TransBaltic

Towards an integrated transport system in the Baltic Sea Region

Study report

on

IMPLICATIONS OF THE EU TRANSPORT POLICY ON DEVELOPMENT OF SUSTAINABLE TRANSPORT IN THE BALTIC SEA REGION

Task 4.3 Sustainable Transport and Green Corridors

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List of Abbreviations

BSPC	The Baltic Sea Parliamentary Conference
BSR	Baltic Sea Region
CEC	Commission for Environmental Cooperation
CIM/COTIF	Contract for International Carriage of Goods by Rail
CMR	Contract for the International Carriage of Goods by Road
EC	European Commission
EIA	European Intermodal Association
ERDF	European Regional Development Fund
ETS	Emissions Trading System
EWTC II	East West Transport Corridor II
GHG	Greenhouse Gas
HBEFA	Handbook Emission Factors of Road Transport
ICT	Information and Communication Technology
ILO	International Labour Organisation
IMO	International Maritime Organization
ITS	Intelligent Transport System
MoS	Motorways of the Sea
NAFTA	North American Free Trade Agreement
NAIADES	Navigation and Inland Waterway Action and Development in Europe
Plc	Public limited company
SCANDRIA	Scandinavian Adriatic Corridor for Growth and Innovation
SEC	EU Secretariat-General documents (Staff working documents)
SME	Small and medium enterprises
SPCs	Short-sea Promotion Centres
STWC Convention	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
TEN-T	Trans-European Transport Network
TERFN	Trans European Rail Freight Network
TransBaltic	Towards an integrated transport system in the Baltic Sea Region
UNCITRAL	United Nation Commission on International Trade Law
VASAB	Vision and Strategies around the Baltic Sea 2010
WTO	World Trade Organisation

Introduction

European transport policy needs to face the challenge of maintaining the sector's competitiveness whilst curbing emissions of greenhouse gases. But there is also an opinion that this can be achieved through steps having a rapid, direct and tangible effect on costs[1]. Competitive, reliable and profitable transport is a precondition for European economic prosperity.

In order for freight transport to function seamlessly and with respect to sustainable development principals, an integrated and effective transport system in the Baltic Sea Region should be created. It should allow the use of environmentally friendly transport modes within the green corridor concept, which serves a new opening for the EU transport policies. With the Greening Transport Package the Commission aims to move transport further towards sustainability.

The report's major topic is the impact of the EU transport policy on development actions concerning sustainable transport in the Baltic Sea Region. The research is a part of the 4.3 task Sustainable Transport and Green Corridors, realised within the partnership of the TransBaltic project - Towards an integrated transport system in the Baltic Sea region.

The task refers to the EU freight transport agenda statement that well-organised freight transport contributes to sustainable and energy-efficient operations, and strengthens cohesion by enabling businesses across the EU, including the peripheral regions, to have better access and draw more benefits from the Internal Market. Moreover, to render freight transport more sustainable, the agenda emphasises a need to minimise energy consumption and pollutants, greenhouse gases and emission of noise caused by the carriage of goods.

Main topic areas of the study include:

- the challenges to the development of sustainable transport in the European Union and EU policy responses,
- identification of obstacles to sustainable transport development in the BSR,
- the green corridor concept as a new opening of the EU transport policies – what is new, what is old,
- the state of the research and development activities with regard to the green transport corridors worldwide,
- conclusions and recommendations for transport policies at EU, national and regional levels.

[1] Opinion adopted by the EESC plenary on 17 March 2010 in CES/10/34 Date: 18/03/2010: EESC calls for a green and competitive transport sector

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The existing transport system needs to be more "green-oriented" and should ensure added reliability of environmental protection. Transport policy is crucial not only for the economy but also for security and development. Therefore, concepts of "sustainable transport policy" need to be coherent and include the idea of co-modality. Modern sophisticated transport systems and transport technologies can facilitate development of new sustainable approach. Concept of greening transport is brought into life by implementation of European transport network projects, especially in the Baltic Sea Region. Thereby, analysis and development of this concept will play a major role in development of the whole region.

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1. Challenges to the development of the sustainable transport in the European Union and policy responses

The sustainable development objective of EU transport policy, which combines economic, social and environmental dimensions, can only be accomplished on the basis of an efficient set of law regulations[2].

Articles 154 – 156 of the EC Treaty define Trans-European Networks policy and its contribution to achieving the objectives of the internal market, social and economic cohesion for the benefit of all its citizens, economic operators and regional and local communities by targeting Community action to promote interconnection and interoperability of national networks as well as access to such networks. Furthermore, sustainable development must be integrated into the transport policy[3].

The policy development towards an integrated and sustainable transport system in the EU envisions:

- Provision of sustainable, innovative, intermodal and interoperable regional and national transport and logistics networks, infrastructures and systems,
- Modal shift strategies to encourage energy efficient means of transport,
- Optimisation of infrastructure capacity,
- Internalisation of external transport costs.

The existing and proposed EU measures in the field of sustainable transport will continue to be complementary to action taken by Member States, which are vital element in achieving sustainable mobility. All these initiatives are particularly important given the current political context. Both the European Parliament[4] and European Council stressed the importance of a sustainable transport policy, particularly in the context of combating climate change.

1.1 The framework - from Lisbon Agenda to EU 2020 Strategy

Despite remarkable achievements the Lisbon Agenda 2010 did not meet the target of turning the EU into the most competitive and dynamic knowledge-based economy in the world by 2010. In March 2010, the European Commission launched the 'Europe 2020 - A European strategy for smart,

[2] For more information on EU transport regulations, policies and actions please see the "Transport Development Inventory Report" by Jon Halvard Eide, 2010 Edition

[3] European Union consolidated versions of the Treaty on European Union and of the treaty establishing the European Community. c 321 e/1, 29.12.2006.

[4] Resolution of 11.3.2008 on sustainable European transport policy, taking into account European energy and environment policies — Reporter: Mr Albertini.

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sustainable and inclusive growth' - to come out of the crisis and prepare EU economy for the next decade.

The Commission identifies three key drivers for growth, to be implemented through specific actions at EU and national levels[5]:

- smart growth meaning fostering knowledge, innovation, education and digital society,
- sustainable growth (making the production more resource efficient while boosting EU competitiveness),
- acquisition of skills and the fight against poverty.

Five measurable EU targets for 2020 are proposed to steer the process and be translated into national targets: for employment; for research and innovation; for climate change and energy; for education; and for combating poverty. In order to meet the targets, a series of flagship initiatives are listed, the implementation of which will be required at all levels: EU, Member States, and local and regional authorities[6]. Among them are:

- Resource-efficient Europe - supporting the shift towards a resource efficient and low-carbon economy. Europe should stick to its 2020 targets in terms of energy production, efficiency and consumption. This would result in €60 billion less in oil and gas imports by 2020.
- An industrial policy for green growth – helping the EU industrial base to be competitive in the post-crisis world, promoting entrepreneurship and developing new skills.
- An agenda for new skills and jobs – creating the conditions for modernising labour markets, with a view to raising employment levels and ensuring the sustainability of our social models, while baby-boomers retire.

EU 2020 Strategy defines key guidelines that will underline every European level policy for the next decade. Therefore, also the European transport policy which is based on concepts of sustainability, competitiveness and efficiency will benefit from the Strategy through focusing further on innovations in products and IT solutions that will contribute to the development of coherent transport network. The Strategy will also support transport industry's shift towards low carbon emissions and firmer focus on sustainability issues, which may by realised e.g. by a green corridors concept (see chapter 3).

[5] Europe 2020: Commission proposes new economic strategy in Europe. IP/10/225 Brussels, 3rd March 2010

[6] Communication from the Commission, Europe 2020, a Strategy for smart, sustainable and inclusive growth. 3 March 2010.

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1.2 Sustainable transport challenges and policy responses

1.2.1 Co-modality vs. dominance of road transport

There is a strong imbalance between the different transport modes in inland freight transport, with road transport well ahead. Looking at the four land transport modes (road, rail, inland waterways and pipelines), rail accounts for just 17% of EU inland freight transport (2006 data), while inland waterways and oil pipelines account for 5% each. Road, on the other hand, accounts for 73% of total freight transport in the EU 27, remaining the dominant freight transport mode in all member states except Estonia (65% rail) and Latvia (54% rail). Taking intra-EU maritime and air transport into account, the share of roads falls to roughly 45% but nevertheless remains dominant. Rail's share of inland freight transport then decreases to around 10.5%, while shipping accounts for nearly 40% and air transport 0.1%[7].

In its 2001 the **White Paper on Transport**[8], the EU set an objective to achieve a better balance of the individual modes of transport by shifting traffic away from roads to more sustainable transport modes. This was done in response to growing concerns regarding the environmental impact of road transport, the scarcity of fossil fuels and other negative external effects produced by road freight, such as congestion and accidents.

The White Paper applies a comprehensive approach to integrate transport with sustainable development, which combines tariffication, growth of alternative transport for road transport and investments in trans-European transport networks. Investments in rail, maritime and multimodal transport instead of road infrastructure were expected to assure better usage of other way of transportation and decouple transport from economic growth. Yet, in the 2006 Mid-Term Review[9] a reflection appeared that road transport was likely to remain at the centre of EU transport operations for the foreseeable future. In consequence, the EU stressed the importance of promoting "co-modality", which means better integration of various transport modes into efficient logistics chains by using each mode to its optimal potential and combine with other modes in order to resolve transport obstacles and obtain optimal efficiency.

Adopted in October 2007 the **EU Action Plan for Freight Transport Logistics**[10] is to a large extent focused on enhancing technical harmonisation and interoperability across systems to facilitate the use of several transport modes on a single trip. It supports measures aimed at improving

[7] Eurostat figures

[8] The White Paper: European transport policy for 2010: time to decide, COM(2001) 370 final. Brussels 12/09/2001],

[9] COM(2006) 314.

[10] EurActiv 19/10/07,

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connections between the various modes, putting greater emphasis on quality criteria in modal choices, investing in modern transhipment hubs, and enhancing cross-border management of freight flows and the associated administrative reporting requirements.

To reinforce the position of railways, three rail packages aimed at market liberalisation and harmonisation have been adopted at the EU level, with the latest package aimed at opening up international passenger transport to competition as of 2010[11]. A Communication on a Freight-Oriented Railway Network, as a part of the Logistics Action Plan, aims to boost the retracting rail freight sector by tackling key efficiency, reliability, punctuality and competitiveness problems. Measures proposed include making passenger trains a priority on lines with mixed traffic when networks are congested. They also put forward harmonisation of train lengths and loads in order to increase interoperability between countries and prevent freight trains from being stopped and delayed at borders due to differences in standards.

On road transport, the Logistics Action Plan suggests "assessing the need to review the current limitations of road vehicle weights and dimensions". The initiative aims to tackle congestion by removing an existing ban in most member states on 25-metre long, 60 tonne 'modular trucks' that can carry larger volumes without increasing the number of trips. But the apprehensions arise that the move would drive the price of road transport down even further, generating unsustainable demand and exacerbating competition with rail.

The Freight Transport Logistics Action Plan also has a strong concern on urban dimension, since distribution in cities and conurbations is particularly strenuous. The establishment of urban freight distribution terminals, providing an interface between long-distance shipments and 'last-mile' deliveries, can help reduce the number of trucks driving in urban areas. The focus is also on ensuring that transport between production centres and customers within city centres are clean and efficient. One of the suggestions is to strengthen the freight component of the EU CIVITAS initiative, which provides support for cities wishing to test and introduce innovative urban mobility solutions and re-balance the modal split towards sustainable transport modes.

At large, the **TEN-T policy** has begun to provide responses to issues in the field of freight transport, where expected growth (an increase of 34% between 2005 and 2020) underlines the importance of introducing real co-modal solutions to overcome problems such as congestion, rising CO_2 emissions, infrastructure missing links and organisational gaps. The TEN-T Guidelines envisage the establishment of a single, multimodal network as the ultimate policy objective, covering both traditional ground-based structures and equipment (including intelligent transport systems) to

[11] EurActiv 23/07/07.

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enable safe and efficient traffic. It also involves the deployment of innovative systems that have substantial potential for industrial innovation[12].

