finalised in month 36 of the project (January 2013). Based on input from Task 5.1 "Identify unsolved bottlenecks", task 5.2 will define and suggest recommendations for future R&D activities to the European Commission, hereunder especially DG-Move, DG-Industry and DG-Research.

An important part of the work is therefore to coordinate with other relevant Strategic Research Agendas (SRAs) of relevant technology platforms such as the Waterborne, European Intermodal Research Advisory Council (EIRAC), European Rail Research Advisory Council (ERRAC), and the European Road Transport Research Advisory Council (ERTRAC). In addition, several other relevant sources have been investigated in order to secure coordination of the recommended R&D priorities:

- The Transport Research Knowledge Platform[2]
- The EC Research and Innovation website/platform[3]
- The Strategic Transport Technology Plan[4]
- The ERA-WATCH platform[5]
- The European Green Car Initiative[6]
- Horizon 2020[7]

Since the work of T5.1 serves as key input it should be mentioned that the gap analysis performed therein, contributing to bottlenecks mitigation and removal, will determine what is available and what is needed to make the corridors greener according to the defined benchmarks. This potential gap makes the basis for potential R&D recommendations to be described in task 5.2.

[2] http://www.transport-research.info/web/

[3] http://ec.europa.eu/research/index.cfm?lg=en

[4] http://ec.europa.eu/transport/research/sttp/sttp_en.htm

[5] http://erawatch.jrc.ec.europa.eu/erawatch/opencms/about/

[6] http://www.ertrac.org/en/content/european-green-cars-initiative_52/

[7] http://ec.europa.eu/research/horizon2020/index_en.cfm

2 Objectives

2.1 Objectives of the SuperGreen project

The EU Commission's Freight Transport Logistics Action Plan (2007), introduces a series of policy initiatives and a number of short to medium-term actions to improve efficiency and sustainability of freight transport in Europe. One of these actions is to define "Green transport corridors for freight". In this framework, the SuperGreen project, an acronym for the "Supporting EU's Freight Transport Logistics Action Plan in Green Corridors Issues" project, was launched.

The general objective of the SuperGreen project is to support the development of sustainable transport networks by fulfilling requirements covering environmental, technical, economical, social and spatial planning aspects.

The SuperGreen project is a coordination action. It has sufficient "reach" in the wide area of freight logistics, and it will actively contribute by giving input to on-going and new projects so that resources are used most beneficially. The SuperGreen project will:

- Give overall support and recommendations on Green Corridors to EU's Freight Transport Logistics Action Plan.
- Conduct a programme of networking activities between stakeholders (public and private) and on-going EU and other research and development projects to facilitate information exchange, research results dissemination, communication of best practices and technologies at a European, national, and regional scale, thus *adding value to on-going programmes*.
- Provide a schematic for overall benchmarking of Green Corridors based on selected KPIs, also including social and spatial planning aspects.
- Deliver a series of short and medium-term studies addressing topics that are of importance to the further development of Green Corridors.
- Deliver policy recommendations at a European level for the further development of Green Corridors.
- Provide the Commission with recommendations concerning new calls for R&D proposals to support development of Green Corridors.

2.2 Objectives of Work Package 5 and Task 5.2

The main objective of WP 5 is to identify and define recommendations for calls for R&D proposals to the Commission. Building on input from other related work packages (WP 2- Benchmarking Green Technologies, WP 3- Sustainable Green Technologies, and WP 4- Smart exploitation of ICT-flows), task 5.2 has an explicit focus on identifying recommendations for future calls for R&D proposals to the Commission. Important sub-tasks in this work are:

- Based on the identified ICT and technology gaps for mitigating bottlenecks in European supply chains from Task 5.1 (Identify unsolved bottlenecks), study and evaluate research agendas (SRAs) in relevant Technology Platforms, and to the

extent possible also in national R&D activities in terms of on-going activities for closing the gaps.

- Synthesize R&D efforts being carried out at a pan-European basis to conclude on recommendations for future R&D to the Commission.

The conceptual approach to the work is as visualized in the figure below.

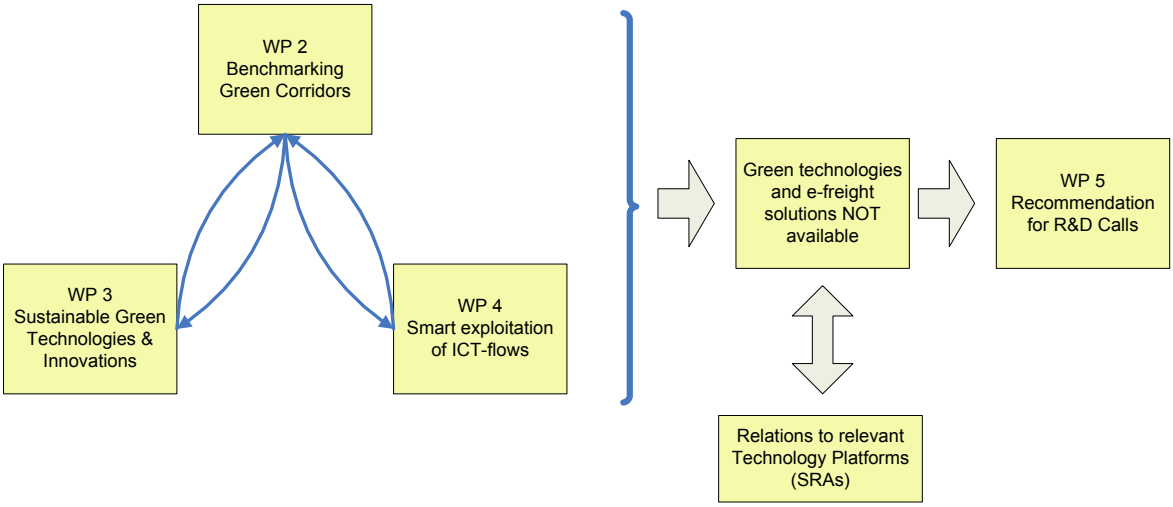

Figure 1: The conceptual approach in WP 5.

3 Methodology

Based on the reported corridor specific bottlenecks, and the related ICT and technology gaps identified, T5.1 produced a number of points as input to the development of the initial R&D recommendations. These were included in the T5.2 analysis and further elaborated on.

Further, all Strategic Research Agendas from relevant Technology Platforms were revisited and the main objective was to document the following elements:

- SRA work & related challenges
- SRA specific R&D Recommendations
- Identify R&D GAPS and recommendations – hereunder providing an overview of the following.
    - identify on-going R&D activities that are specifically targeted for solving the identified bottlenecks, and
    - equally important if there is a lack of activities for solving the identified bottlenecks (i.e. disclosure of R&D gap).

It should be noted that the identified R&D recommendations are limited to the results from the SuperGreen corridor analyses, and from the analysis of other relevant sources (e.g. Transport Research Knowledge Centre, EC – Research and Innovation- Transport, The Green Car Initiative, etc.).

By reviewing SuperGreen work and other relevant sources, the main goal for T5.2 is to develop R&D recommendations that intensify and go beyond what is already defined by different EC transport Research Advisory Councils and other research initiatives. Hence, key objectives of this first version of D5.2 has been to identify and provide an overview of relevant initiatives playing key roles in shaping the directions of future R&D efforts, as well as identifying main elements for R&D recommendations.

4 Background

Although the significance of previous and on-going R&D efforts has resulted in considerable advances towards increased efficiency and reduced environmental footprint within the European transport industry, there is still a need for further efforts to support the development of efficient transports and the free movement of goods within the EU.

A closer look at European trade and the region's modal split reveals that road transport in 2008 accounts for as much as 1.878 Billion tonne-km (Btkm) of all goods transported within the EU. This is 46 % of the total Btkm, with rail, inland waterways and short sea shipping accounting for 11 %, 3,5 % and 36 % respectively (European Road Statistics, 2010). This understates clearly that road is by far the preferred mode of transport within Europe today. Although the growth in trade has resulted in the development of a more cost effective SSS network, linking Europe's major hub ports to smaller European ports, particularly in the Baltic Sea but also to UK, the Iberian Peninsula, and the Mediterranean Sea and the Black Sea (ref. feedering), the current situation in ports and on the European road network gives rise to serious concerns. Due to a lack of transport capacity from infrastructure struggling to cope with the increase in traffic volume, the European road network is suffering from congestion. The European freight volume is predicted to increase with as much as 50% by the year 2020. In addition, the White Paper (2011), targets for achieving a 60% reduction in emission from transport operations by 2050, and a 50% shift of road transports to rail and sea by 2050, clearly signalize that considerable actions are necessary (The EU White Paper, 2006; Baltic Maritime Outlook, 2006).

For EU as a region it is vital to continue the long-term efforts towards securing economic growth and minimizing the impact on the environment and the society at large. Important elements for reaching these targets are a prolonged effort towards establishing innovative infrastructures (e.g. Forever Open Road, energy neutral or energy generating motorways), on new organisational concepts (e.g. payload sharing, advanced logistics, supply chain management and e-freight), and methods of working related to their introduction and on innovative vehicle technologies (e.g. modular vans and lorries, electric and diesel-electric vehicles, etc.), (EU White Paper, 2011, Green Cars Initiative, 2010).

This work includes important aspects such as developing measurements of transport impact on society, establishing a consensus on the measurement framework for transport and logistics environmental footprint, and on the measurements of transport and logistics performance.

Another aspect is to secure technology uptake by the industry. An example of the importance of technology uptake by the industry is provided by the Second IMO Green House Gas (GHG) study (2009), identifying that 1,046 million tonnes (3.3 %) of global CO2 emission in 2007 came from shipping. A significant potential for a reduction of GHG through technical and operational measures were acknowledged, and if implemented, these measures could in total increase efficiency and reduce the emissions rate by 25% to 75% below the 2007 level.

5 Transport industry and technology uptake

The level of technology uptake in the transport industry is vital for deployment and implementation of R&D results in the market, as well as for securing critical feedback concerning further development needs. The main objective of this chapter is to provide best practice examples from successful industry implementation of technological advances and R&D results that have a significant impact on improving the environmental footprint and efficiency of transports. Although the overview by far is exhaustive, it provides a good indication regarding status of technology uptake, mainly focusing on the European transport industry.

5.1 Innovative Intermodal Transport

The European Intermodal Association (EIA), being a membership organisation with the mission of promoting sustainable intermodal mobility in Europe, published in 2010 a document containing 49 different fact sheets describing different cases of best practices, particularly related to intermodal transport. By showing adoption of innovative technology in intermodal chains, new types of services or business models, and successful entry into new markets, the fact sheets show how the intermodal transport industry has been progressing by successfully adapting to changing requirements and circumstances (i.e. representing technology uptake within the European transport industry). As such, the document can be viewed as an extension of the PROMIT[8] project, providing a comprehensive overview of transport related advances in terms of energy and operational efficiency (EIA, 2010).

Since most of the fact sheets relate to one or more chapters, their distribution across the different chapters are to some extent arbitrary, and should therefore not be interpreted too narrowly. However, the 49 fact sheets are grouped into five chapters, and below is a short introduction to the topic of the different chapters along with examples of fact sheets (EIA, 2010).

- The first chapter, 'intermodal transport today', briefly presents the geography of intermodal transport flows in Europe and is meant as an overall introduction to the intermodal transport sector.
- The second chapter, 'intermodal transport in supply chains', describes ways in which market players have integrated intermodal transport into supply chains and how the role of intermodal transport in supply chains has been successfully improved.
    - Fact sheet 1 describes how ocean line CMA-CGM controls the movements of its containers in the port hinterland in order to ensure their productive use.

[8] http://www.promit-project.net/; with a main objective of contributing to a faster improvement and implementation of intermodal transport technologies and procedures, and for helping the promotion of intermodal logistics and mode shift by creating awareness on innovations, best practices and intermodal transport opportunities for potential users as well as for politicians and for the research community.

  - Fact sheet 9 compares lead times and demonstrates that intermodal solutions on many transport links can deliver as fast as/or faster than road transport.
  - Fact sheet 12 explains what an efficient terminal could look like on the basis of an exercise in connection with the DIOMIS[9] project.

- The third chapter deals with 'business models and cooperation' and is of particular relevance to the intermodal transport sector, mainly since all intermodality somehow originates from cooperation and arrangements between different companies and very often involves public players as well. The fact sheets describe different models of cooperation for different purposes.
  - Fact sheet 14 describes how ocean line Maersk successfully entered the railway market by establishing BoXXpress and ERS Railways.
  - Fact sheet 17 is cooperation between railway infrastructure managers on freight corridors in order to pursue and coordinate improvements capable of culminating in breakthroughs in international rail transport.
  - Fact sheet 19 describes how different players in five different countries are involved in running the Bosphorus Europe Express. A pilot experiment demonstrated that a high quality service could be delivered through intense cooperation between operators, infrastructure managers and customs authorities.
- The fourth chapter contains fact sheets on 'innovative intermodal assets' and presents innovation through a more traditional approach by highlighting features of technological innovation and their use.
  - Fact sheet 32 presents the twin wagon which made semi-trailer transport on rail more attractive by adapting to semi-trailer design rather than the reverse.
  - Fact sheet 36 describes multisystem locomotives and the many differences between national railway networks that they overcome.
  - Fact sheet 37 describes SynchroTess, a terminal operation system which optimises all physical handling in the terminal and also incorporates administrative functions.
- The fifth and final chapter focuses on 'intermodal transport and society' by elaborating on how the interests of private enterprises and society coincide in the development of sustainable transport solutions.
  - Fact sheet 44 explains how ICT, in this case for river information services, can improve the utilisation of infrastructure, traffic safety and transport efficiency.
  - Fact sheet 47 describes how the Port of Rotterdam has incorporated sustainability objectives in the land reclamation, development and exploitation phases of Maasvlakte 2.

[9] http://www.uic.asso.fr/diomis/spip.php?article8

- Fact sheet 48 provides a methodology by DNV for mapping emissions that companies can use for measuring achievements in their sustainability objectives and for identifying quick wins (EIA, 2010).

5.2 Deep sea transport – cutting emission by operational measures

Maersk Tankers recently launched a service named 'virtual arrival', providing customers with the opportunity to affect the level of slow-steaming on chartered vessels. This is particularly valuable when congestion at the port of discharge will cause unnecessary waiting time. Allowing the customer to determine level of slow-steaming, thereby minimizing waiting time outside the port, creates the potential for a direct win-win situation both for the customer and for Maersk Tankers. The vessel will use less fuel and thereby reduce cost as well as CO2 emissions. This allows the customer to compensate for the "time loss" caused by the congestion - which would be the case anyway while the vessel is waiting to call the berth – by paying less for bunker fuel and similarly improve the CO2 footprint of Maersk Tankers. As such, the concept of 'virtual arrival' is an example where pure operational measures are implemented for contributing to CO2 reduction, while at the same time providing added value for the customer[10].

[10] http://www.maersktankers.com/Sustainability/Pages/FocusStories.aspx?SSItemId=1

6 Relevant Strategic Research Agendas (SRAs)

The main objective of this chapter is to provide an overview of focal European instruments promoting mode-specific R&D recommendations and development strategies, all targeted to answer future transport demands and challenges. Produced by various transport Research Advisory Councils, all represented by a wide range of European transport stakeholders[11], the different SRAs relevant for the SuperGreen project are briefly elaborated, namely the Road SRA (2010), the Waterborne SRA (2011), the Rail SRA (2011), and the Intermodal SRA (2011). The mode-specific focus is given by the nature of the different SRAs, although all documents contain elements for improving transport interfaces and co-modality. Since SuperGreen aims to promote R&D recommendations advancing and reinforcing the ones already identified, such an overview is necessary as well as useful. Further, in order to advance sustainable mobility across modes it is necessary to address both mode-specific and intermodal challenges.

It should be noted that all SRAs have been subject to recent revisions and updates, naturally also involving updates of recommendations for further R&D, including roadmaps for implementation.

6.1 The European Road Transport Research Advisory Council (ERTRAC)

ERTRAC, the European Road Transport Research Advisory Council, represents the diverse range of road transport stakeholders and brings them together with representatives from public authorities at the European, national, regional and urban levels. The main objective is to develop a shared vision and to ensure a timely, coordinated and efficient implementation of road transport research in Europe, with the objective to tackle the societal challenges of road transport and to enhance the European competitiveness.

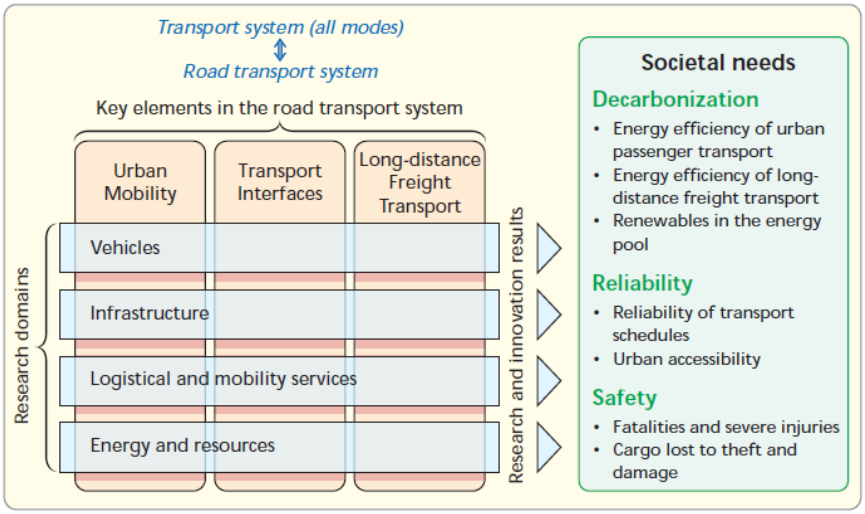

Figure 2: A systems approach to achieving a 50 % more efficient road transport systems (Source; ERTRAC SRA, 2010)

[11] consumers, manufacturers, suppliers, infrastructure operators and developers, service providers, energy suppliers, research organisations, cities and regions as well as public authorities at both European Union and national level.

As illustrated by both the above figure and the next figure, the innovation in European road transport is focused on urban mobility, transport interfaces and long distance freight transport. The research domains are vehicles, infrastructure, logistical and mobility services and energy and resources. The main objective is to improve and fulfil societal needs (such as e.g. interconnection between urban and rural areas by providing reliable transport systems) and to reduce negative societal impacts by e.g. minimizing environmental impacts and preventing and minimizing the number of incidents.

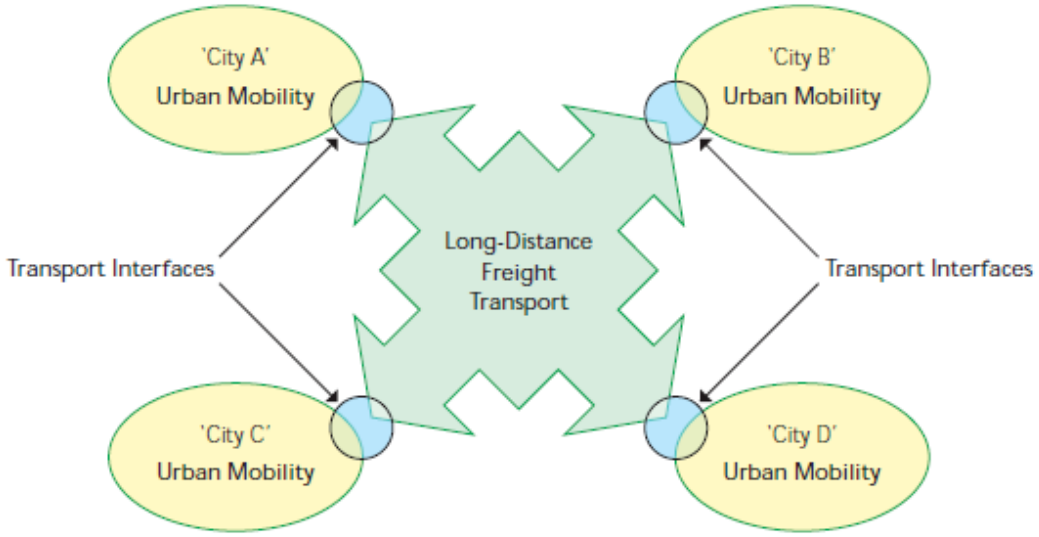

Figure 3: The focus areas and main elements of road transport research (Source; ERTRAC SRA, 2010).