The TEN-T revision process, commenced in 2009, concentrated on optimisation of the transport system as a whole in terms of efficiency, energy efficiency and the reduction of its environmental impact, e.g. by making best use of existing capacities, creating synergies and facilitating 'alternative drives'. According to the recent Green Paper, "the central question is how to shape the future multimodal network and how to ensure timely completion"[13]. The dimensioning and equipment of the TEN-T network elements will be determined by[14] [15]:

- passenger and cargo traffic demand and customers' needs,
- mitigation of bottlenecks affecting long-distance and international traffic flows (including environmental bottlenecks),
- the goal of reduction in travelling times and improvement in reliability,
- contributing to climate change goals and environmental issues, such as avoiding or mitigating air, water and noise pollution,
- preventing, minimising or compensating any significant effects on the environment, in particular on the conservation objectives and the integrity of Natura 2000 sites.

Since the objectives are rather broad, which has made it impossible to meet them in full with the available instruments, the Green Paper tries to ensure that they operate to best effect, based on an integrated and innovative infrastructure that keeps pace with technological developments in the energy, infrastructure and vehicle sectors.

1.2.2 Internalising the external costs of transport vs. road congestion and transport emissions

Road congestion is estimated to cost around 1.1% of EU GDP per year. The EU wants to achieve a better integration of different transport modes into efficient logistics chains, in order to allow for an optimised use of all modes that will reduce congestion. An important part of this programme will be enhancing technical harmonisation and interoperability across systems - the focus of 2007 Action

[12] For more information on TEN-T guidelines and relevant actions please see "Transport Development Inventory Report" by Jon Halvard Eide, 2010 Edition

[13] GREEN PAPER TEN-T: a policy review - towards a better integrated Trans-European transport network at the service of the common transport policy. COM(2009) 44 final Brussels, 4.2.2009.

[14] Commission Working Document - Consultation on the Future Trans-European Transport Network Policy. Brussels, COM(2010) 212/7

[15] For more information on architecture of the future TEN-T core and comprehensive networks please see "Transport Policy Report 2010" by Wiktor Szydarowski

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Plan for Freight Transport Logistics[16]. The European financing programme, Marco Polo, has also been available since 2003 to promote innovative solutions in this field.

Specific regulatory measures aim at moving transport away from the most congested modes, e.g. by focusing on 'getting the prices right'. The rationale explains that as the transport costs do not generally reflect the real costs on society resulting from the transport mode choices, the users are rather reluctant to adopt less costly behaviour. By introducing common charging frameworks and making the charges smarter (for example, varied respective of the location and time of day) it could be possible to encourage transport users to switch to cleaner vehicles or modes (including walking and cycling), to use less congested infrastructure or to travel at different times.

The EU has already started to internalise these external costs through the rules on motor fuel taxation, as well as with the Commission's proposals to include the aviation sector in the EU's ETS (Emissions Trading System) and to incorporate a CO_2 component in registration and annual circulation taxes for cars. In the road sector the strategy launches immediate action to allow more effective and efficient internalisation with the proposal on infrastructure charging for heavy goods vehicles. Private transport is not covered because of subsidiary, but the Commission encourages Member States to implement a charging system for all road transport and not just heavy goods vehicles This would create incentives for all road users to change their behaviour. In the rail sector the proposal on internalisation for heavy goods vehicles will also have a positive impact by giving further opportunities to internalise in the sector.

Internalisation of external costs through smart road charging systems will be the key way to mitigate the congestion problems. The directive on infrastructure charging for heavy goods vehicles will be the main EU instrument in the road sector. This will be accompanied by the earmarking of most funding for rail, inland waterways and maritime infrastructure transport under the Trans-European Networks and the Marco Polo programme, as well as for actions on electronic toll systems, where tolling systems have been implemented together by at least two Member States. Environmental differentiation of port and airport charges remains a necessity, too.

Charging lorries for every kilometre they travel can reduce pollution and improve the efficiency of the sector. A revision to the EU 'Eurovignette' road charging rules, has been proposed by the European Commission but not yet agreed. It has to be seen whether Member States should be allowed to include external costs, such as the costs of climate change, and congestion caused by lorries into road charges. Such a move would be in line with the 'polluter pays principle'[17].

[16] EurActiv 19/10/07.

[17] Understanding the effects of introducing lorry charging in Europe July 2010. www.transportenvironment.org/lorry-charging

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According to the EU Commission report, a mixture of technical and non-technical options could reduce emissions from transport by 89% between 1990 and 2050, whereas a 74% rise is foreseen under 'business as usual'[18]. These include:

- to limit CO_2 emissions from new cars,
- to include aviation in the EU Emissions Trading System (ETS),
- to apply differentiated annual circulation and registration taxes for cars based on their CO_2 emissions,
- and to ensure that all means of transport not covered by the ETS contribute to achieving national targets for limiting greenhouse gas emissions.

Among the non-technical measures recommended are: lowering speed limits, and reorganising taxes and charges so that forms of transport that emit large amounts of greenhouse gases lose all subsidies.

Member States should meet objectives for increasing the share of renewable energy used in road transport. The Commission recently proposed making a 10% target binding. The Commission has also proposed that fuel suppliers reduce greenhouse gas emissions from fuel across its life-cycle by 10% by 2020.

For motor fuels, EU rules set minimum tax levels; nevertheless most aviation and maritime uses are exempt, although Member States can limit these exemptions to international transport. Costs for CO_2 will be tackled through fuel taxes as part of an envisaged review of the Energy Taxation Directive

The proposals have focused on providing a general framework for assessing noise and for limiting noise emissions from all new, motorised inland transport modes in the framework of the Single Market (including, for example, the technical specifications for interoperability in the rail sector). Limits are also introduced for aircraft, and more stringent restrictions can be put in place at certain EU airports. Airports, large towns (including their ports), heavily-used railways and roads must also be mapped for noise and action must be taken to reduce it where necessary. There are also limits for tire noise which come into force in 2009 for replacement tires.

In addition, there are particular EU requirements for some road vehicles concerning equipment such as air-conditioning systems. The Commission is developing initiatives on gear-shift indicators and recently proposed a framework for tyre pressure monitoring systems.

[18] http://www.transportenvironment.org/Printer/News/2010/7/Back-to-the-future-as-2050-roadmap-published/ as of 22 July 2010.

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All transport modes are covered by general legislation on where and how waste can be disposed of and there are specific requirements for some types of road vehicles and their components (e.g. tyres, batteries).

1.2.3 Systems supporting efficiency of transport modes

The aim of the EU Commission is to support the development of Intelligent Transport Systems (ITS) as a means of improving the efficiency and sustainability of the European transport system. The Freight Transport Logistics Action Plan calls on the EU to develop a roadmap for the implementation of the 'e-freight concept', enabling to trace the freight in a paperless, electronic way throughout its journey across transport modes. This would facilitate safer, more reliable, more efficient and more expedient deliveries, while regulatory procedures would be simplified.

The action plan on Intelligent Transport Systems for Road, accompanied by a legislative initiative, will set out a common approach to get existing technologies onto the market and used. It should help identify a set of core Europe-wide ITS applications, work out their business case, organise the necessary research and validation, and manage their implementation across Europe by road operators, industry, service providers and road users. These technologies will help reduce congestion, while increasing safety and fuel efficiency by allowing shippers and the travelling public to plan their journeys to avoid traffic jams and by allowing governmental authorities to direct traffic away from areas where it would contribute significantly to local air pollution. In addition, using existing infrastructure more efficiently will mean that less new infrastructure will be needed, avoiding habitat fragmentation and soil sealing.

Currently, widespread deployment of ICT in freight logistics is being hindered by a lack of standardisation between countries and transport modes. Nevertheless, the hope is that e-freight will take off and become more affordable with the development of emerging technologies such as radio frequency identification and the use of the Galileo satellite positioning system.

1.2.4 Greening of maritime transport

For maritime transport, the greening strategy should be developed in line with the new European Integrated Maritime Policy[19].

[19] COM (2007) 575. This policy includes several proposals improving the sustainability (greening) of maritime transport. For more details see section 4 of the Greening Transport Inventory Commission Staff Working Document SEC (2008) 2206.

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The resolution about strategic aims and recommendations for EU maritime policy to 2018 introduced in March 2010 emphasises in turn that maritime sector comes into prominence as a part of EU economy and European transport system. That is why the common maritime policy needs to take into consideration the role and requirements of maritime transport sector and the fact that it functions and competes on a global market. An efficient maritime transport system is essential for Europe's prosperity, having significant impacts on economic growth, social development and the environment. The economic importance of international shipping and the vital necessity of a global regulatory framework need to be supported by the development of a package of measures at IMO to reduce CO2 emissions from shipping and by the implementation of the ILO Maritime Labour Convention by Member States. The commitment of the Commission to free trade principles and the incorporation of maritime services into the hoped for WTO agreement is also key, as is the concept of a "European Maritime Space Without Barriers" in so far as it may improve customs and facilitation procedures. In addition, the importance of quality shipping, maintaining competence in key maritime professions, the promotion of careers at sea and supporting maritime research also were noticed in the document.

The Resolution addresses also maritime areas of emission control on territorial waters of EU and supports building "green ports", which should reduce damaging effect on environment and promote environmentally friendly ships. Technical progress is significant in this sector because new fuel and better engines can relieve an unprofitable influence. Document focuses also on maritime safety problem and opts for acceptance safety package and decisions about replacing supervision with risk analysis.

The document recommends improving implementation of regulations by providing better access to information through establishing benchmarking and the exchange of best practices, moreover it focuses on the need to boost the efficiency of existing infrastructure and norms.

Exploiting the full potential of short sea shipping and sea transport for business and services in Europe is one of the objectives. European Union aspire to create European maritime space without barriers by promoting the efficiency of intra-EU trade and short sea shipping through improved customs and facilitation procedures is supported by the global industry, assuming such measures are compatible with IMO requirements.

The European Commission has been also advocating since 2007 for closer integration of maritime surveillance systems since the European sea basins face some common challenges, but each has its own specific characteristics in this respect. For example at any given time thousands (some esteem 1500) of ships sail on the Baltic Sea, amongst them 250 tankers, being on the move from/to one of each ports from/to the North Sea. Statistics show seaborne oil transportation through this area to

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tend towards the volume of 200 million tons per year. As a result of this, the Baltic ecosystem is in danger[20].

A more interoperable surveillance system would bring together existing monitoring and tracking systems used for maritime safety and security, protection of the marine environment, fisheries control, control of external borders and other law enforcement activities. The benefits of sharing maritime surveillance information seem to be obvious.

1.2.5 Research and innovation in supporting the transport policies

Unrestricted increase in mobility of people and goods inevitably leads to chaos, transport network congestion and excessive investment in traditional infrastructure. The problem can be handled by innovative solutions, based on new technologies, new ideas in the management of transport and logistics process and a genuine integration of various forms of transport[21].

Important reason boosting new solutions in transport is the necessity to improve its relations with the outside world by better accessibility in time and space, better quality of service and less harmful environmental impact. Research efforts should focus on solutions that will mitigate the permanent obstacles and inefficiencies or eliminate them all.

First of all, it is essential to elaborate the inventory (list) of major shortcomings of the present transport systems. The inventory should be frequently updated. The inventory may be used as an indicator to the direction in which innovation efforts should be directed in order to mitigate or eliminate deficiencies. In the process preparation of introducing innovation oriented activities and processes in transport and logistics, the starting point should be the evaluation of efficiency and productivity of the current system. Such evaluation is again a major challenge in terms of methodology and availability of information. Substantial abyss between developed countries and those on lower level of socio-economic development are evident. Deficiencies in current transport systems should be aggregated in following groups: a) symptoms of technological stagnation (conservatism), b) distortions in technology and attitudes (pathologies), c) overambitious efforts for innovation, inconsistent with current abilities and socioeconomic development level.

A symptom of technological stagnation is the excessive reliance on the internal combustion engine. Transport means have so far been propelled exclusively by combustion engines only rail transport so far has used stationary electric power supply. The economy, including transport as well, must gradually shift to removable energy sources (RES) like biomass, hydropower, wind, solar, geothermal, tidal, etc. power supply.

[20] Ibidem
[21] Innovative perspective of Transport and logistics – edited by Jan Burnewicz. University of Gdansk, 2009

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Another symptom of technical stagnation in transport is heavy reliance on traffic based on wheels. Efficiency of that transport is ensured not only by the wheel itself, but also by good quality of roads (also rail) and the transport network density, which all together is costly and time-consuming. One of possible solution might be appliance of innovative road building technologies, against the drift of accepted engineering, geological and environmental stereotypes.

As an innovative solution in transport the reliance on the concept that cargo should be moved in mobile, close compartments/vehicles. In the worst case there is a duplication of these compartments – in intermodal technologies – leading to increase of used materials, heavier weight of the loading units and higher cost. In many cases it is not an easy task to get rid of the vehicle as such, but a reduction in its weight would be a significant improvement.

Technological conservationism most strongly affects special differentiation of transport costs. A common error in today's transport systems is the fact, that the applied technologies ensure an acceptable unit cost level only when a high level of operational activity is reached - owing to a high flow of cargo or large number of vehicles in operation. These systems are unproductive in low demand areas and on disadvantaged competitive position against individual forms of transport, like private car or in-house transport. This conservationism could be overcome through innovation making transport more customised[22] with solutions ensuring its low cost and creating a lasting order of such traffic in time and space.

A challenge for researchers and transport policy makers is posed by the distorted attitudes created over past decades to the way in which mobility requirements could be satisfied. Transport users seem not to be impressed by the burden of congested roads and streets or degradation of environment caused by transport.

It is estimated that the volumes of goods transported in Europe will increase by 50% between 2000 and 2020. In the years ahead, freight transport must address the challenges of efficiency, quality and sustainability. It will therefore need to come up with suitable responses to the problems of congestion, climate change (freight transport is responsible for one third of the CO_2 emissions arising from transport), and energy supply and security. At the same time, the new information and communication technologies and the influence of European freight transport on the global market offer major opportunities for the future[23].

Research into cleaner and safer transport has been given priority at EU level. Within EU transport policy a significant activity in transport analysis, research and regulations is taking place. Research conducted under EU auspices, particularly in the framework programmes, have significant influence on the sector and enable to develop joint cooperation of experts and specialists from various countries.

[22] "Learning from a failed innovation process." www.rstraol.nl
[23] http://ec.europa.eu/transport/logistics/index_en.htm

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The Sixth Research Framework Programme targeted sustainable development, global change and ecosystems as priority areas. The 7th Framework Programme, launched in 2007, with allocation of €4.1 billion of the €50.5 billion research budget specifically to transport research activities, such as research on 'greening' transport and on decongesting transport corridors. A further €2.26 billion has been allocated to energy research, including research on hydrogen fuel cells and renewable fuel production, such as biofuels.

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2. Hindrances of sustainable transport development in the BSR

The majority of topical publications, including the documents and statements of the DG TREN (DG MOVE) and of pan-Baltic organisations (e.g. the Baltic Development Forum), give only very general statements on existing barriers in making the transport performance in the Baltic Sea Region more efficient and sustainable.

In practical terms, sustainable transport development can be embraced by such keywords as: multimodality, skilful logistics, fast movement, high level and compatibility of infrastructure and transport means, easy and fast border checking, new technologies ensuring low emission and being environmentally friendly, shifting cargo from road to rail or sea, widely considered security, compatibility of information and documentation systems. Therefore, everything what disturbs the development in these aspects must be treated as a barrier. The majority of barriers described below can apply to the EU generally as well as to specific development situation of the Baltic Sea Region.

For the European Commission the sustainable transport development is considered as the top priority. "A sustainable future for transport"[24] document gives a short description of developments in the recent years and reveals a general vision of a future EU transport.

Generally, only a slight development in the energy efficiency in the EU transport has been achieved. On the whole, transport energy efficiency has been increasing in the past decade; however, the gains in efficiency have not been enough to outweigh the larger transport volumes. There has also been limited progress in shifting transport volumes from road to more efficient modes, although a certain rebalancing has taken place and the relative decline of rail transport appears to be counteracted.

The situation in transport may improve when a well-maintained and fully integrated transport system is established, while its ability to move people and goods seamlessly and efficiently relies primarily on the optimal functioning of all soft and hard transport infrastructure elements, which will contribute to a better use of the networks capacity and cause significant reduction of congestion, pollution and accidents. This, however, requires the optimisation and operation of the network as a single entity, whereas currently modal networks are largely separated and even within modes there is a lack of integration between countries.

[24] A sustainable future for transport, Directorate-General for Energy and Transport, June 2009

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2.1 Optimising transport modes

The problem with sustainable transport development rises when co-modality is considered. In fact each transport mode is dealing separately with its specific problems. Rail is prone to prolonged delivery times, frequent delays and limited capacity, while road suffers from growing congestion, rising oil prices and an increasing negative impact to the environment. Also, inland waterways are facing strong competition from tourism, leisure and housing development; many ports are congested and often lack the adequate transhipment facilities and connections with the hinterland.

Consequently, such an isolation status is a barrier to sustainable transport development, which urges for more effective implementation of the co-modality.

2.1.1 Barriers for interoperability in rail transport

Many technical barriers to the operation of international services still exist, requiring solutions, which come at additional cost. As international passenger transport covers only a very small part of the total rail service that is offered, technical standardisation is only feasible to a limited extent. For example rail freight transport between Ukraine and Poland shows that the difference in track gauges also presents a technical barrier for the railways in Eastern Europe[25].

The incomplete implementation of existing EU legislation continues to be a barrier to the development of cross-border passenger services. In some countries fears remain of discrimination in the allocation of paths. Problems and delays in accessing facilities such as cleaning and maintenance depots can act as additional barriers. The lack of strong independent regulators, to whom appeal can be made in case of dispute, is also considered to be a barrier[26].

High track access charges can also be a barrier, particularly on new high-speed lines. An additional barrier is the failure to charge air transport for its externalities or even to harmonise tax arrangements such as value added tax between the two modes.

Border delays still make cross-border rail travel unattractive between some countries. Poor organisation and fears of unreliability on the part of the railway companies are factors contributing to this barrier[27].

Barriers for interoperability can be diminished once international arrangements such as COTIF are applied by more countries. However, the gauge difference between Eastern Europe and Central and Western Europe will remain a bottleneck for the growth of the rail market share. The creation of a

[25] Situation and perspectives of the rail market TREN/R1/350-2008 lot 2 Final Report, March 2010.
[26] *ibidem*
[27] *ibidem*

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1,520 mm gauge connection into Central Europe could be helpful for specific links and for market segments such as container transport.

Border crossings are another problematic issue with respect to interoperability between the EU railways and the railways of neighbouring countries. The establishment of jointly operated border crossing facilities, where operations are carried out simultaneously, can help reduce the total time required at borders to complete all procedures and formalities.

Freight transport is a commercial activity and private operators - as well as joint ventures of private and public operators - will be the main actors in the future. Although the speed of opening of the market and railway reform varies from country to country in Eastern Europe, the trend is heading towards stronger private involvement. This will benefit the position of railways in the long run.

The opening of the international rail passenger market on the one hand creates opportunities for new market entries and on the other it creates opportunities for closer international cooperation. Organisational barriers are still a big challenge in the transport system and particularly in international rail business development. The main problems can be attributed to:

- Implementation of EU and international legislation.
- International competition.
- Administrative barriers.
- Intermodal and intramodal competition.

Regarding the implementation of EU and international legislation, most EU Member States are still not ready with the implementation of the first and second railway packages. The main points of contention are the lack of independence for the infrastructure manager in relation to the railway operators, the inadequate implementation of the directive related to the infrastructure access charge and the low levels of efficiency of railway networks. Further problems relate to the lack of proper incentives for cost and tariff reduction on the part of the infrastructure manager, and the lack of charging systems based on the direct costs of railway service provision. Non-compliance with the provision concerning the creation of an independent control body which has the necessary competencies to solve all problems related to railway competitiveness is also considered problematic.

When analysing the barriers towards the opening of the rail passenger market the differences between the countries in the EU27 have to be taken into account. For example, Spain plays a leading role in the high-speed rail market. The rail market in the Netherlands is characterised by a large share of commuter traffic. In contrast, international rail passenger travel in Finland is almost irrelevant due to its peripheral geographic situation.

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Despite the diversity of the situations in the various European countries, there are some common impediments to the evolution of a deregulated market. Firstly, the delays in implementing the railway packages 1 and 2 represent a threat to competition from a legal perspective. Secondly, the opening of the rail market increases the competition among operators in relation to services, quality and price. Operators will need to come up with competitive strategies, for example in ticket pricing, to make their services attractive to customers.

From the regulatory point of view, there are separate legal systems regulating the international carriage of passengers and freight by rail in the Baltic States:

- the Uniform Rules concerning the International carriage of passengers and freight by rail (as part of the COTIF convention) and
- EU regulations and Agreements signed within the framework of the Organisation for Cooperation between railways (OSJD). These systems establish the relationships between different parties with respect to the carriage of passengers and freight, but they differ in the form and content of the individual provisions of transport law.

Related to the previously elaborated railway gauge difference issue, the performance of Baltic railways to some extent depends on the cooperation principles established with its close neighbours and general macro-economic and political developments between these countries.

The **international rail freight market** is more advanced regarding the opening of the market than the passenger market. Rail freight is by its nature more border crossing oriented. Consequently, the merits that come with opening of the market are more tangible for freight transport. Since the beginning of 2007, the rail freight transport market has been opened completely within the EU, for both national and international services. This means that any licensed EU railway company with the necessary safety certification can apply for capacity and offer national and international rail freight services throughout the EU. This has led to new companies entering the market, lower prices and initially, growth in volume; although in the recent economic downturn the volumes have dropped severely. The position and ownership structure of rail freight operators within the EU has also experienced substantial changes.

For historical reasons and technical compatibility of track gauge, the rail freight market in the Baltic States mainly relies on trade with Russia. Increasingly this includes transport flows from Central Asia. On the one hand, the fact that the rail network characteristics are the same as the Russian ones is a benefit to the Baltic States by facilitating transit flows from the Far East to the Baltic Sea area and further to Europe. On the other hand, and for the same reason, the Baltic States are not fully integrated into the European railway network. It should be mentioned that ERTMS is not the highest priority for the Baltic countries in their relation with rail traffic development with Russia.

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The above-mentioned gauge difference issue can be considered as an interoperability problem affecting the process of integration of the Baltic rail system into the European railway network. At the same time, it represents an opportunity to develop business with neighbouring countries (Russian Federation) with further potential for the development of a more global-oriented transport corridor between China and the Baltic Sea.

In Russia the railway infrastructure is not yet open for access of international railway companies. The only way to operate in the Russian market is to establish joint ventures (as described in the case studies of joint ventures between JSC RZD and DB and JSC RZD and the Finnish operator VR).

2.1.2 Barriers in maritime transport

The main obstacle for free movement of goods in the EU (and adequately in the BSR) is the border procedures in the field of maritime transportation. In principle, EU customs legislation makes no difference in the border procedures for vessels calling the ports in the EU countries coming from other EU ports or from non-EU ports. The only clear difference exists between "regular shipping line" and "non-regular shipping line". A regular shipping line between EU ports can be authorised by customs to get the status of "authorised regular shipping service", and there is no requirement for formalities. The status of an “authorised regular shipping service” is route and vessel related.

In other segments than liner shipping the border formalities always have to be executed, even if the vessel arrives from another EU port, and no authorisation can be issued in order to exempt the shipping from the formalities.

A solution to this problem is to eliminate the border formalities in maritime transport in intra EU trade. Procedures in maritime transport between EU member states should be reduced to the same level as in other transport modes. This places maritime transport on similar condition and chance as land transport in intra-EU trade. It will facilitate the development of intermodal transport chain to be more efficient and fluent.

Elimination of customs formalities in maritime transport has been proposed by the European Commission initiative of the Common European Maritime Transport Space without Barriers. It is a very promising initiative that may enhance development of trade and intermodal maritime transport in the Baltic Sea region as well as within the EU.

Simultaneously, it should be strengthened by the development of EU maritime traffic monitoring systems like SafeSeaNet, LRIT and AIS and their integration into Customs Information Systems. Development of these information systems will support the accomplishment of the initiative and benefit the maritime traffic.