For more details regarding specific research priorities for de-carbonizing road transport please view the ERTRAC Strategic Research Agenda[12] (2010).

6.2 The Waterborne Technology Platform (WATERBORNE)

WATERBORNE[13] is an initiative that came forth from the Maritime Industries Forum (MIF) and its R&D committee in 2005 and is making considerable efforts to regularly update R&D requirements in the maritime sector for European competitiveness, innovation and the meeting of regulations like safety and environment. The stakeholders include EU associations covering deep and short sea shipping, inland waterways, yards, equipment manufacturers, marine leisure industry, research and university institutions, classification societies etc.

A vision of the year 2020 (Vision 2020) was developed and was followed by the first WATERBORNE Strategic Research Agenda (WSRA) in 2007. The WSRA has now been reviewed and updated to reflect developments in the maritime sector. New environmental

[12] http://www.ertrac.org/en/content/ertrac-publications_10/

[13] http://www.waterborne-tp.org/

and economic challenges experienced since the publication of the first issue are also considered. The changes include an increased priority on CO2 reduction, the growing offshore renewable energy market and refitting existing ships to accelerate the introduction of the environmental and economic benefits of new technology.

The WSRA addresses the innovation challenges in the next 15 years, summarised under the 3 pillars of the Waterborne Vision 2020:

- Safe, Sustainable and Efficient Waterborne Operations
- A Competitive European Maritime Industry
- Manage and Facilitate Growth and Changing Trade Patterns

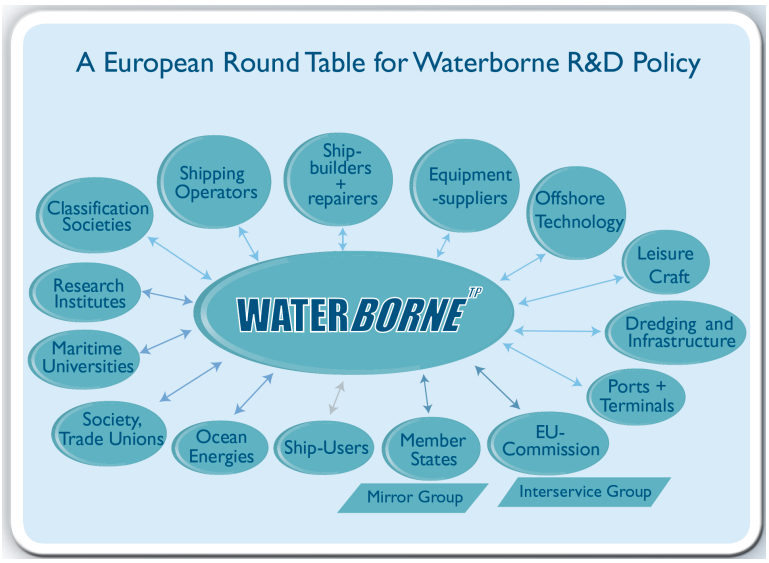

Figure 4: WATERBORNE stakeholders

For more details regarding specific research priorities for maritime transport please view the Waterborne Strategic Research Agenda[14] (2011).

6.3 European Rail Research Advisory Council (ERRAC)

The European Rail Research Advisory Council (ERRAC) was established in 2001 with the main objective to create a single European body with both the competence and capability to help revitalize the European rail sector and make it more competitive, by fostering increased innovation and guiding research efforts at a European level. ERRAC comprises 45 representatives from each of the major European rail research stakeholders: manufacturers, operators, infrastructure managers, the European Commission, EU Member States, academics and users' groups. ERRAC covers all forms of rail transport: from conventional, high speed and freight applications to urban and regional services.

ERRAC (2010) has defined a strategic roadmap for R&D for rail freight until 2015 to address the following issues: interoperability, new maintenance work management and information on the shipment position. The more recent documentation of the ERRAC

[14] http://www.waterborne-tp.org/index.php/documents

roadmap (2011[15]) has formulated three research agendas for promoting a rail freight modal shift. First is technical improvement through better wagon design for all types of services and reduced maintenance cost, enhanced train interfaces with other modes, track maintenance and traffic management to boost punctuality and reliability. Second is to address rail the system in view of creating a network through development of flexible local distribution with specialized operators, improving interoperability, cross border information system and harmonising safety rules towards seamless network goal. Third is the commercial and marketing issue to address new markets or reopen lost markets to road, organizing co-modality efficiently, real time information service to customers, interconnecting clients for easy tendering, integrated supply chain logistics and efficient spatial planning to support more productive rail transportation. The following figure show the seven ERRAC priority areas supporting rail as the sustainable backbone of single European transport area.

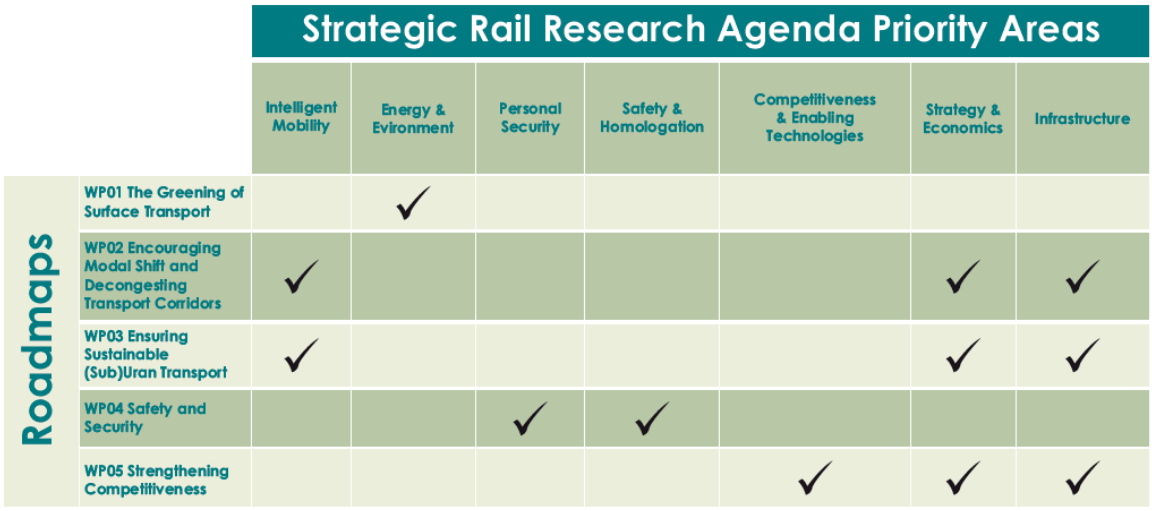

Figure 5: ERRAC strategic research priorities (ERRAC SRA, 2011)

For more details regarding specific research priorities for rail transport please view the Railway Strategic Research Agenda[16] (2011).

6.4 European Intermodal Research Advisory Council (EIRAC)

Launched in 2005, the European Intermodal Research Advisory Council (EIRAC)[17] is a peer group of more than 50 high level industrial players, and focuses on achieving interoperability between modes with a view to the creation of a single European logistic system in line with the objectives set out in the White Paper on Common Transport Policy.

EIRAC's mission is to determine the vision, scope and content of the Strategic Research Agenda for intermodality as an important step towards the creation of a co-ordinated intermodal research strategy for Europe. The intermodal industry faces specific challenges of interoperability, logistics, security, socio-economics and education, and the SRA

[15] http://www.errac.org/spip.php?article4

[16] http://www.errac.org/IMG/pdf/railroute2050_errac_final_v2.pdf

[17] http://www.eirac.eu/

addresses all these challenges. The goal is to develop intermodal transport as an important part of the sustainable transport system. Intermodal transport then becomes a high quality service, which is seamless, reliable, available, accessible, secure, sustainable, accountable, and affordable.

In the SRA EIRAC has selected certain research priorities, and the selection of priorities has been based on objective criteria that EIRAC has established, taking into account relevant policies related to the fields considered most important. These are:

- Energy efficiency
- CO2 reduction and sustainability
- Efficient use of infrastructure
- Horizontal collaboration
- Supply chain policy
- Education and training
- Supply chain security

Table 1: EIRAC Strategic research priorities (EIRAC SRA, 2005)

	Interoperability Between Modes	Logistics	Security	Socio-Economics	Education and Training
Seamless	X	X			X
Accessible		X			
Reliable	X	X	X	X	X
Available		X		X	X
Sustainable	X			X	
Accountable		X			X
Transparent		X		X	X
Secure			X	X	
Affordable			X	X	

Regarding intermodal specific R&D priorities proposed by EIRAC, please see the SRA Rail Route 2050 – the sustainable backbone of the single European transport area[18].

[18] http://www.eirac.eu/documents/The%20next%20EIRAC%20Strategic%20agenda%202010-2030+.pdf

7 European R&D activities – efforts, status and results

Supplementing the previous chapter, an overview of current efforts and status within transport industry research results is also needed for SuperGreen to provide a set of useful R&D recommendations to be accomplished. This chapter provides information on a selection of relevant initiatives particularly targeted for promoting and disseminating information about R&D results. However, as European transport research covers a wide range of topics and themes, all promoting different sub-themes and tasks (often accompanied by detailed description of R&D recommendations), this analysis will be on a high-level. Initiatives identified are the Transport Research Knowledge Centre, EC-Research and Innovation – Transport, the Strategic Transport Technology Plan, and the ERA-WATCH platform. In addition, the newly established funding mechanism "the Green Car Initiative" is visited. Further, the main pillars and focal areas for the new R&D program "Horizon 2020" is provided (European Commission, 2011).