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The bottlenecks and suggested solutions in the field of logistics and short sea shipping have been identified and analysed in many circles, including Short-sea Promotion Centres and SSS and Logistical Focal Points, in co-operation with the Commission. These fora are also helpful in identifying barriers specific for the BSR as well.

Short-sea Promotion Centres (SPCs) can provide information on maritime and intermodal transport solutions for shippers, forwarders as well as for transport- logistics operators and authorities in transportation area.

2.2 Incompatibility of transport and information systems in different BSR countries

It is obvious, that transport systems of various BSR countries are dramatically different. It concerns the difference between "the old" and "the new" EU countries, but even to a higher extent the differences between EU and non – EU countries. It includes all aspects: road networks, rail, ports, as well as types and technical level of transport means.

The system incompatibility situation is also in the case of information systems, necessary for implementing effective logistics solutions. The differences concern both hardware and software of these systems as well as a form and quality of the documents feeding the systems.

Elimination of such barrier is not easy task, because of capital intensive nature of infrastructural investments and conflicts with environmental protection (NATURA 2000 and other areas protected by law).

The pressure should be put on looking for common priorities to get rid of bottlenecks. The missing links of transport and information infrastructure in Central and Eastern Europe have to be developed, whereas the challenge for Western Europe is to use the existing system more efficiently.

Restrictive cross-border checking

The main problem in this aspect is on the eastern border of the EU, so it concerns the East-West Transport Corridor (EWTC II project). But also transportation of cargo on North-South direction (SCANDRIA project) meets obstacles in sea ports.

The double border controlling between EU countries and Belarus, Ukraine or Russia is a time-taking process. Moreover, besides of complicated procedures, very often restrictive behaviour of border checking officers and corruption can be observed. Additionally, in case of passenger traffic, discouraging is the visa procedures and a small number of consulates where it is possible to obtain it.

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The border barriers on North-South direction concern the sea ports. The border controlling procedures, even inside EU, are much more complicated than in the case of road border check-points. For example in Polish ports, the ship can meet, in extreme situation, controlling officers of eight independent border institutions, such as: border guard, customs, sanitary inspection, inspection of plants and seeds, food inspection, veterinary inspection, port state control etc.

Political factors

Political aspects have also certain influence on dynamics of sustainable transport development in the BSR. One of the reasons is instability of political situation in new EU countries and in Ukraine, which results in permanent changing of the development programmes. Moreover, controversies between the politicians of some EU countries and the politicians of Belarus, Ukraine or Russia have a negative influence on business relations, as well as on undertaking of mutual efforts on development of transport infrastructure.

The above mentioned opinion of Copenhagen Economics[28] underlines the necessity of including Russia to the process of improving transport system in BSR.

"Extend the Green Corridor concept for the Baltic Region to Russia with a focus on key projects that have high short to medium probabilities of success.(…). Support complementing regional for business dialogue with Russian counterparts in the Region and to encourage "modernisation in Russia".

But it is not enough. The participation of Ukraine and Belarus is also necessary, because the transport corridors in the BSR reach the economic centres in these both countries.

There is a need to place the issue of better cooperation and coordination higher on the political agenda and to work on synergies to the benefit of the business community and also public sector in the region. The lack of cohesion between national and regional policies and strategies is another issue of relevance that creates unnecessary barriers within the region.

Barriers for innovation

Innovations in transport are implemented with the aim of increasing efficiency and mitigating environmental impact. They are of great importance for transport competitiveness and productivity. Innovations do not depend exclusively on technological know-how. Also a level of knowledge, gained specific experience, level of education, co-operation with suppliers and consumers, competitiveness conditions and abilities, interactivity and multidisciplinary contacts.

[28] Going for green growth in the Baltic Region, policy recommendation for regional co-operation, Copenhagen June 2010

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The main barriers for innovations are:

- destabilised legal conditions
- reluctance of managing staff
- doubts of owners and stakeholders about benefits from innovation
- lack of long-term vision in management level
- fear of risk
- high cost of innovation and implementations

Among barriers to innovation in transport one is particularly aggravating - it is the mentality of human nature manifested in conservative attitudes of traditional means of transport users, fear of automatically controlled vehicles and disturbs alternative propellers.

The success of innovations in transport depends not only on the technological solutions but also on innovation oriented education and shaping more creative attitudes.

2.3 Differences in the level of dynamics of economic development in various countries

The differences in the level of economic development in various BSR countries are significantly high, which has negative influence on the development of the trade between them. Insufficient exchange of goods and usually a lot of importers involved makes that small shipments of goods are transported usually, and the road transport is preferred.

Additional obstacle, limiting the shift of transport "from road to sea", is a lack of logistics and distribution centres in many ports of new EU countries and in Russia. Such centres could, to some extent, solve the problem of small shipments of cargo.

The economic crisis, which has taken place in the last years, has also negative influence on the volume of international exchange and as a result on the volume of transport.

Conflicts between business and social interests.

This barrier is of major importance. Considering the problem of sustainable transport, including green corridors, we always have to take into account the requirements of environment protection. In consequence we encounter the conflicts between interests of business and social interests.

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The companies involved in export, import and transport, use to think in categories of economy because of their market oriented nature. The lowest cost and the highest income matter a lot for them.

The environment protection by its nature has a social character. The ecology causes considerable cost and does not bring profits in short time perspective.

It would be difficult to solve this kind of conflict without using various instruments of economic and legal nature. As it was stated recently on the seminar of Green Corridor Development in the Baltic Sea Region, held in Stockholm on 24 November 2009, it will be necessary to achieve an extensive stakeholders' involvement, especially owners of goods. In the field of legal, organisational and technical improvements, it is necessary to look for solutions bringing advantages from the environmental point of view, being in the same time profitable or at last less arduous for the business.

Peripheral importance of the Baltic Sea routes.

The Baltic Sea constitutes only a small part of the main world maritime transport streams. Only transport of the bulk (mainly a crude oil from Russia) is significant. The transport of general cargo on the Baltic Sea, especially to the eastern part of the BSR, has actually character of feeder service. The large part of cargos is transloaded on trucks in hubs of Western Europe, such as: Rotterdam, Antwerp or Hamburg, and then transported by roads. As a result the changes of transport procedures in BSR countries are slow, because the development in technology and logistic chain is easier in case of large volume of cargo.

Shifting the fright from roads to rail and from roads to sea is still limited by tariff systems. Road transportation is usually cheaper and more easily implements the door to door rules.

Spatial development

According to the recent VASAB analysis, accessibility in some parts of the BSR is still low, despite all efforts including the planned TEN-T investments. In particular, this can be the case for Latvia and Estonia and for the northern part of the BSR. The main reasons are the following[29]:

- low quality and frequency of international rail passenger (and also, in many cases, cargo) service in the BSR (as an indicator one can note that the distance of 850 km from Kaliningrad to St. Petersburg was covered by train in early 90's in approximately 24 hours, but it takes 36 hours now),
- growing road congestion in the East BSR (EBSR), resulting from growing car ownership coupled with financial constraint for roads' development, such as rising road maintenance costs (due to growing traffic of heavy trucks),

[29] Zaucha J.: Obstacles and problems of spatial development in the BSR, as viewed from transnational (VASAB) perspective

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- bottlenecks caused by border procedures (this is important, in particular, on the borders between Russia and Belarus and the other BSR countries), in fact by differences in custom and fiscal policies of different countries,
- relatively low GDP per person in the E-BSR, which prevents a more frequent use of air transport in those countries, lack of flight system integration between Russia and Belarus from one side and the rest of the BSR countries from the other side,
- concentration of high value freight volume in few BSR ports, mainly in the western part.

Even if network improvements were fully implemented, they will not lead to satisfactory integration between and of Baltic States and Kaliningrad. The measures/key themes proposed by VASAB have focus on two issues:

- Strategic development zones important for transnational integration within the BSR;
- Transnational transport links important for cross-BSR and cross-Europe integration.

These measures can be illustrated by the following examples, respectively:

- the South Baltic Arc corridor from Hamburg-Szczecin through Gdansk-Gdynia to Kaliningrad and its continuation to the Via Baltica,
- passenger railway links between Baltic States capitals, and from these to St. Petersburg resp. to Warsaw.

The background of VASAB opinion about infrastructure development is not the cargo or passenger flows but rather long-term impact of the proposed investments on regional development. This approach starts from spatial development needs and concludes from there to transport infrastructure (this can serve as an example of an integrated approach of transport and spatial planning, which was not the case in the development of the TEN-TINA networks).

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3. Review of green corridor concept as a part of the EU transport policies

3.1 Sustainable transport system and green transport corridors

According to the European arm of the Rand Corporation and several partners, the definition of sustainable transport adopted by the Ministers of Transport of the 15 European Union countries should be favoured because it is concrete, comprehensive, and "has been reviewed by political mechanisms and received general political acceptance". The definition referred to is as follows:

A sustainable transport system [is] defined as one that

- allows the basic access and development needs of individuals, companies and societies to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations;
- is affordable, operates fairly and efficiently, offers choice of transport mode, and supports a competitive economy, as well as balanced regional development;
- limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes while minimising the impact on the use of land and the generation of noise[30].

The EU definition was taken almost word for word from the definition developed in 1997 by the Toronto-based Centre for Sustainable Transportation. The Centre's definition is now as follows:

A sustainable transportation system is one that:

- allows the basic access needs of individuals and societies to be met safely and in a manner consistent with human and ecosystem health, and with equity within and between generations.
- is affordable, operates efficiently, offers choice of transport mode, and supports a vibrant economy.
- limits emissions and waste within the planet's ability to absorb them, minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components, and minimizes the use of land and the production of noise.

[30] Victoria Transport Policy Institute website: http://www.vtpi.org

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The main differences between the Centre's definition and the version adopted by the European Union Council of Ministers are these:

- first bullet point: "access needs of individuals and societies" has been expanded in the EU version to "access and development needs of individuals, companies and societies";
- second bullet point: the word "fairly" and the phrase "as well as balanced regional development" have been added to the EU version;
- third bullet point: the phrase "minimizes consumption of non-renewable resources, limits consumption of renewable resources to the sustainable yield level, reuses and recycles its components" has been replaced in the EU version by "uses renewable re-sources at or below their rates of generation, and, uses non-renewable resources at or below the rates of development of renewable substitutes"[31].

As outlined within the presented EU documents, the green corridor approach's key objective is to minimise external impacts of transport. Thereby, to fight climate change and other environmental impacts such as noise and pollution, enhance transport safety and security and facilitate congestion relief are of particular importance.

To reach these goals different approaches have been embedded in the concept. Co-modality is of major interest as shifting of flows of goods to means of mass transportation has great potential to improve transport efficiency. Thereby, all surface modes of transportation - short sea shipping, rail, inland waterways and road – should be integrated according to their system advantages. Several times Motorways of the Sea have been mentioned as an alternative to land transport. The same applies to NAIADES (development of inland waterway transport) and freight-oriented railway networks.

As co-modality implies shifting goods between transport modes, it imposes specific requirements to infrastructural needs. Therefore, green corridors can not only reflect physical connections but also need efficient transhipment facilities (in ports, terminals, intermodal connection points or dry ports) at defined strategic locations that enable consolidated long-distant transport flows between major hubs.

Another approach is to supplement the green corridor concept with the use of innovative, green technologies. Especially the ITS has been mentioned as a key element for efficient, seamless transport in Europe. Applications could be electronic toll collection systems, journey planning, dynamic in-vehicle navigation or eco-driving support. In later steps also green propulsion technologies (e.g. bio fuels) and required infrastructure could be included. In any case, green

[31] "Defining sustainable transportation", prepared for Transport Canada, the Centre for sustainable transportation, 2005

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corridors should serve as ground for experimentation with and implementation of green technologies.

Also, green corridors have to be supported by transnational collaboration and coordination involving all relevant stakeholders such as infrastructure providers, operators, users and local and regional authorities. One source names the green corridor initiative a business-oriented 'bottom-up' approach indicating that the private sector plays an important role in finding green transport solutions.

Concerning the conceptual integration of green corridors into broader EU freight logistics and transportation policy, it will be most interesting to see how green corridors will be integrated in the TEN-T policy review. So far, the concept has been mentioned in the 2009 green paper and the work of installed expert groups, also as an element of the aspired TEN-T core network. Concluding, Fig.1 provides an overview on the evolution of the EU green corridor concept over time. To keep the EU policy content up to date, ongoing developments in EU transport policy will continuously be integrated in this document. The same applies to non-EU green corridor issues.

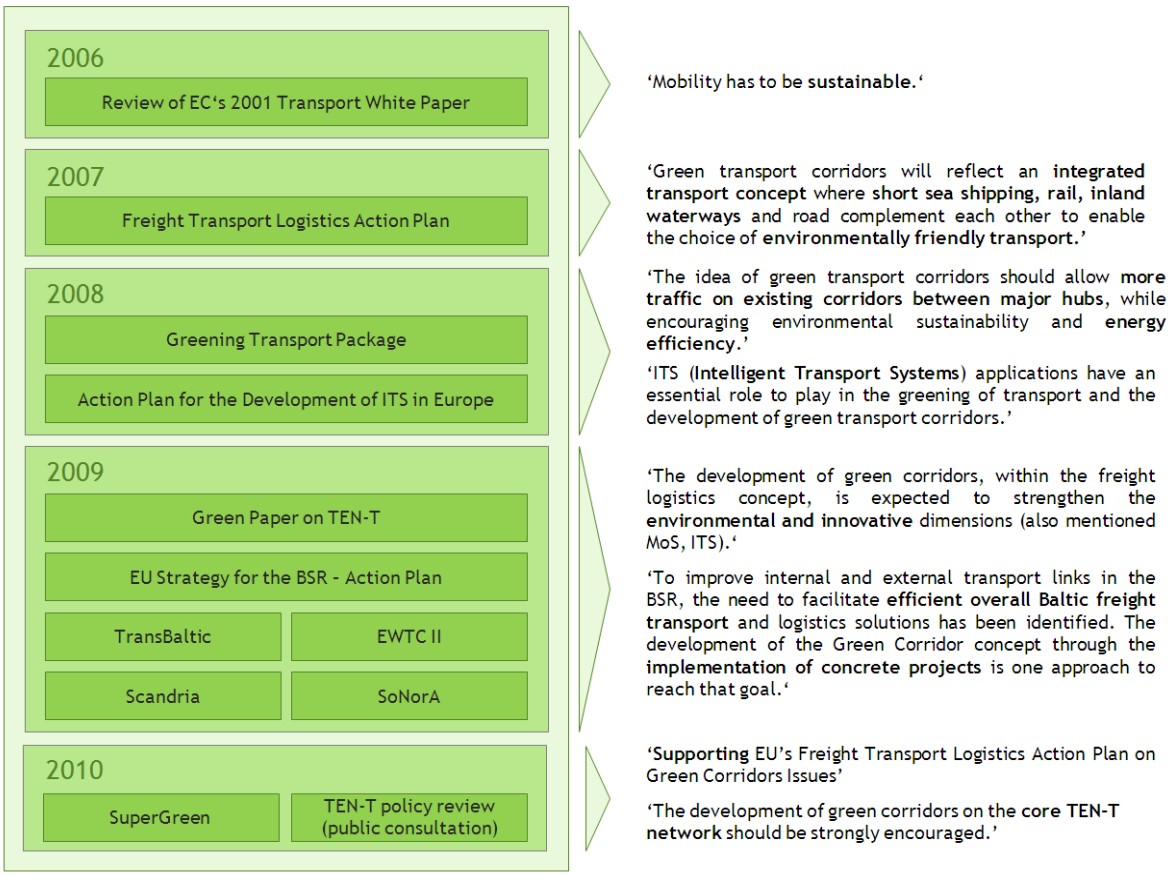

Fig. 1. Evolution of the green corridor concept in the EU

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The term 'green corridor' is applied in various contexts (see Appendix 1). Comparing the different green corridor initiatives it becomes clear that although for example objectives, time horizon or participating players may differ extremely, there are still common characteristics. To a great extent there exists unanimity concerning the wording:

The term 'corridor' in 'green corridor' stresses the fact that it has a spatial dimension, representing local, regional, national or trans-national focus of the initiatives. The presented examples range from projects with a city context or regional initiatives to international cooperation spanning different countries and languages. Also, being closely related to spatial component an often mentioned objective is to improve accessibility, for example of city regions, logistic hubs or commercial centres. Further, 'green' exclusively means 'environmentally sound' or 'sustainable'. The majority of initiatives aim to mitigate negative impact to the environment with an emphasis on the conservation of resources and energy efficiency. Thereby, arguments are to tackle climate change, enhance biodiversity and support nature conversion to maintain or improve people's quality of life[32].

3.2 Evolution of the green corridor concept

The green corridor idea with emphasis on transportation issues is primarily a European concept currently in the state of definition, refinement and implementation within several national and transnational projects in the European Union. In the following, a summary on how the concept evolved within the EU is given.

Freight Transport Logistics Action Plan (2007)

The concept was first mentioned as an integrative part of the EU's 2007 Freight Transport Logistics Action Plan (18.10.2007)[33]. As described therein, the concept of transport corridors is defined by a concentration of freight traffic between major hubs and by relatively long distances of transport. Along these corridors industry should rely on co-modality and advanced technology to deal with rising traffic volumes while promoting environmental sustainability and energy efficiency. Also, green transport corridors will reflect an integrative transport concept combining short sea shipping, rail, inland waterways and road with its distinct advantages to enable the choice of environmentally friendly transport. They will be equipped with adequate transhipment facilities at strategic locations (such as seaports, inland ports, marshalling yards and other relevant logistics terminals)

[32] For more information please see Appendix I
[33] Commission of the European Communities, 2007

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and with supply points initially for bio fuels and, later, for other forms of green propulsion technology.

Green corridors could serve as a ground for experimentation with environmentally-friendly, innovative transport units, and with advanced ITS applications. To support this goal, initiatives such as the freight-oriented railway network, motorways of the sea and NAIADES (inland water transport) will be included.

The Freight Logistics Action Plan defines a road map for the green transport corridor development.

- Define green transport corridors and organise cooperation between authorities and freight transport logistics operators in order to identify improvements to ensure adequate infrastructure for sustainable transport. Deadline: 2008.
- Reinforce green corridors in the TEN-T and in the Marco Polo priorities. Deadline: 2010
- Develop a freight-oriented rail network. Deadline: Proposal by 2008. Corridor structure by 2012.
- Promote the establishment and recognition of Motorways of the Sea through, among others, a better co-ordination of different funding sources. Deadline: 2008.
- Implement the NAIADES programme for inland waterway transport. Deadline: Full implementation by 2013.

EU greening transport package (2008)

The EU's commitment to sustainable, greener transport resulted in the greening transport package (08.07.2008). With this package the Commission aims to move transport further towards sustainability. It includes:

- strategies to ensure that the prices of transport better reflect their real costs to society in terms of environmental damage and congestion;
- a proposal to enable member states to help make this happen through more efficient and greener road tolls for lorries;
- a proposal for reducing noise pollution from rail freight.

Related documents pick up the idea of green transport corridors. Within its staff working document 'Greening transport inventory' (SEC (2008), 8.7.2008), the Commission remarks that the concept of green transport corridors should facilitate more traffic on existing corridors between major hubs, while simultaneously encouraging environmental sustainability and energy efficiency[34].

[34] Commission of the European Communities, 2008d

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Later in 2008, the Commission adopted the Action Plan for the Deployment of Intelligent Transport Systems (ITS) in Europe (16.12.2008), which amongst other initiatives draws on the Action Plan on Freight Transport Logistics. The main objective is to foster the integration of ITS in EU road transport and to support interoperability of services and systems in Europe. The action plan outlines six key areas:

- Optimal use of road, traffic and travel data.
- Continuity of traffic and freight management ITS services on European transport corridors and in conurbations.
- Road Safety and security.
- Integration of the vehicle into the transport infrastructure.
- Data security and protection, as well as liability issues.
- European ITS cooperation and coordination.

Again, the Commission refers to the green corridor concept and points out that ITS applications are an essential instrument to its supplementation. Especially to support an integrated freight transport concept where different transport modes complement each other to allow more environmentally friendly alternatives for long-distance transport, ITS applications serve as a key element. Also, ITS is crucial to influence traffic demand by differentiated charging of vehicles with Electronic Toll Collection systems. Furthermore, ITS can enable greener mobility in terms of congestion relief (through journey planning and dynamic in-vehicle navigation) and eco-driving support (less energy consumption)[35].

TEN-T policy review

The green corridor concept is also continuously mentioned within the current TEN-T policy review process. The TEN-T policy review process follows a comprehensive structure of expert group sessions, public consultations, working documents and Commission communications, with the Green Paper on TEN-T published in February 2009 as a starting point.

A major step in the preparation of the Green Paper has been the 2008 TEN-T days in Brussels (14th - 15th October), which gave about 500 representatives from various stakeholder sectors the opportunity to express their views, needs and expectations on the TEN-T review during a series of workshop sessions. Each of the workshops resulted in an issue paper and a workshop report, which have been taken into account by the Commission in the final drafting of the Green Paper.[36]

[35] Commission of the European Communities, 2008a
[36] Commission of the European Communities, 2008b

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The workshop on 'Logistics and Green Corridors' developed requirements on a future green corridors concept which were in line with findings in other EU documents. Key issues reflected in the workshop have been:

- Green corridors should allow the efficient transfer of massive freight traffic flows among several hubs on a 24/7 basis.
- Green corridors should minimize external impacts of transport such as safety, congestion, noise and pollution.
- Infrastructure needs underlying the logistics operator's activities should not only reflect physical connections between hubs but also transhipment facilities (terminals, intermodal connection points, dry ports) as well as ancillary systems (ITS applications, green propulsion systems etc.)[37].

The green corridor concept was finally mentioned in the resulting Green Paper on TEN-T (04.02.2009) in the following contexts:[38]

- Emphasising the green dimension of 'Motorways of the Sea', possibly as part of the green freight corridor concept. Funding through different instruments (at national and EU level) should be streamlined and their economic viability highlighted.
- Strengthening environmental and innovative approaches through the development of green corridors as part of the EU freight logistics concept.
- Optimisation of individual modes and enable seamless connections through intelligent transport systems. ITS is a key to achieving major Community policy objectives in transport and beyond, in the field of safety, security, efficiency of operations, tackling congestion and fighting climate change. The green corridor concept is named as one approach to tackle the last issue.
- In the context of how to use coordination as an instrument to support TEN-T implementation, the green corridor approach was explicitly named a business-oriented 'bottom-up' approach. Thereby, the coordination of relevant corridors calls for the involvement of all relevant stakeholders (infrastructure providers, operators, users and local and regional authorities) to develop solutions, which are acceptable to all and technically, economically and financially feasible.

Based on those expert findings, the call for participation is accompanied by a working document (04.05.2010) and a staff working document (11.05.2010), which (shortly) also pick up the idea of green corridors[39].

[37] Commission of the European Communities, 2008e
[38] Commission of the European Communities, 2009b

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The most recent step within the TEN-T policy review process was a **public consultation** to refine developed policy options. The consultation period went from 04.05.2010 to 15.09.2010. During the run-up phase to the public consultation the Commission installed **six expert groups,** which worked between November 2009 and April 2010 dealing with specific issues of TEN-T planning and implementation. Again, the concept of green corridors had been taken up. In particular the experts emphasised that:

- All surface transport modes should be integrated according to their relevant system advantages.
- Enhanced cooperation between authorities and freight transport logistics operators is necessary.
- Motorways of the Sea can become part of green corridors when complying with the criteria laid down for green corridors.
- Green corridors could serve as experimentation platforms with innovative environmentally-friendly forms of transportation and with the use of advanced ITS applications.
- The development of green corridors on the core TEN-T network should be strongly encouraged.[40]

Results from the public consultation of authorities, registered and non-registered organisations as well as citizens can be summarised as follows:

- The idea of green corridors should be connected with the concept of a TEN-T core network.
- Green corridors should facilitate multimodal transport solutions.
- Green corridors should especially be developed against the background of reducing CO_2 emissions.
- Green corridors need multimodal terminals for combined and multi-modal transport.
- Green corridors should prioritise the most environmental modes of transport (rail and sea)[41].