As such, the order and selection of the different initiatives may seem arbitrary. However the main focus has been on identifying key initiatives with the objective of transferring R&D results to the transport stakeholders, in addition to pure R&D supportive mechanisms. Note that the listed initiatives by no means are meant to be exhaustive.

7.1 . Transport Research Knowledge Centre (TRKC)

One main objective of the Transport Research Knowledge Centre (TRKC; an initiative funded by FP6) is to connect transport research with EU policy, and to provide an overview of research activities both on an EU and a national level. In order to meet those objectives, the Centre has developed two key services, namely the Compendium and the different Thematic Research summaries.

7.1.1 Transport Research in the European Research Area – a compendium

TRKC published in June 2010 the document "Transport Research in the European Research Area- a guide to European, international and national programmes and projects[19]". This is a compendium mainly targeted for the European Commission's Directorate-General for Energy and Transport (DG-TREN) with two main objectives:

- To establish a comprehensive overview of the extent of research and project results across the European research area.
- To make results available in a handy format to practitioners and policy makers.

Moreover, the compendium provides a summary of the outputs from the Transport Research Knowledge Centre (TRKC), a free-of-charge web portal that makes transport research results and best practices from the European Research Area easily accessible. As such it serves the role as a primary source of information for policy makers and research managers at European, national and local levels. In particular, it provides an overview of transport research funding mechanisms and sources at European, international and national level including a directory of programmes, a summary of thematic definitions and

[19] http://www.transport-research.info/download/TRKC_Compendium.pdf

information on the Thematic Research Summaries and Policy Brochures available on the TRKC portal.

The compendium is structured in four chapters:

- Chapter 1 explains the rationale behind the TRKC project and the methodology used to collect, monitor and analyse transport research programmes and projects across Europe. It also describes the other key publications such as the Thematic Research Summaries and Policy Brochures.
- Chapter 2 provides short definitions for each of the 30 themes chosen for categorising transport research projects. The relevant research results are summarised in the Thematic Research Summaries (please see section below).
- Chapter 3 describes the approaches to research management in 30 European countries, all members of the European Research Area. It also includes a list of government departments, ministries and the main actors involved in transport research as well as a list of identified programmes sponsored by these bodies.
- Chapter 4 covers the TRKC Thematic Research Summaries and Policy Brochures and gives an overview and brief description of all publications, which can be downloaded from the TRKC portal.

The nations covered in the compendium are Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and United Kingdom (TRKC, 2009).

The compendium is an important source of information for establishing an overview of relevant research initiatives that are not covered by the Framework programmes or the transport related Strategic Research Agendas (SRAs).

7.1.2 Transport Thematic Summaries of R&D efforts

Through the web portal of the Transport Research Knowledge Centre[20] (TRKC), 30 thematic summaries are available for the public, each providing summaries of project research results from across Europe. Although not an exhaustive compilation, the content of each Thematic Summary is structured according to:

- Associated policy issues
- Synthesis of findings from completed projects
- References to policy documents
- Projects contributing to each theme
- Implications for further research.

The latter is of particular interest for the SuperGreen project, and a compiled overview of the R&D recommendations from a selection of Thematic Summaries of particular relevance for SuperGreen is given in Annex 1. However, based upon the Thematic Summaries identified, being: Transport Management (2010), Safety and Security in Mobility (2010), Integration and Policy Development (2011), Environmental

[20] http://www.transport-research.info/web/publications/thematic.cfm

Aspects(2010), Freight Transport (2010), Infrastructure and Trans-European Networks (2010), Waterborne Transport (2010), Road transport (2010), and Rail Transport (2010), a synopsis of the R&D recommendations provided is provided below. Please note that the following elements apply to all of the mentioned Thematic Summaries:

- Decongestion of transport
- Engine and propulsion technology for increased energy efficiency
- Institutional cooperation (e.g. competitiveness, environment, energy, safety and security)
- Securing integration of supply chain and transport systems (pan-European interoperability).
- Strategies for awareness raising and training key stakeholders
- Infrastructure safety (data for reliable design and safety recommendations)
- Production processes and vehicle innovation
- Promotion of best practices and industry up-take of technology

7.2 EC – Research and Innovation – Transport

The website "EC- Research and Innovation - Transport" serves as a main hub for dissemination of activities within European research, presenting the latest advances within a variety of topics, and as such being an important source of information for a range of different stakeholders. In regards to transport, the website communicates a set of research priorities for all transport modes however those relevant for SuperGreen are related to rail, road, water, and multimodal. For a detailed overview of the different issues and challenges identified for the different modes, along with corresponding research priorities, the website[21] serves as an excellent reference point.

Although too detailed to be covered here in full, the issues, challenges and related R&D priorities for the different transport modes are related to:

- Greening of transport operations and the environment (incl. de-congestion)
- Interoperability between modes
- Competitiveness
- Safety and security
- Innovative materials and production methods

However, what should have been clearer is how the specifics of the R&D priorities are co-ordinated with the different SRAs.

[21] http://ec.europa.eu/research/transport/index_en.htm

7.3 Strategic Transport Technology Plan (STTP)

As outlined in the new White Paper on Transport Policy (2011), the European Commission has launched an initiative to develop a strategic framework for future transport research, innovation and deployment. Based on the shared goal of establishing an integrated, efficient and environmentally friendly European transport system, the STTP[22] is meant to introduce shared areas of technology that are particularly beneficial for transport stakeholders to co-ordinate their efforts. As an important step in realising this goal, transport stakeholders have been invited to take part in conferences and answering questionnaires, and the below is a selection of input received:

- Focus should be directed towards identifying the links and commonalities between Research & Innovation within infrastructure, vehicles and the users.
- Increased attention should be directed towards the changes experienced by the maritime industry as a consequence of environmental demands and rising fuel costs.
- Investigations should focus on whether a framework for fuel efficiency will contribute to increase the innovation speed and technology take-up.
- The STTP should clearly distinguish between the needs between inland waterway transport and seagoing transport.
- Safety and security are key issues that must receive more attention

7.4 The ERA-WATCH platform

The ERA-WATCH[23] platform is the European Commission's information source on European, national and regional research systems and policies, with a main objective of supporting policy-making in the research field in Europe and to contribute to the realisation of the European Research Area (ERA). The long-term initiative is a joint effort by European Commission's Joint Research Centre - Institute for Prospective Technological Studies (JRC-IPTS), Directorate-General for Research and Innovation (DG-RTD), in close collaboration with the Directorate-General for Enterprise and Industry (DG-ENTR).

Covering a total of 61 countries; the 27 Member States of the European Union, 13 countries associated with the European Community's Research Framework Programme and 21 third countries, the platform holds relevance for WP 5 due to the extensive overview of up-to-date information and analysis of national funding mechanisms and regional and EU level R&D programs[24].

However, due to the tremendous amount of information available for each country (e.g. overview of funding flows and structure of the research system, regional research policies, policy mix, governance structures, research funders, research performers, national policy and European research area, etc.), how a review of this platform will be carried out will be addressed in the second and final version of D5.2.

[22] http://ec.europa.eu/transport/research/sttp/doc/report_sttp_public_consultation.pdf

[23] http://erawatch.jrc.ec.europa.eu/erawatch/opencms/about/

[24] http://erawatch.jrc.ec.europa.eu/erawatch/opencms/information/country_pages/

7.5 The Green Car Initiative

From the outset of increasing global and local pollution arising from transport of passengers and cargo, along with the necessity to further develop production processes for securing competiveness of European car manufacturers, the Commission has established a program to support research within the area of greening transport modes. By focusing both on passenger and cargo transport, the "Green Car Initiative[25]" provides funding for research within a variety of areas, and the most essential ones are listed below:

- Electric and hybrid vehicles
- Logistics (de-congestion and interoperability across modes)
- Internal combustion engine (increased energy efficiency and decreased emission)
- Biofuels
- Hydrogen fuel cells

The initiative also aims to provide the European industry with a financial boost for increasing the development and implementation of green transport technologies through the establishment of Public Private Partnerships.

7.6 Horizon 2020

Horizon 2020[26] is the new EU research framework programme planned for the period 2014 to 2020, replacing the 7th framework program. Three main research areas are described: Social challenges, industrial development and strengthened R&D:

- Societal challenges include research on health, demographic changes and wellness, food security and bio-based economy, safe, clean and effective energy, smart, green and integrated transport, access to raw materials, resource efficiency and climate handling, including, innovative and safe society.
- Industrial development includes leadership in generic and industrial technologies, access to risk capital and innovation in small enterprises.
- Strengthened R&D includes strengthened basic research, future and emerging technologies, qualification and carrier development and research infrastructure.

Particularly relevant for the SuperGreen project is how the new Research program aims to secure development of smart, green and integrated transport solutions for contributing towards the development of a resource-efficient, environmentally-friendly, safe and seamless transport operations. Highlighting the need for breakthroughs in research, innovation and pan-European implementation of green technologies a number of activities are described. These are given below:

- Resource efficient transport that respects the environment
    - Securing greener transport mode design (energy and noise efficient)

[25] http://ec.europa.eu/research/transport/road/green_cars/index_en.htm

[26] Horizon 2020 – The Framework Programme for Research and Innovation, COM(2011) 808 final, November 2011

  - Developing smart equipment and infrastructures
  - Improving transport and mobility in urban areas
- Better mobility, less congestion, more safety and security
  - A substantial reduction of traffic congestion
  - A substantial improvements in the mobility of people and freight
  - Developing and applying new concepts of freight transport and logistics
  - Reducing accidents rates and fatal casualties and improving security
- Global leadership for the European transport industry
  - Developing the next generation of transport means as the way to secure market share in the future.
  - On-board, smart control systems
  - Advanced production processes
  - Exploring entirely new transport concepts
- Evidence-based transport policy for the long term

7.7 Status of EU R&D efforts for Green Corridors

The overview of R&D priorities and recommendations described in the Technology Platforms in the previous chapter (i.e. the SRAs), in addition to Horizon 2020 and the Green Car Initiative, clearly show an increased focus towards developing intermodal, energy efficient, and more competitive solutions for the transport industry. The latter encompassing a variety of topics, spanning from business models to pure operational measures.