3.3 From vision to action - the green corridor concept in the EU

After being integrated in transport strategies on EU level, the green corridor concept was applied to the Baltic Sea Region as a part of the action plan for the EU Strategy for the Baltic Sea Region (SEC(2009) 712 - European Union Strategy for the Baltic Sea Region: Action plan (10.06.2009)). To

[39] Commission of the European Communities, 2010a;Commission of the European Communities, 2010b
[40] TEN-T Expert Group 2, 2010
[41] Commission of the European Communities, 2010

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'*improve internal and external transport links*' in the Baltic Sea region, the need to '*facilitate efficient overall Baltic freight transport and logistics solutions*' has been identified. The development of the green corridor concept through the implementation of concrete projects is one approach to reach that goal.[42] In this context, various national and transnational EU funded projects in the BSR have recently been set up to refine and implement the concept of green corridors.

Swedish Green Corridor Initiative

In preparation of its presidency of the EU Council (second half of 2009) Sweden started a national green corridor initiative in October 2008 to firstly substantiate the EU green corridor concept. The project was initiated by the Swedish Logistics Forum, an advisory board for the Ministry of Communications and the government, bringing together different stakeholder groups such as shippers, transportation companies as well as research institutions.[43]

The Logistics Forum defines a green corridor as being conform to the following characteristics:

- Sustainable logistic solutions (reduced environmental and climate impact, high security, high quality and efficiency).
- Co-modality (optimal utilisation of different transport modes).
- Harmonised rules and openness for all actors.
- Concentration of flows of goods on long transport legs (national and international).
- Strategically placed, effective transhipment points and adapted, supportive infrastructure.
- Platform for development and demonstration of innovative logistics solutions (information systems, collaboration and business models and technology)[44].

Based on that definition the Logistics Forum follows a threefold strategy, which is to (1) demonstrate therewith consistent transport solutions, (2) promote the development of EU green corridor policy and (3) establish international partnerships. To reach these goals, already existing projects, initiatives and technologies have been identified as proposals on what green corridors might look like in the future. In sum, about 30 projects have been compiled involving (amongst others) companies like Green Cargo, Scania, Volvo, and DB Schenker[45]. Currently, the initiative focuses on:

[42] Commission of the European Communities, 2009a
[43] Swedish Ministry of Enterprise, 2010
[44] Swedish Ministry of Enterprise, 2009
[45] Lindström, n.d.; Traffic Technology Today, 2008

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- Establishing pilot corridors running Oslo-Gothenburg-Rotterdam and Narvik-Stockholm-Naples,
- the development of new business models, and
- developing measuring and labelling criteria for green corridors.[46]

East West Transport Corridor II (EWTC II)

Overall goal of the EWTC II project is to make the east-west flows of goods in the Baltic Region more efficient, safe and environmental friendly. The project follows a threefold strategy.

- EWTC II should serve as a good example of a Green Transport Corridor bringing the EU's latest transport policies to life and meeting market demands for more environmental friendly and efficient transports.
- EWTC II should be a testing ground for innovative technology and information systems aiming to improve efficiency, traffic safety, and security as well as to reduce the environmental impact in the corridor.
- EWTC II should stimulate new business models to foster economic growth within the corridor, in particular in ports and inland hubs.

Scandinavian-Adriatic Corridor for Growth and Innovation (SCANDRIA)

SCANDRIA is another project that facilitates efficient transport and logistics solutions as described in the Action Plan for the EU Baltic Sea Strategy. The geographic focus is from the Nordic Triangle via the Öresund region, Mecklenburg-Vorpommern to the capital region Berlin-Brandenburg. The Baltic-Adriatic corridor is completed by SoNorA, Scandria's (southern) twin project, which covers the central European leg from the German capital region to the Adriatic. Scandria's main goal is to enhance the infrastructural efficiency for passengers and freight and to improve the accessibility of regional economic potentials. Also, as another component of EU's strategy of greening transport, Scandria will focus on the practical testing of green corridor solutions (alternative fuels in heavy goods vehicle transport or ICT (Information and Communication Technology) in logistics).[47]

[46] Swedish Ministry of Enterprise, 2010
[47] Baltic Sea Region Programme 2007-2013, n.d.

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Cooperation of TransBaltic, EWTC II and SCANDRIA

In November 2009, the projects TransBaltic, EWTC II and Scandria as well as the Swedish Ministry of Enterprise, Energy and Communication set up an agreement to streamline their green corridor activities. Therein, EWTC II provides the theoretical concept through developing a manual on green corridors, comprising guidelines, key performance indicators and steering mechanisms. Also, it should function as a role model for other regions in Europe. Scandria however should serve as a testing ground for feasibility studies of developed green corridor measures. TransBaltic, in its function as an umbrella project for the corridor projects across the Baltic Sea Region, will generalize the findings and lift them up to a pan-Baltic level as macro-regional solutions (blueprints).[48]

SuperGreen

Funded under the Seventh Framework Programme, SuperGreen (Supporting EU's Freight Transport Logistics Action Plan on Green Corridors Issues) promotes the development of European freight logistics in an environmentally friendly manner and thus assists the Commission with defining the green corridor concept. Major objectives are to:

- Support EU's Freight Transport Logistics Action Plan and develop recommendations on green corridors.
- Strengthen co-modality for sustainable solutions.
- Benchmark green corridors on the basis of still to develop KPIs covering transport operations and infrastructure (emissions, internal and external costs).
- Foster networking activities between stakeholders to improve information exchange in terms of research results, best practises and technologies. [49]

Also, part of the SuperGreen project is to select 6-8 corridors for further examination. Therefore, 15 corridors have been pre-selected on a basis of different criteria such as transport volume, length, bottlenecks, and application of new technologies. After that, a final selection of 9 corridors had been performed by the project management committee on the basis of feedback given at the SuperGreen workshop in Helsinki (28th of June 2010). **Błąd! Nie można odnaleźć źródła odwołania.** summarizes the selected corridors.

[48] TransBaltic, 2009
[49] Minsaas & Psaraftis, 2009

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ACRONYM	BRIEF DESCRIPTION- BRANCHES	NICKNAME
BerPal	Malmö-Trelleborg-Rostock/Sassnitz- Berlin-Munich-Salzburg-Verona-Bologna-Naples-Messina-Palermo Branch A: Salzburg-Villach-Trieste (Tauern axis) Branch B: Bologna-Ancona/Bari/Brindisi-Igoumenitsa/Patras-Athens	Brenner
MadPar	Madrid-Gijon-Saint Nazaire-Paris Branch A: Madrid-Lisboa	Finis Terrae
CorMun	Cork-Dublin-Belfast-Stranraer Branch A: Munich-Friedewald-Nuneaton Branch B: West Coast Main line	Cloverleaf
HelGen	Helsinki-Turku-Stockholm-Oslo-Göteborg-Malmö-Copenhagen (Nordic triangle including the Oresund fixed link)- Fehmarnbelt - Milan - Genoa	Edelweiss
RotMos	Motorway of Baltic sea Branch: St. Petersburg-Moscow-Minsk-Klapeida	Nureyeev
RhiDan	Rhine/Meuse-Main-Danube inland waterway axis Branch A: Betuwe line Branch B: Frankfurt-Paris	Strauss
AthDre	Igoumenitsa/Patras-Athens-Sofia-Budapest-Vienna- Prague-Nurnberg/Dresden-Hamburg	Two Seas
SinOde	Odessa-Constanta-Bourgas-Istanbul-Piraeus-Gioia Tauro-Cagliari-La Spezia-Marseille-Barcelona-Valencia-Sines Branch A: Algeciras-Valencia-Barcelona-Marseille-Lyon Branch B: Piraeus-Trieste	Mare Nostrum
CNHam	Shanghai-Le Havre/Rotterdam-Hamburg/Göteborg-Gdansk-Baltic ports-Russia Branch:Xiangtang-Beijing-Mongolia-Russia-Belarus-Poland-Hamburg	Silk Way

Fig. 2. Selected SuperGreen corridors[50]

3.4 Measures for environmentally friendly transport chains

The green corridors concept is intended to help investigate how elements of a transport corridor (e.g. transport vehicles, port operations) can be developed in an environmental friendly way. Due to the fact that partners from several European countries participate in the TransBaltic project, this compilation will be a valid base to represent the European dimension.

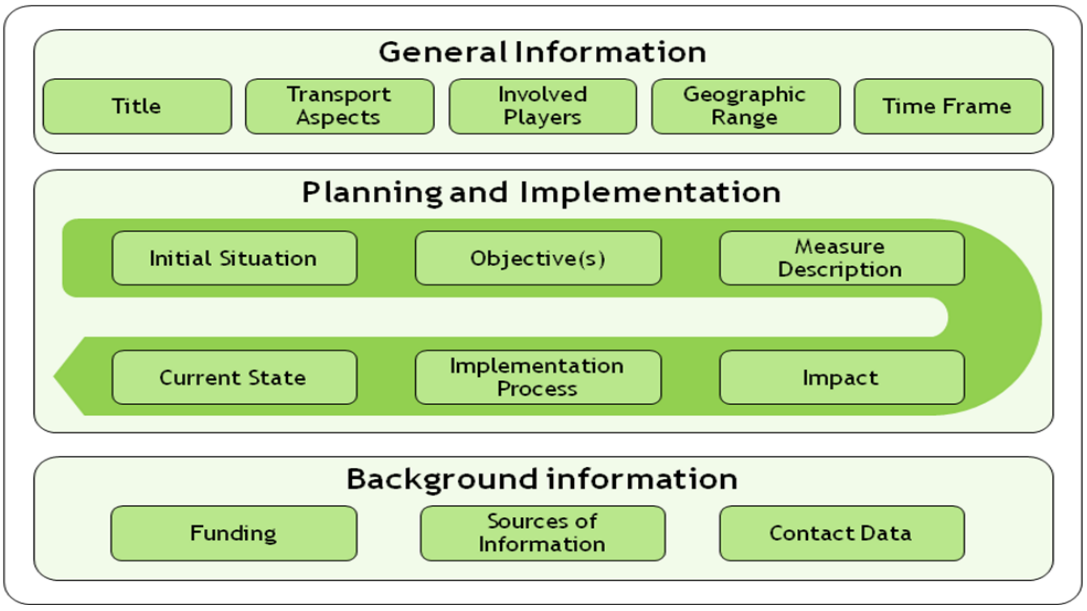

Fig. 3. Structure of the green corridor template

[50] Salanne, 2010

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Different players along the supply chain such as shippers, forwarders, transport operators or shipping lines already develop sustainable transport solutions and products to comply with 'green' requirements. Also, other stakeholders such as government agencies, researchers, NGOs and legislative bodies which influence the 'transportation environment' are involved and shape the green transportation landscape. To catch the experiences already made, a good practice compilation has been started within the project TransBaltic. The overall aim of this compilation is to identify players which are involved in the field of green transport and logistics and display their initiatives so that they can serve as role models for others. To develop the lessons learned from the examples collected so far, reflections are made regarding:

- Which actors are involved (Who)?
- What is their motivation (Why)?
- What are the initiatives overall goals (What)?
- What measures/actions have been applied (How)?
- What is the outcome (How much)?

At this point it should be mentioned that, as the compilation currently consists of around 20 examples, the conclusion have a rather explorative character and are not statistically representative.

Actors

The presented examples show a very **diverse picture in terms of actors involved** in the development of green transport solutions and therewith depict a realistic picture of the transport system, which is characterised by a wide range of different players. Only rarely, solutions have been developed by a single actor. These few cases include for example environmental programs of large logistics companies, whose development is - by its nature as a company's business concept - a fundamental responsibility of each single company. In most cases, initiatives have been started by **joint efforts of different actors** along the supply chain and its environment, i.e. the **research and governmental sector**. This is especially true for projects which include technological innovation and therefore often demand a scientific partner. Other collaborative initiatives are **public private partnerships (PPP)** where a venture is funded and operated through a partnership of government and private sector companies. Also, political or governmental involvement comprises the introduction of research programmes or the creation of an environmentally sound legislative framework. So far, the good practice compilation has a strong focus on company initiatives. In the future, the compilation will be further extended regarding the broad actor arena and concentrating more on modal shift and transport mode optimization.

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Motivation

The motivation to engage in green transportation issues originates from very different sources. Even within homogenous groups of actors, reasons for why to develop green strategies can be quite different. In many cases, motivation originates from an **inward need to change**. Some of the examples indicate that simply the need to **reduce economic inefficiencies** in existing transportation/ logistics systems is the triggering factor. This is closely connected with the motivation to reduce wastage, eliminate bottlenecks in transport systems as well as to realise implied cost savings. Reducing such inefficiencies creates **win-win situations between economic and ecological goals**. However, 'green' change is rather incremental than radical. Concerning external reasons, the improvement of a company's public image or the response to changes in customer behaviour, e.g. a growing demand for 'greener' products and services, can be a factor. Also, compliance with changes in environmental legislation plays an important role.

Goals

Most of the examples deal with the improvement of a company's, business segment's or product's **carbon footprint**. In this context goals are displayed in CO_2, CO_2 equivalents or in fuel savings. Also, besides savings directly related to specific projects or products, the overall goals of most **corporate environmental programmes** are displayed in terms of CO_2. Other initiatives display goals in terms of saved truck loads or TEUs, especially when the goal is a **modal shift** from road to rail/barge. Further, companies define goals in terms of **product diversification**, the **entering of new markets or customer groups** (e.g. rail ports, sustainable load carrier) or **compliance with laws, regulations or standards**.

Actions

What can different groups of actors do in practice? Examples can be clustered into

- technological innovations,
- business strategy (including new products), management and organisation as well as
- infrastructure development.

Thereby technological innovations can be found along the whole supply chain, improving load carriers, vessels, logistics hubs and infrastructure.

Outcome

Many companies present the outcome in accordance with the goals set in the beginning, i.e. in terms of CO_2 savings, TEUs, truck loads etc. In some cases, when presented initiatives are still in the process of implementation, the outcome is displayed as estimated impact only. Both types of outcomes share the same problem. There is no standardised procedure for evaluating the outcome of green transport initiatives. Because of this **lack of standards**, actual outcomes are difficult to

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verify and even more difficult to compare. Therefore, benchmarking and ex-post evaluation in the field of CO_2 emissions and other environmental factors often fails from the beginning.

To collect and present good practice examples in a structured way, a template - based on earlier work in the field of sustainable logistics - has been developed[51]. It consists of 14 different categories organised within three broader sets of information. The latter are 'General Information', 'Planning and Implementation' and 'Background Information'. For more information please see Appendix II.

[51] Flämig, 2004

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4. Experience in conceptualising the green transport corridors

Greening is basically a cooperative process including many successful green initiatives being based on changing relationships with suppliers, partners and logistics providers.

The interest in new environmental transportation options is high and so are the opportunities in green logistics abound, but unfortunately the knowledge and resources necessary to implement green initiatives successfully is often lacking. The chapter thus presents the state of activities applying the concept of green transport or green transport corridors.

4.1 Interregional sustainable transport cooperation in Corridor VI

In October 2009 in Brussels two interregional agreements were signed in order to advocate for more dynamic fulfilment of the VI pan-European transport corridor requirements. The co-signatories of the agreement for "prompt accomplishment of rail corridor North-South" (Gdansk/Gdynia – Warsaw – Brno/Bratislava – Vienna – Bolonia) were from 14 regions representing Poland, Czech Republic, Slovakia, Austria and Italy. In December 9 regions representing Poland, Czech Republic and Austria signed a joint declaration emphasising the European and regional importance of the motorway Gdansk-Brno-Vienna (priority Project TEN-T No 25). Importance of revitalisation of north – south axis and Pan-European Transport Corridor nr VI has been equally recognised among Central European nations and other EU countries.

Both agreements (rail and motorway) create a chance not only for faster accomplishment of the corridor's infrastructure (from Polish side motorway A-1 and rail lines E-65 and CE-65), but back up the co-operation and coordinated activity between regions – co-signatories of agreements aimed for stimulating the activity of the corridor.

North-South transport corridor always played an important role in economic development of Pomorskie Region and for other regions located along the corridor's route. Decades ago the coal trunk-line connecting the port of Gdynia with Silesia secured the development of Polish maritime sector, foreign trade and industry[52].

[52] Development belt of the Baltic-Adriatic transport corridor – seminar organised by Pomorskie region. Gdansk 2009.

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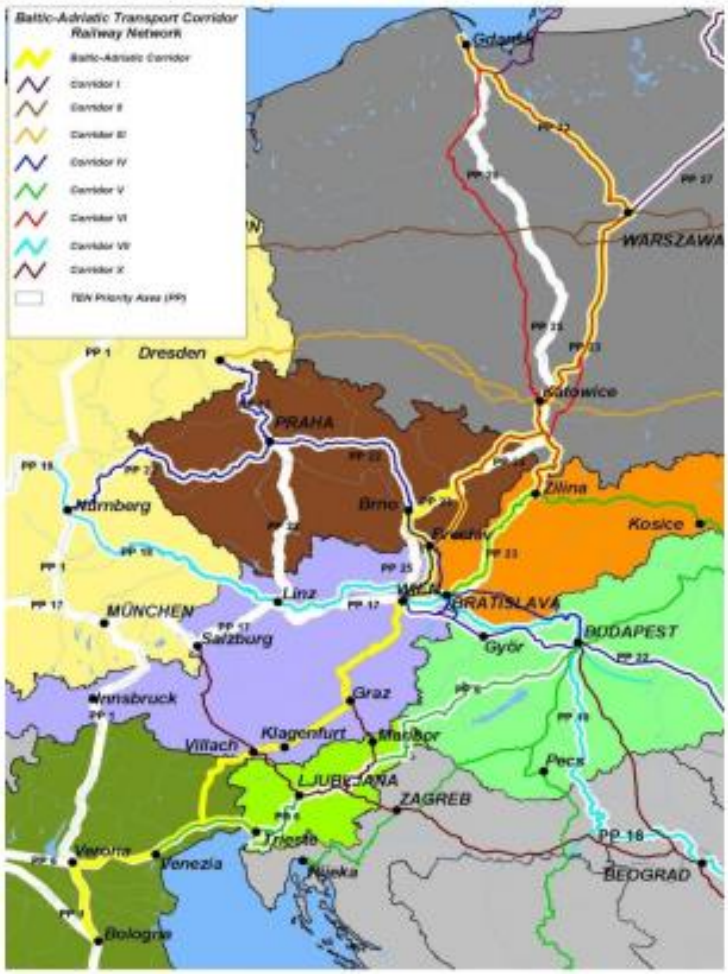

Fig. 4. Map of corridor nr VI

Improvement of major transport routes in the north-south axis will allow reshaping the Central European region into a transit area, which thanks to modern transport infrastructure will provide seamless flow of goods. Strengthening the economic ties between Central European countries: Poland, Slovakia, Czech Republic, Austria and Italy through development of Baltic – Adriatic multimodal transport corridor connecting countries along the corridor is one of the essential targets to be realised as a part of close cooperation.

At the same time, the Baltic-Adriatic transport axis will complement the existing land transport connections and will constitute a strategic importance for Central Europe.

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Fig. 5. Container ship "Maersk Taikung" at the DCT Gdańsk container terminal

Source: Port of Gdańsk Authority

Two large sea ports linked permanent with many industrial centres in the Baltic Sea Region and other parts of the world are located in Pomorskie Region. The accessibility to those ports is gradually improving, the infrastructure is being modernised with EU financial support. Recently new circumstances upgrading the rank of southward connections appeared – ocean-going large containerships (Maersk Line) are calling weekly the Deepwater Container Terminal in the port of Gdansk linking the port with Shanghai in Far East[53]. DCT Gdansk in January 2010 achieved its goal of becoming the new hub for the entire Baltic Sea region.

Moreover, there is a large potential in foreign trade between Poland and Scandinavian countries, which can be justified by granting the status of Motorway of the Sea to the ferry link Gdynia-Karlskrona. These positive symptoms indicate increasing significance of Polish ports in seaborne trade and recognise the role of Poland in the Baltic Sea Region.

It is worth to underline that the region's location along the corridor play a vital role in its activation and they will benefit from the favourable location within the country's main transport thoroughfare. That is also why the creation of economic development zone should go on parallel in all adjacent regions. The crossing points of the motorways, logistics centres, intermodal nods and development zones are particularly important in proper utilisation of the assets assuring sustainable development for the benefits of the regions, society and environment.

The targets of interregional co-operation for creation of development zone in VI transport corridor include:

[53] On 4 January 2010, DCT Gdansk received the largest container vessel ever to call Poland when the 8200TEU Maersk Taikung (length 332 m; beam 43.2 m; draft 14.5 m) arrived from the Far East. From January 2010, Maersk post-panamax ships sailing on Maersk Line's AE10 service from China call DCT Gdansk weekly, bringing Polish, Russian and Finnish cargo to be discharged at DCT Gdansk.

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- Elaboration of cohesive strategic and special planning system for regions located along the corridor (cohesion of elaborated documents, regional operational programs, regional spatial plans)
- Elaboration of tools stimulating development of corridor zone (attracting investors, stimulating new shipping lines, creation of new economic zones, logistics centres, storage facilities),
- Initiating activities in order to eliminate legal, procedural and administrative barriers related to transport services in the corridor,
- Elaboration of data base about transport infrastructure investments in neighbouring regions (pending investments and planned to be accomplished),
- Joint promotion of Baltic-Adriatic corridor on various national and international foras and events,
- Co-operation with national and regional organisation involved in corridor's issues.

The collaboration for the benefits of the corridor is planned to proceed according to the following schedule (yearly basis):

- Inventory of investments database carried on located along the VI corridor area, based on reporting questionnaire about pending and planned infrastructural and progress in fulfilling the tasks (January – March).
- Elaboration o report for regional offices managements (April – June),
- Elaboration of printed booklets for information and promotion (June – September),
- Yearly assembly of working group and seminar summarising the progress of works in the corridor – every year changing turns to different region (November).
- The competitive strength and the importance of the corridor in the Baltic Sea Region policy will depend on the quality of co-operation.

4.2 Nässjö - local development initiative in green transport and goods logistics

Nässjö is a very good example of local development initiatives successfully implemented by the municipal authorities in close collaboration with local trade and industry, to strengthen Nässjö's position as a logistics hub. The positive will demonstrated by the municipal authorities to take new initiatives and make new investments as a vital success factor for Nässjö.

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Cooperation initiatives between municipal authorities, companies and carriers can create gains on the central, as well as the local level. Local initiatives, together with overall national strategies can develop the national transport system to respond to the requirements of individual companies.

Nässjö is some 40 kilometres south-east of Jönköping, not in the immediate vicinity of any major Swedish city, but only two hours by rail from Goteborg, Stockholm and Copenhagen. Nässjö has a vibrant trade and industry sector whose successes are largely due to its strategic location, and the fact that this is utilised to its full potential.

Facts about Nässjö

Population: 30,000.
The logistics sector, because of the rail link to Goteborg Port employs some 1,200.
During the past three years, over 2 billion SEK has been invested in the building of warehouse and storage facilities.
The municipal authorities have invested 5 million SEK, and Jönköping International Business School 2.5 million SEK, in the establishment of a Chair of Logistics. This has been a joint initiative between the Nässjö Trade and Industry Association, which is owned by 290 member companies, the Nässjö Lärcenter for adult and further education, and Jönköping International Business School at Jönköping University.

Based on determination and positive initiatives, Nässjö has now become one of Sweden's most important logistics centres and also a model example of local sustainable development. Successful cooperation between the municipal authorities, local trade, industry and logistics specialists, such as Goteborg Port and Green Cargo, has resulted in the development of Nässjö's position as a main line rail junction, supported by its proximity to both the E4 motorway and Jönköping airport.

One example is the establishment of Höglandsbanan – the rail cargo shuttle from Goteborg which transports hundreds of container loads daily to Höglandsterminalen – the Nässjö railroad terminal – destined for the major central warehouses of, for example, the Jysk and Rusta retail chains. Another example is IKEA, for which goods are reloaded for road carriage to the nearby central storage facilities.