At the same time, the significant source of information represented by The Transport Research Knowledge Centre, The EC – Research and Innovation web site, clearly show that the scope of R&D topics covered by various stakeholders are extensive and wide-ranging. In addition, these are very positive efforts and processes for dissemination of transport and intermodal best practices throughout Europe.

However, the scope and the variety of R&D recommendations identified is no guarantee for successful implementation and industry adoption of project results. As identified in other SuperGreen deliverables (D2.5 and D4.1v2), there are still a number of transport bottlenecks that need attention and alleviating measures. The latter forming the basis for of the R&D recommendations, while also being the main output from D5.1. The following section will therefore revisit these recommendations before the initial set of R&D recommendations are presented in chapter 9.

8 Findings and recommendations from D5.1

Another key starting point for the development of R&D recommendations is naturally importing the findings and main conclusions from D5.1. The results from D5.1 indicates that the majority of bottlenecks identified can be improved by facilitating implementation and harmonisation of existing ICT-related measures, rather than of "hard" technologies. In many cases it also seems to be a matter of policies and harmonisation of regulations, and political reluctance to implement what is already available in terms of ICT systems and technologies, than a question of need for new developments.

The identification of unsolved bottlenecks was categorised according to some overall needs for mitigating measures (i.e. operational, ICT and transportation technology, Infrastructure, Policies, Legislation and regulations, and other). Gaps as basis for R&D recommendations were identified according to these needs based on what is available of technologies and ICT. In case gaps are considered as policy issues, this will be taken care of in WP 6.

Acknowledging that much work still remains to be accomplished the initial set of R&D recommendations is summarized in the table below.

Table 2: Task 5.1 input to R&D recommendations

Task 5.1 input to R&D recommendations
1. Within the ICT domain, a portfolio of systems and solutions already exists. However, there is still a need to further streamline and harmonise solutions to fulfil the overall requirements of co-modality and secure interoperability.
2. There is a need for increased emphasis on implementation of available supply chain management systems and solutions throughout the chain. Further elaboration on actions and measures that could reduce obstacles and improve stakeholders' ability to adopt them should be strengthened.
3. In some areas assignment of icebreakers to vessels is key issue for improved safety and efficiency of operations. There is still a gap in the implementation of available systems, and as part of this need for implementation of new functionality to meet user needs.
4. Major bottlenecks still exist due to lack of harmonisation at a Pan-European level. Existing policies and regulations on a Pan-European level should be further analysed with the aim of improved harmonisation throughout Europe. Examination of all measures and actions that could solve incompatibility issues, enhancement of ICT integration and ensure interoperability.
5. In some areas there is a reluctance to implement available technologies and solutions that would improve the efficiency of e.g. border crossings. Further efforts should be accomplished for piloting of available technologies and solutions in regions to improve efficiency.

6. There is a continuous need for further development of key technologies that improve green corridor benchmarks. Technology, necessary to pursue R&D efforts within energy and propulsion systems, cargo handling and transfer, fuels and sources of energy, vehicles, navigation technologies for energy efficiency, fleet optimisation, etc., should be further developed and implemented. Actions and measures that may reduce obstacles and improve stakeholders' ability to adopt them should be emphasised.

7. Smaller ports should be developed to be the preferred ports for European Short Sea Shipping by means of tailored functionality and equipment, as they are often more efficient for this kind of services than bigger ports.

8. Develop and implement through piloting decision support systems to benchmark and compare energy use and emissions on a uniform level for all transport modes, also in co-modal solutions.

9. Rail freight operation is much about optimising the use of journey time. However, in order to facilitate this more efforts should be targeted towards gaining access to the data, including structuring it for optimal use, allowing for measurement of potential time saving and thus less emission.

10. Within the rail industry measures are also needed for raising load factors, optimizing train length and weight for best use of available paths.

9 SuperGreen R&D recommendations

This chapter's main objective is to present the initial set of R&D recommendations as identified by the SuperGreen project. As with the different SRAs already presented, focus is initially directed towards identifying and elaborating on mode-specific recommendations (i.e. SSS & intermodality, Road and Rail), before a wider and intermodal approach is applied in the final section by elaborating on the SuperGreen common development needs. The latter was initially presented by D2.5 as important areas to improve in order to facilitate bottleneck mitigation and corridor benchmark achievement.

Please note that the following joint discussion of SSS and intermodality rests upon the nature of the industry (i.e. being fully dependent on operations in port of loading and port of discharge). Moreover, it also rests upon the value inherent in viewing SSS in a wider perspective (i.e. becoming an integrated part of the transport chain), and the number of previous EU projects carried out with a similar focus.

As such, this first version of D5.2 will identify the main directions of future R&D efforts and present initial recommendations for future R&D specific activities to be accounted for in Horizon 2020, TEN-T 2014-2020, and InterReg IVC

9.1 Waterborne and intermodal specific R&D recommendations

9.1.1 Operational recommendations

Regarding pure operational bottlenecks related to waterborne operations and intermodality there are a number of on-going alleviating activities, which also are addressed in the recent updates of the SRAs. In addition to a number of projects that have been launched for improving intermodality operations, research has also focused on developing new vessel concepts that enable a better integration of SSS into intermodal operations. As of this, R&D recommendations include:

- Continued focus on further development of cargo handling systems, integrated transport systems, promotion of best practices, efficient terminal lay-out, and port hinterland connections.
- Energy efficient and propulsion technologies, including development of non-fossil fuel technology
- Development of technology minimizing emission to air and water (i.e. propulsion technologies, exhaust cleaning systems, and grey/black water treatment technology).
- Development of vessel concepts creating a stronger link between shortsea and inland waterways
- Contribute to increase technology up-take of new innovations
- Increase the attractiveness of maritime professions through developing new training programmes, career opportunities, and technology for improving life at sea.

9.1.2 ICT and transportation technology recommendations

There is a growing concern for developing actions to get better and transparent information of freight flows among the different transport stakeholders. Hence, policy decisions at European level should reflect the needs of the co-modal transport industry to contribute to promote sustainable and effective logistics throughout Europe. Recommendations for R&D are therefore covering the following:

- Continue work for the development of harmonised ICT and decision support systems.
- Development of ICT systems that promote and support development of improved business models (e.g. new intermodal transport solutions based on logistics and co-modality require the deployment of a new range of suitable ICT systems and technologies to become a real option for shippers).
- Efforts for gaining a deeper understanding of future demands within the ICT domain and transport technology, in addition to definition of ICT system requirements.

9.1.3 Infrastructural recommendations

An efficient and seamless European transport system depends on efficient hubs or nodes that enable multimodal interconnections. With reference to the research initiative "Green Hubs", and the development of sustainable transport operations, recommendations for R&D cover:

- Further development of a network of intermodal terminals across Europe, being part of multimodal supply chains
- Development of transport technology and operational solutions targeting alleviation of the growing congestion on European roads and port access

9.1.4 Recommendations related to policies, legislation and regulations

There are some interesting measures related to solving the problems concerned with legislation, regulations and procedures in order to make maritime transport safer, more secure, greener and more competitive. Although this is the main focus of work package 6, the following recommendations are identified by work package 5:

- The lack of harmonisation of national regulations within various fields between nations.
- The barrier for carriage of dangerous goods due to differing regulations between transport modes, and thus also being a barrier to free market competition. Currently, the rules and procedures are highly more complex for sea transport than for land transport.

9.2 Rail specific R&D recommendations

Many of the challenges faced by rail transport are identified and their anticipated solutions are well known by the industry. However, there is a glacial response from the European

railway sector to the recognition and response to these and a reluctance to undertake the sort of macro and micro reforms needed to make rail a more attractive option to shippers.

9.2.1 Operational recommendations

At the operational level previous projects including NEWOPERA and RETRACK have provided a number of R&D recommendations also relevant for SuperGreen. These recommendations can be viewed in annex 2. In addition, the following R&D recommendation applies:

- For long distance operation, considerations should be made regarding how many large rail freight operators that would be the ideal number for optimised operation of a rail corridor. The rationale is that the appearance of a few more large players (such as DB) in the rail freight market would be helpful to bring the long distance cross border rail freight to be more competitive against road freight. In turn this will invite alliance of smaller players to form as a bigger player that consequently creates a competitive market.

9.2.2 ICT and transportation technology recommendations

The rail industry needs to focus on developing solutions that produce quick but also sustainable results in terms of additional traffic and revenue, and there needs to be a much more profound adoption of commercially based initiatives. This needs to be matched with measures to constrain and drive down costs commensurate with a drive to raise asset and resource productivity by factor amounts. Also, in terms of "green technology" identified by the project (e.g. braking energy recovery for rail), efforts should be targeted for identifying areas of application. This because most rail electrified operations should be capable of incorporating regenerative braking irrespective of the line voltages used. Moreover, R&D recommendations also include the following:

- Efforts for shifting focus from over-reliance on technical measures towards more commercially based initiatives should be investigated.
- Identifying where and on which corridors such "green technology" should be promoted and implemented.

Also, the benefit of European Rail Traffic Management System (ERTMS) for advancing interoperability has been around for sometime (e.g. Vinck, 2006). Within the rail industry there is evidence that countries like UK, Sweden and Germany are setting targets to implement the technology extensively within the next few years. The fact is that many rail actors/operators are still in doubt of the returns out of the high investment made. This is particularly true as high investment will create more expensive service and in turn reduce the competitiveness of the rail service to other modes. However, it has been highlighted that ERTMS would only make economic sense if all the corridors (long distance ones), are equipped with such technology (Schabert, 2006), which then reinforces questions about its deployment and the benefits that flow from its application.

9.2.3 Infrastructural recommendations

Moreover, the rail sector needs to stop prioritizing its own supply side measures as a priority and attempt to deliver against customer requirements and expectations to levels

that make it competitive with road transport. At the same time there are challenges related to utilisation of wagon assets, but also for developing new economic concepts adapted to more sustainable operations. As such, recommendations for R&D activities encompass:

- R&D on developing strategic supports and promotional campaigns specifically targeted for the rail industry.
- Development of economic concepts to be applied on different corridors in order to determine necessary investments in infrastructure, bottlenecks, bypasses, technology, rolling stock, longer heavier trains, etc. in order to increase productivity, and generate additional capacity dedicated to freight transport.
- R&D on how asset management can lead to reduced dwell times and improved commercial activity (i.e. clarification of responsibility for individual assets).

9.2.4 Recommendations related to policies, legislation and regulations

Although being the main focus of WP6, the full use of rail's "green" endowment should be made ensuring this is contributing to sustainability, both in economical and environmental terms. Further, SuperGreen also supports the recommendations already identified by NEWOPERA and RETRACK, namely:

- Future project supported by EU to sponsor new rail freight services on other corridor to start up in the form of repayable working capital through new mechanisms or via existing instruments such as Marco Polo;
- At the national level, the Member States need to ensure that incumbents do not retaliate on pricing to drive away the new entrants;
- Need for a complete through transit ability to track the movement of the train, wagon and cargo module independently of the railway administration to confirm ETA or any revisions.

9.3 Road specific R&D recommendations

9.3.1 Operational recommendations

One of ICTs main scopes is to overcome complexity of modern transport systems and procedural obstacles. Research should be at a high level aiming to increase visibility in the supply chain management, effortless information transferring, friendlier Graphical User Interfaces (GUIs), simplify operations, unify various stakeholders and different countries technologies. More specifically these include:

- R&D for dynamic vehicle routing using real-time traffic information.
- R&D for dynamic congestion charging to control traffic.
- R&D focusing on single window apps along the EU road network.
- Combined legislation and operational R&D efforts to decrease non useful level of complexity

- R&D with extra focus on operations, (toll charging, crossing borders, customs duties, dangerous goods,)

9.3.2 ICT and transportation technology recommendations

As stated before, ICT's implementation, adaptation and development are very crucial to the overall efficiency of the road transport. The R&D recommendations are focused in development, integration and implementation of road ICT technologies:

- R&D focusing in development of new, easily adopted and efficient ICTs to meet the future trends of road transport.
- R&D focusing in the integration of the existing road ICT technologies in order to increase performance and visibility.
- R&D focusing in information flow along the transport chain.

9.3.3 Infrastructural recommendations

Infrastructural bottlenecks in road transport are present and often magnified due to lack of stakeholders willingness for adaptation. To be more precise, the infrastructure sufficiency is dependent on the level of transport load and characteristics. The increase of transport load is developing bottlenecks on road transport and these bottlenecks can be overcome by enhancing road and related infrastructures, by increasing the efficiency and the capacity of existing infrastructure or by encouraging shifts of road cargo to other modes of transport. Therefore the R&D recommendations for road transport include:

- R&D for developing forecasting and simulation techniques for future road cargo flows.
- R&D for increasing infrastructure efficiency and performance
- R&D for increasing road modes efficiency, performance and payload
- R&D for enhancing modal shift from road transport to rail, sea and inland waterways.
- R&D on specific areas of road transport such as expert pollution charging systems in trans European road networks or congestion avoidance systems

9.3.4 Recommendations related to policies, legislation and regulations

Recommendations related to policies, legislation and regulations will be addressed in deliverable D6.2. In addition to this, it is a commonly accepted fact that ICTs in general are value added investments in the transport industry. Additionally those systems exhibit an eco friendly impact on the environment either by directly decreasing emissions and other polluters or by increasing levels of safety and minimising accidental pollution. To that extent, proposed R&D recommendations include:

- R&D efforts seeking for and designing appropriate funding methods to develop, install and operate ICTs especially for road.
- R&D efforts aiming to enhance homogenizing standards and procedures for road transportation among EU countries.

- R&D recommendations to adopt a single window intra-European application dedicated to road transport.
- R&D on the regulatory framework of selection of critical ICTs and transforming them voluntary to mandatory use.
- R&D on efforts to enhance the use of common EU policies and regulations over the nationals so as if to avoid multi-legislation issues.

9.4 SuperGreen Common Development needs

Considering one of the main objectives of SuperGreen, being supporting the development of sustainable transport networks, there are obviously several intermodal development needs. These are important to address for securing efficient and effective co-modal operations within green corridors, but also if the transport sector is to reach the objectives set by the White Paper (2011), targeting a 60% reduction of transport emission by 2050, and a shift in cargo transport from road to rail and sea by 50% within 2050. The common development needs are given in the figure below:

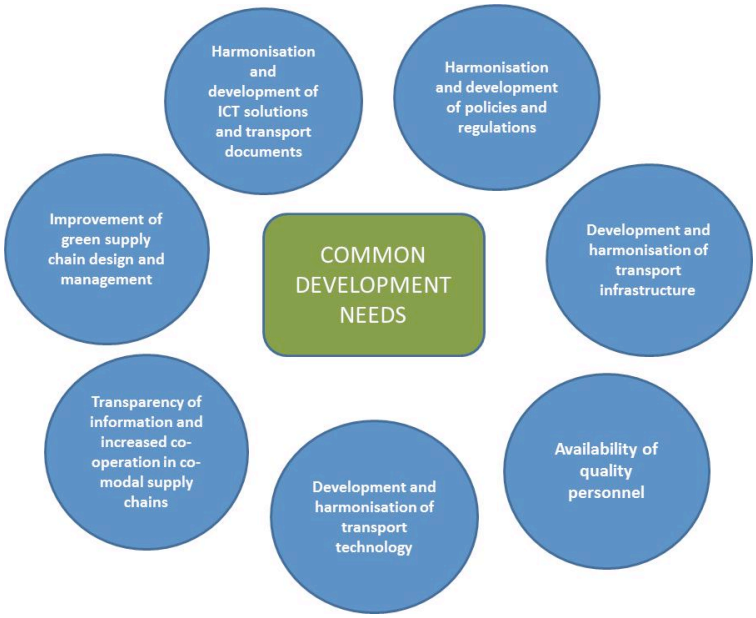

Figure 6: SuperGreen common development needs

The following tables therefore elaborate on these common development needs by presenting general findings and initial recommendations for R&D. In addition to accounting for the elements identified in D5.1 (as given in chapter 8), relevant issues from the conclusion of D6.2 are also included.

9.4.1 Improvement of green supply chain design and management

Area of development	*Improvement of green supply chain design and management*
General findings	SuperGreen analysis indicates that there is a lack of detail analysis of case-by-case specific needs and requirements. Although ICT solutions such as VTS, ERTMS, VMS are currently being applied in selected road and rail networks and in transport nodes (i.e. ports, terminals and freight villages), it is necessary to apply technologies in more segments or critical nodes in order to better distribute the traffic flow and reduce congestion (especially due to capacity limitation of rail and road networks). In addition there is a clear lack of data and statistics on transport performance, but also for identifying directions and intensity of cargo flows within the European region.
Recommendations	• In order to advance technology up-take of existing solutions, and the development of new ones, a study of all main ports and transportation systems are necessary in order to harmonise the implementation of dedicated ICT systems and solutions (i.e. targeted impact studies). • There is a need for increased emphasis on implementation of available supply chain management systems and solutions throughout the chain. • Further elaboration on actions and measures that could reduce obstacles and improve stakeholders' ability to adopt new technologies and ICT solutions should be strengthened. • As identified in D2.4 there is an evident lack of data and reliable tools enabling proper benchmarking exercises. This is critical for enabling measurement of transport performance. I addition, D6.2 concluded on a few issues also relevant for this development area: • The concept of cluster governance, applicable in cases where a closer integration of the involved actors could lead to overall performance improvements, needs to be further researched as it seems quite promising for supply chain applications. • The design of harmonised port tariffs that reward vessels operating on cleaner fuel whilst in port is a recommended market based measure for sea-going and inland waterway vessels sailing along green corridors.

9.4.2 Harmonisation and development of ICT solutions and transport documents

Area of development	*Harmonisation and development of ICT solutions and transport documents*
General findings	SuperGreen results indicate that the problem is not as much the development of the systems themselves, but more a lack of appropriate implementation and harmonisation in order to secure information transparency and efficient information exchange. Thus, R&D should focus on how this should be facilitated on a Pan-European basis (e.g. case by case specific definition of needs), while also on developing regulatory issues to enhance the use of dedicated ICTs. Moreover, there is a need to further streamline and harmonise solutions to fulfil the overall requirements of co-modality and secure interoperability
Recommendations	• Specifically related to transport documents, uniform European procedures and permits will definitely simplify transports, e.g. uniform European certificates and training CVs and documents. • For maritime transport, an adequate ICT system could not be identified for reduction of vessel waiting times outside ports (i.e. waiting for available quay space), creating an unnecessary increase in local emissions to air. It is therefore a need to develop a new system or to upgrade an existing system. Here, the mentioned operational measure implemented by Maersk for their deep sea services should be evaluated for SSS industry-wide application. • In terms of implementing harmonised ICT solutions, more focus should be directed towards performing implementation analysis in order to secure that the benefits outweigh the costs in the most effective manner. • There is also a requirement for implementing available decisions support tools for how to assign icebreakers to other vessels, with the use of already existing (communication)-technologies. From D6.2, there are particularly two issues worth mentioning: • Information sharing is considered as the basic pillar of supply chain integration. The merits of taking initiatives for developing interoperable and interconnected solutions at a global scale can be assessed. While respecting the different information needs at each level, such initiatives should standardise information and communication protocols in order to avoid data duplication. • Further actions are necessary to close gaps in national River Information Services (RIS) infrastructure and in the provision of services to logistical RIS users across Europe. The European and national legal framework on RIS needs updating and the implementation of the “European RIS Services” (e.g. European Vessel Certification Database, RIS Data Management System) is recommended.

9.4.3 Harmonisation of policies and regulations

Area of development	*Harmonisation of policies and regulations*
General findings	This is an issue for policy implications (i.e. WP6), rather than for research and development within ICT and technology. However, for the harmonisation and development of policies and regulations, a crucial conclusion is that the limit is not in the ICT technologies portfolio but in the willingness to adopt them. This is a main obstacle and challenge.
Recommendations	• One recommendation for this development area is that an examination of all actions and measures that could limit obstacles and enhance transportation shareholders to adopt them should be carried out. E.g. present and market the benefits, penalize inefficiency, analyse industry reluctance and user-friendliness of developed systems, etc. • Further, all policies and regulations already existing should be analysed and harmonised (European regulation is needed to favour the transport and reduce the obstacles).

9.4.4 Developing harmonised transport infrastructure

Area of development	*Developing harmonised transport infrastructure*
General findings	Harmonised transport infrastructure, including terminals and transport nodes, are vital for achieving overall efficiency of logistics networks, so as for the environmental profile of the co-modal supply chains. Fast hinterland connections for import and export traffic are therefore necessary, including remote gateways and their transport connections.
Recommendations	• Specifically related to SSS, smaller ports should be developed to be the preferred ports for European Short Sea Shipping by means of tailored functionality and equipment, as they are often more efficient for this kind of services than bigger ports. • Although application and verification of interoperable technologies in railways is on-going, harmonisation and renovation of infrastructure in the transport chain is needed. From D6.2 the following should also be observed • A comprehensive European transport network model similar in capabilities to TRANS-TOOLS should be used in all cost-benefit analyses of transport infrastructure projects enhancing comparability and compatibility of results. • The work performed on standardised estimation of transport-related external costs, with emphasis on measuring and allocating CO2 and other emissions, needs to be continued until a universally acceptable methodology is reached. The work of CEN and ISO in this direction needs to be supported

	and accelerated. • The Life Cycle Cost methodology needs to be introduced in decision making and environmental assessment. • At least one certified carbon and environmental footprint calculator needs to be developed and the relevant action of the 2011 White Paper is fully supported.

9.4.5 Development and harmonisation of transport technology

Area of development	*Development and harmonisation of transport technology*
General findings	In addition to developing key technologies supporting achievement of corridor benchmarks, on-going and future R&D activities within the area should continue its efforts within energy management and efficiency, emission reduction technology, operation decision support systems, cargo handling, etc., should be further developed and implemented.
Recommendations	• Actions and measures that may reduce obstacles and improve stakeholders' ability to adopt them should be emphasised. One key activity could be to apply pilots for developing and implementing decision support systems for benchmarking energy use and emissions on a uniform level for all transport modes, also in co-modal solutions. • Further, and as noted above, another crucial conclusion in terms of ICT is that the limit is in the harmonisation and integration ability of systems, and not as much in developing the technology itself. There are many incompatibility issues among the candidate list of ICT systems making integration a difficult issue, representing a main obstacle and challenge. Related to this particular development need, D6.2 identified the following corresponding issues: • Investigation and impact studies of conditions under which slow steaming in EU's short sea routes seems favourable should be accomplished. This will inevitably necessitate the creation of a ship speed surveillance system which will make sure the rules will be obeyed even in times of high demand for shipping services. Caution should be exercised to avoid reverse modal shifts. • Introduction of a load efficiency labelling system that provides incentives to transport operators for improving the load factors of their vehicles should be studied and reviewed.

9.4.6 Availability of quality personnel

Area of development	*Availability of quality personnel*
General findings	Despite being an important topic, the issue has not been particularly investigated by the project and possible alleviating measures in terms of ICT and technology will therefore not be elaborated on. However, according to what has been identified as relevant measures in an intermodal context a few aspects are noted.
Recommendations	• Uniform European procedures and permitting to simplify the transport are Uniform European CV to obtain the identification of the training and skills of personnel at an European level, and educational and training passport is needed to have specialized personnel • In order to face the shortage of maritime professionals there is a need to develop actions for increasing the attractiveness of transport occupations, promote investments in new training programmes for the professionals and create new career opportunities. In relation to manning requirements for inland navigation vessels, D6.2 notes that these are only partially harmonised across Europe and in some countries are considered unnecessarily high. A revision of the current legislation is therefore needed.

9.4.7 Improvement of transparency of information and increase of co-operation in supply chains and transport systems

Area of development	*Improvement of transparency of information and increase of co-operation in supply chains and transport systems*
General findings	Within the area there is a need to solve the mentioned incompatibility issues among transport modes and examine regulatory measures to implement dedicated ICT systems. Further, this work must be supported by detail analysis of corridor specific needs.
Recommendations	• R&D should focus on appropriate measures to solve obstacles and enhance willingness to adopt and further improve the proposed ICT technologies. There is a portfolio of available technologies but users are seldom aware of its benefits and improvement potential. In addition, D6.2 concludes that developing fuel consumption standards for trucks could be a viable approach for improving transparency of supply chain and transport system performance.

10 Conclusion

In order to develop recommendations for future R&D calls within the transport domain, a number of relevant sources have been investigated. In addition to incorporating input from D5.1, focus has also been directed towards WP2, WP3 and WP4.

From the work carried out it seems that the recent updates of the different SRAs from the relevant Technology Platforms, along with the respective roadmaps for implementation, represent clear and profound long-term development strategies. Supported by detailed description of R&D activities, each Research Advisory Council aims to support the achievement of the following European transport objectives:

- Improved sustainability of operations
- De-carbonization of modes
- Improved competitiveness

Supporting the above, although much work within the project remains before a set of final and detailed recommendations can be presented, the initial SuperGreen results presented do show that there are still room for broadening existing and defining new areas for R&D activities. The SuperGreen common development needs are as such an effort to advance and initiate intermodal activities supporting the improvement of more sustainable intermodal operations on a corridor and Pan-European basis. When summarising the results from the analysis, the following generic measures are noted:

- There must be an increased focus on rectifying the evident lack of data and reliable tools enabling proper benchmarking exercises within the transport domain.
- A further strengthening of efforts securing integration and implementation of harmonised ICT solutions, also developing new ones.
- Increased focus on corridor and case-by-case specific analysis, both in terms of requirements and tailored solutions.
- Performance of impact studies for assessing potential environmental and cost savings when introducing new ICT and technology solutions
- Further development of freight flow optimisation and traffic management tools
- Efforts to enhance cargo interchange between transport modes, including expansion of the technology uptake by industry.
- Actions to improve the energy efficiency among transport operations and reducing dependency on fossil fuels.
- Development of harmonised transport documents

A further detailing and revision of R&D recommendations presented in chapter 9 will be the main focus of the final version of D5.2.

11 References

Baltic Maritime Outlook, (2006), " Goods flows and maritime infrastructure in the Baltic Sea Region".

EIA (European Intermodal Association), 2010, Innovative Intermodal Transport

EIRAC (2005), Strategic Intermodal Research Agenda 2020

ERTRAC, (2010), European Green Cars Initiative, IV. "Logistics and Intermodality"

European Union Road Federation, (2010), European Road Statistics

Green Cars Initiative (2010), IV. "Logistics and Intermodality"

IMO (2009), " Prevention of Air pollution from Ships, Second IMO GHG Study 2009"

Schabert, H. (2006) Technical requirements and innovations in rail freight in *Europe's rail freight market* pp:175-189. Community of European Railway and Infrastructure Companies (CER). Eurail press

The European Commission (2007), "Freight Transport Logistics Action Plan", COM (2007) 607 final

The European Commission (2011), "Concerning the Specific Programme 'Tackling Societal Challenges' implementing Horizon 2020 – The Framework Programme for Research and Innovation (2014-2020), Council Decision, Draft version.

The European Commission (2006), " Keep Europe moving - Sustainable mobility for our continent. Mid-term review of the European Commission's 2001 Transport White Paper", Brussels, COM(2006) 314 final

The European Commission (2011), "WHITE PAPER - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system", Brussels, COM(2011), 144 final

TRKC, 2009, "Transport Research in the European Research Area- a guide to European, international, and national programmes and projects"

Vinck, K. (2006) Developing European freight corridors with ERTMS – new European political initiatives in *Europe's rail freight market* pp:79-89

12 Annexes

12.1 Annex 1 TRKC – Thematic R&D implications and recommendations

Transport management – Thematic Research Summary

The transport management theme is very wide ranging, covering all transport modes and overlapping with numerous other themes. However, by referring to 35 projects (25 being EU funded), it includes traffic management for all modes as well as mobility management aspects for passengers and logistics for freight. When summarizing implications and recommendations for further R&D, the document highlights the following:

- Congestion, conventional pollution, health damage and accidents are largely concentrated in urban areas and need to be addressed in an integrated way.
- EU-sponsored research is continuing into the formulation and exchange of best practice in areas such as transport infrastructure, norm-setting, congestion and traffic management, public transport services, infrastructure charging, urban planning and safety issues.
- Although much technical research work has taken place, delivering transport and traffic management tools, processes and best practice, further research into costs and benefits of various aspects, services and tools related to transport management is needed, due to continuing lack of exploitable data in most modes and sectors.
- Similarly, in some cases research is needed on the integration of tools and processes into existing business models.
- Business model research needs are rather specific to individual organisations and local circumstances, hence research at EU level may not necessarily be appropriate in all cases, but further dissemination and exchange of good practice solutions to such issues and examples of successful implementations would be beneficial.
- Furthermore, several of the systems and concepts developed require more robust testing in a real environment (with real users) over longer periods – i.e. Field Operational Tests (FOTs). This is now a major area within FP7 related to Information and Communications Technology (ICT) for transport.
- There is a continuing requirement for support from the EU for some key pan-European industrial projects, in particular SESAR (for air traffic management) and ERTMS (for rail).

Safety and Security in Mobility – Thematic Research Summary

The document deals with Safety and Security in transport, although the emphasis of the current issue is on safety, mostly due to the fact that security is quite a new theme which in turn limits the availability of research results. When summarizing implications and recommendations for further R&D, the document highlights the following:

- Road infrastructure safety is an R&D topic that is perceived to be an area that only to a limited extent is investigated. Lack of availability of comprehensive data as input to reliable design and safety recommendations prevails. Hence it has been suggested in the course of recent research to collect more data on the performance of the same (design and safety) in different accident situations. Information on infrastructure and maintenance costs of various design and safety measures need to become more easily available.
- Finally, the roles of the various European Technology Platforms should be mentioned in the context of future research plans and strategies such as the Strategic Research Agendas from the European advisory councils for road, rail, waterborne, air and intermodal transport (ERTRAC, ERRAC, WATERBORNETP, ACARE and EIRAC respectively).

Integration and Policy Development –Thematic Research Summary

This document includes an upstream analysis of policy options, long-term visions and scenario-building, as well as transport planning aspects on a transversal level, e.g. taking into account economic, environmental, societal, land use or other factors. When summarizing implications and recommendations for further R&D activities, the document highlights the following:

- The interdependence between freight and passenger transport should be explicitly modelled and there should be an improvement in the relationship between the policy levels and the functioning of the transport system.
- The definition of a series of population thresholds for urban areas, for which national transport data should be disaggregated and reported to Eurostat, measuring performance in a consistent manner when assessing it against common overarching national and European objectives, and the definition by the EC/Eurostat of a small number of 'quick win' indicators for which the Member States should provide data at urban level, measured in a consistent way. These should concentrate on outcome indicators for which there are common objectives at the European level and for which national data is already collected for all countries.
- A standard definition for transport fatalities and serious injuries, continued research aimed at defining means to characterise and benchmark transport outcomes, and the launch of a periodic (e.g. every 3 to 4 years) Eurobarometer survey on urban transport issues for the EU-27.

Environmental Aspects- 2010 - Thematic research summary

The document covers 3 sub-themes by elaborating on background, research objectives, research results, and policy implications. When summarizing implications and recommendations for further R&D activities, the document highlights the following:

- With regards to sub-theme one, Global warming is now acknowledged to be an urgent issue, but this is not yet feeding through into research findings and there is a more urgent need for research into carbon creation in transport and its impacts on global warming. In similar vein, the need to act swiftly on the findings from the

large and growing amount of research into the rapid expansion of air transport, its environmental impacts and how they might be mitigated is becoming more pressing. More research on how to cost carbon emitted from transport most meaningfully is also required.

- Although much of the requirements for the fundamental research appears to be met, sub-theme two highlights that mitigation requires not only significant research and development of new transport technologies, but also considerable changes in operating practices in the transport industry as well as changes in transport behaviour, both in the shorter term through mode shifting and in the longer term, such as through changes in land-use planning.

Freight Transport – 2010 - Thematic research summary

The first part of the document includes a brief overview of the scope of the theme and summarises the main policy developments at EU level relevant to the theme. The second part contains a synthesis of the main findings and policy implications from research projects and identifies the implications for further research. When summarizing implications and recommendations for further R&D activities, the document emphasises need for further research in developing tools for increasing the competitiveness of waterborne transports. In particular, actions should be taken to on (SPIN-TN, 2005):

- Expand services such as PortNet to cover European Ports at a regional level, and through interregional exchange to achieve pan-European interoperability.
- Carry out surveys to identify all information requirements that can impact directly or indirectly on inland and short sea shipping. Then survey all currently available information tools to check whether the above identified requirements are included, and create a list of missing information. Finally, identify way for obtaining the missing information.
- Design a strategy for awareness raising and training key stakeholders of short-sea shipping, river-sea shipping, and inland navigation to encourage the exchange of commercial information, and how to best use such information for maximizing the efficiency of their processes and operations.

Infrastructure and Trans-European Networks – Thematic research summary

The theme of Infrastructure Provision is concerned with the design, construction and maintenance of transport infrastructures for all modes. Both physical networks and information and communication networks are considered as infrastructure. Further, the theme deals with aspects related to the development of the TEN-T including planning, financing and implementation. The following R&D activities are concluded for further actions:

- a number of proposals for research projects aimed at developing road infrastructure according to identified future needs (“Reliable infrastructure”, “Green Infrastructure”, “Safe & smart infrastructure”, “Human infrastructure”);
- recommendations for improving the toolbox and the methodology developed to apply Reliability Centred Maintenance (RCM), analysis to railway infrastructure;

- further research to prove the advantages of GNSS (Global Navigation Satellite Systems) safety applications in the railway environment and validate Galileo;
- issues for improving the proposed methodology for evaluating infrastructure projects;
- further research topics for the development of a common approach for transport infrastructure development in the Mediterranean area

Waterborne Transport – 2010 Thematic Research Summary

The theme comprises five main topics; short sea shipping, inland waterways, ship design, operation and maintenance, maritime safety, and ports and port operations. Following areas for further R&D are concluded:

- Pollution prevention / response, and ship dismantling (focus areas are propulsion, coatings, dismantling, and mitigation of accident-related pollutant spills);
- Vessel technology: propulsion, hull, on-board materials (designing propulsion systems featuring low emission targets, while at the same time defining low-pollutant standards for hull coatings, which also have consequences for the rate, effectiveness, and safety of future vessel);
- Safety of crew, passengers, and port personnel (improve procedures for accident-response, notably the efficient evacuation of passengers and crew. Further, safety of port personnel, particularly in the freight handling departments, is a necessary field of research, until recently neglected);
- Integration in the inter-modal transport chain (more classical sense of "vehicle technology" enhancement, particularly in the areas where competition with other modes is strong (short-sea shipping, and inland waterway commodity transport). Indeed, engine design and innovative propulsion methods are promising fields);
- Economics and business studies (for advancing intermodal freight management, and the efficient intermodal relationships along the handling chain, in order to reduce the bottlenecks often incurred at ports, reduce costs, and improve cost-price principles);
- Institutional cooperation (in order to enhance coordination in scientific, industrial and regulatory issues. Framework research could therefore tackle aspects such as competitiveness, environment, energy, safety and security and human considerations).

Road transport – Thematic Research Summary

The focus of research covered in this summary relevant to SuperGreen is on road infrastructure planning and operation, road vehicles and road use (including driving). Further, the recommendations for R&D given in this report are largely covered by ERTRAC's Research Framework[27] (ERTRAC, 2008), covering the following main aspects (and as such also to some extent being included in FP7):

[27] http://www.ertrac.org/pictures/downloadmanager/1/9/ertrac_research_framework_2008_13.pdf

- Urban Mobility: achieve sustainable mobility for passengers and freight in the urban environment
- Energy, Resources, and Climate Change: provide environmentally friendly road transport systems and a secure, renewable energy supply
- Long distance freight transport
- Road Transport Safety: reduce road transport injuries, fatalities, and accidents

According to the Road SRA, these main aspects will be met by the following elements:

- the world's most advanced electric and ICE propelled vehicles;
- the world's most advanced vehicle concepts, best adapted to their application;
- a road infrastructure network and associated management structure that is able to support the world's highest traffic intensities, as well as providing the highest levels of accessibility and reliability;
- logistical services that hold the highest operational levels of integration and collaboration throughout the entire chain;
- the world's most energy-efficient urban mobility solutions, which will simultaneously guarantee the highest degree of accessibility;
- the highest levels of decarbonisation for road transport fuels, and the most efficient use of fossil and renewable resources;
- the world's lowest level of fatalities and severe injuries per distance travelled, and the highest level of security in freight transport; and
- the world's most flexible and effective production and supply network, which is able to cope with the concurrent challenges of generating ample vehicle concepts, adapting to changing volumes and competing effectively in the global markets

Rail Transport – Thematic Research Summary

In relation to recommendations for further R&D efforts the report points to the seven research priority areas as identified in the ERRAC SRA, covering the following themes:

- Intelligent mobility, essentially to work towards a European-wide intelligent infrastructure with compatible technology between member states and across transport modes, to support improved customer information systems,
- Energy and environment, to work towards new standards and regulations which improve environmental performance and reduce dependence on fossil fuels without detriment to the commercial competitiveness of the rail mode,
- Combatting terrorism and vandalism in order to achieve improved personal security for rail customers and staff,
- Faster implementation of new technologies, to improve the spread of European homologation, calling for streamlined testing and acceptance procedures without compromising safety regimes,

- Enabling technologies for increased rail competitiveness, through the creation of more attractive products for customers and the reduction of life cycle costs through modern technology in all aspects of railway operation,
- New accounting and planning models are required to provide a better understanding of the costs of operating and maintaining rail infrastructure and how these costs vary with changes in types of train used and in service frequency, in order to improve rail economics and strategy.
- Infrastructure developments: there is a need to develop infrastructure systems that can deliver interoperability, increased capacity, increased axle weights and track stability whilst at the same time having low maintenance costs or even be maintenance-free.

12.2 Annex 2 R&D recommendations from NEWOPERA and RETRACK

- Apply economic concept to address specific corridors by making the necessary investments in infrastructure, bottlenecks, bypasses, technology, rolling stock, longer heavier trains, etc. in order to increase productivity, generate additional capacity to be dedicated to freight;
- Upgrading of old or unused rail lines as available resources to be exploited to make the best use of the available infrastructures;
- Make use of the opportunity to maximize capacity use of freight on the progressive introduction of the new High Speed Line in several European member States;
- Future project supported by EU to sponsor new rail freight services on other corridor to start up in the form of repayable working capital through new mechanisms or via existing instruments such as Marco Polo;
- At the national level, the Member States need to ensure that incumbents do not retaliate on pricing to drive away the new entrants;
- EU rail freight sector cannot retain a supply side model of operations in the vague hope that traffic will elect to use rail services under economic or environmental duress but to demonstrate that it can deliver supply side model of operation that is routinely consistent, reliable, customized, secure and cost effective services.
- Need for ease of access by potential users/shippers/cargo interests of the available train services, routes and schedules operated together with input on available space (wagons or container slots), prices, links to any pre or end haulage (road sectors for inter-modal and local trip workings for rail), terminal positions in terms of transit time and storage.

- Need for a complete through transit ability to track the movement of the train, wagon and cargo module independently of the railway administration to confirm ETA or any revisions.
- Disruption management and recovery systems to be in place with information passed to shippers/terminals/hauliers to facilitate re-planning and use of resources
- 24/7 railway
- Greater reliability and information exchange between the infrastructure mangers, train operators, 3PL and shippers.