New major business establishments as well as new employment follow in the footsteps of a well developed infrastructure. This spreads like rings on water and job opportunities increase in, for example, local storage companies, craft companies, and technical consultancies.

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Nässjö is a very good example of how well designed logistics solutions and cooperation between logistics centres can contribute to regional development, while also increasing the competitive power of both small and medium-sized companies.

4.3 RUSTA, rail cargo from Göteborg Port – a green and cost-efficient solution

Logistics is both complicated but very important in business operations of the Rusta company. It has 25000 products in its range, and hundreds of different suppliers, most of which are located in Asia. To be able to offer its customers in 47 stores throughout Sweden the right amount of products, at the right time and at the right cost is a major logistics challenge. To be able to maintain an annual volume growth of some 20-30%, it is vital that Rusta has a continuous development of cost-efficient and reliable logistics solutions. One such example is the shuttle between Gothenburg port and our central warehouse in Nässjö.

In 2003, Rusta carried out a major operational review to identify and select the most suitable location for their new central warehouse. Initially, this was based on a very wide geographical framework - virtually all of south Sweden - in the search for the optimum location. Several critical factors had to be considered, such as the existence of a strategic rail link with good connections to shipping.

Nässjö was chosen as the ideal location, and one year later (2004), Rusta's new warehouse facilities of 24 thous m2 were opened. The warehouse has 70 employees, more than one tenth of Rusta's entire personnel.

The decisive factor in the localisation process was Nässjö's connection to the south main line, and the new Gothenburg rail cargo shuttle, which became operative at about the same time as the Rusta warehouse. The municipal initiatives have been, and still are, very supportive and important for the development of the logistics sector. They work actively together with the business community and with key players such as Gothenburg Port, and they achieve very good results, both for the companies and for the local community. Their successful logistics initiatives are very important to the municipality's economic life and employment opportunities.

Of Rusta's products, some 70% come from Asian producers. Transoceanic shipping is thus a crucial part of the Rusta's logistics mix, and all their Asian products are transported on the rail cargo shuttle via Goteborg Port.

Before the rail link was established, road transport was used. Now the cargo shuttle means a smooth transfer from shipping to land transport, and it is a cost-efficient solution. The goods wagons will be able to roll all the way into Rusta's warehouse.

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To be able to cooperate with a major port which has the capacity to handle transoceanic shipping reduces the number of transhipments, which is a major advantage.

The company depends upon guaranteed scheduled deliveries which are best handled by a major international port. By having a reception area exclusively for sea transports, our work is simplified and enables in-depth cooperation with the port authorities, which for us means safer, more secure and more flexible operations. The other alternative, i.e. to have several minor destination ports would mean substantially more work and increased costs.

4.4 IKEA - example of green logistics approach

Ikea is a Swedish home furnishings retailer, known as the world's largest designer and retailer of well-designed, inexpensive, and functional furniture for the home. The company is owned by a non-profit foundation and has grown 15% per year.

Two decades ago, in order to implement environmental approach and specific greening plans Ikea introduced The Natural Step (TNS) Framework as the basic structure for achieving these goals. With this new scheme the company has made a number of changes affecting its products and services[54].

IKEA is an example of creative attitude to sustainable development of TSL solutions. The company had to overcome a lot of twists and turns on path to current success starting from a tiny one-shop company in the remote and rocky Fields of Smaland. Basic principles did not change dramatically. The attitude of gaining more from limited resources, challenging conventionalities, wise spending of financial resources and avoiding any kind of wastage has changed not only because of costs only but for the sake of „saving the planet", for the welfare of the society and nature.

That is the reason why the company's furniture is designed in sawmills, wood factories and many other astonishing places hardy expected to be a convenient facility for interior designing. The elements of furniture and equipment are packed in flat units and transported and assembled in close cooperation with final receiver. It is a very simple and efficient way of cutting costs of labour and transport, limiting negative impact on the environment and stimulate the activity of less privileged remote areas of high unemployment but with implied potential.

The factories of the company are using components and materials produced according to the principles of sustainable development. For ex ample the fabrics (cotton) for bed linen origin from cotton farming estates using less water and chemicals and co-operate with IKEA network of factories and stores. Moreover, a new method of manufacturing was introduced enabling to use less

[54] The Natural Step website http://www.naturalstep.org/it/usa/ikea

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row material for weaving while keeping still the same high quality of the product. Decreasing row material consumption is one of many ways to reduce costs.

Ikea is participating in sustainable socio-economic development considering better care for the environment, for non-removable natural resources, for leaving condition and human relationship.

THE BENEFITS:
sustainability
The major benefit is much more product in each load unit, meaning better utilization of transport units and storage space. In addition, handling becomes much easier as fewer units are being handled, both at supplier sites, central distribution centres and in warehouses. Thanks to increased efficiency in transportation and handling, the impact on the supply chain and the environment is decreased.
Economic:
Utilization of transportation resources increased by 30% for both IKEA and its business partners,
More space in warehouses that can be used for other purposes, such as storage or display of other products,
The new packaging makes it easier for the customer to handle the product in the store. Easier to replenish the warehouse as the product is more or less “shop ready”
Environmental:
Less noise and emissions due to approximately 400 fewer 40-ft containers on the roads
Reduced need for warehouse space
Smaller packaging leads to use of less packaging materials (corrugated paper and
plastic film)
Social:
fewer trucks less on the roads reduces the risk of accidents (no precise figure is available)
Less transportation, however, affects employment within the transportation industry

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transferability
Transferables:
Eliminating empty space (air) from packaging means that the unit volume is decreased, and this can be achieved for most products in most industries, independent of geographic location and company size.

Often the simplest ideas grant the best solution. One should be aware that sometimes we are also part of the problem and we have to work hard to find proper, and in many cases an innovative solution, considering all benefits and treats. The aggregate of small steps, small improvements in many areas of activity may result in great and remarkable achievement. There is always room for improvement - once it started, it is never ending. For example: old plastic bottles can be recycled into useful container for paper waste; good quality bed-linen can be produced from a mixture of 50% cotton and another 50% of liocel, which is made of cellulose from forests plantation requiring reduced amount of water and chemicals applied in closed cycle; in some series of furniture manufacturing a innovative and efficient technique based on honey plaster construction technique using planks stuffed with cartoon is applied; new technique for printed fabrics has been implemented enabling reduction of water and colouring components; more effective transport and storage technique was applied for some types of sofas enabling to reduce the require space by 50%, which grants substantial cut of costs.

The company using logistics as a competitive advantage. It has always been known for providing decent quality furniture and home furnishings at a reasonable price. One of the ways in which the company is able to keep their prices low for the end consumer is through their utilization of logistics. The key supply chain methodologies that Ikea adheres are[55]:

- **Packaging and design** – Ikea's approach to packaging and design makes the buying process simpler for the consumer. Smaller packaging allows the customer to transport purchased product in their own vehicle. Smaller packaging also allows Ikea to maximize rack space in a warehouse storage environment.
- **Cargo transportation** – Packaging is designed to maximize the cube of ocean containers and domestic over-the-road trailers. This allows Ikea to ship more units at a time which has direct impact in the reduction of their overall landed costs.
- **Strategic Manufacturing** – Ikea manufactures product all over the world with 31% of their products manufactured in low cost environments in Asia.

[55] Forbes.com

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Effective logistics allows growth. Logistics is increasingly important to Swedish industry. All transoceanic shipments arrive at IKEA's 220 thous m2 central warehouse at Torsvik via the rail cargo shuttle Gothenburg-Nässjö. IKEA does not have any storage facilities in Nässjö. The Torsvik warehouse handles shipments for dispatch to IKEA stores in other parts of Scandinavia. The Nässjö terminal receives and sends IKEA transports every working day – in all some 100 containers per week for road transport to Torsvik.

Before the opening of the Högland rail link, all IKEA shipments were transported by road from Gothenburg. The establishment of the rail cargo shuttle allowed new opportunities for IKEA to cut costs, and also use more environmentally friendly transport. The cargo shuttle meets IKEA's requirements for large and scheduled flows of transoceanic shipments.

A Swedish major port - Goteborg simplifies the company's logistic flows. Having access to a major port with a well-developed infrastructure for transhipment is of major importance. IKEA would prefer to increasingly replace road transport with the sea-rail combination, if there were viable infrastructure solutions from the ports.

Matching environmental and supply chain innovations is "a long-term commitment and strategy. Businesses not willing to play in the long-term horizon will be forced out of the game."

Companies such as Interface and IKEA that recognise the holistic vision melding environmental initiatives and supply chain management into a common goal have a distinct advantage.

4.5 Motorways of the Sea and Logistics: Poland – Spain (BSR-MED)

The share of road transport in the European and Spanish modal split continues to increase and is further aggravating in the process congestion problems and severe environmental externalities. It is therefore necessary to identify and promote alternative intermodal transport initiatives, such as the development of Motorways of the Sea, thereby reducing these problems, whilst setting the appropriate bases for the expected commercial growth between within Europe (including Baltic-Iberian Peninsula flows). Traffic flows covering long distances such as those between Spain/Portugal and Central/Eastern Europe would particularly benefit from these alternative transport modes.

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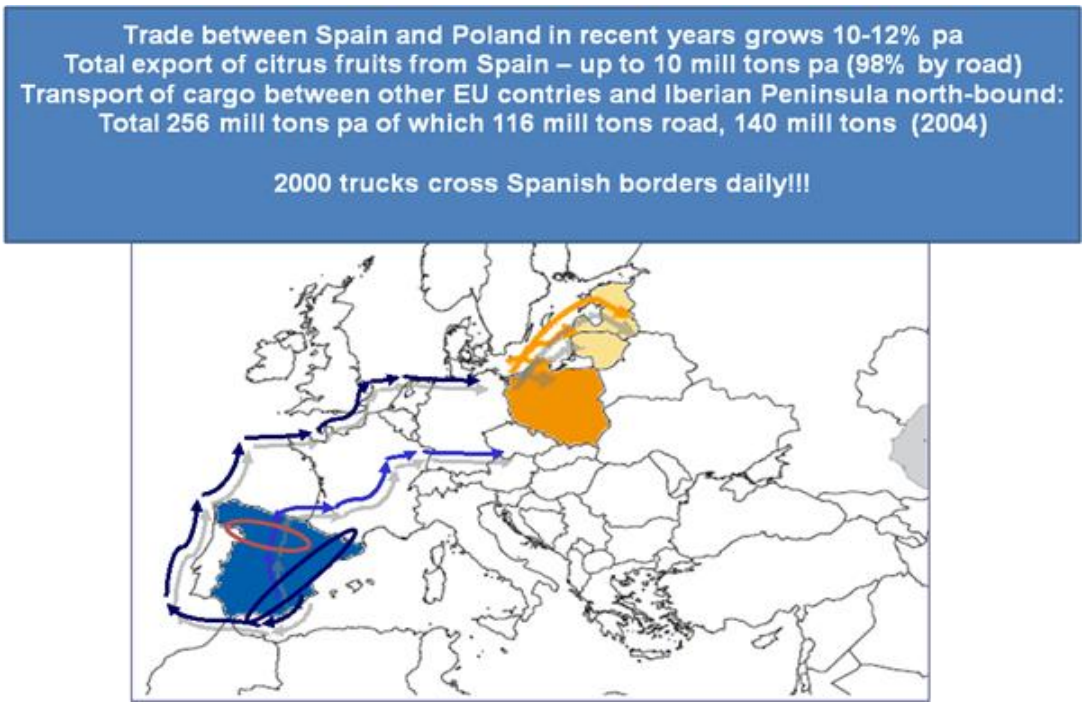

Fig. 6. Map of Poland – Spain routes by sea and by land

Source: www.webgate.ec.europa.eu

For this shift to materialise, however, it is necessary to conceive complete door-to-door solutions capable of competing with the flexibility offered by road transport.

The role of Motorways of the Sea is much more interesting when considering refrigerated products which require special logistics solutions and which are usually not studied.

Despite comprehensive potential for maritime transport development, currently transport between Spain and other European countries is mostly based on the road transport. Therefore, the focus should be on the implementation of new ideas related to maritime transport and short-sea shipping.

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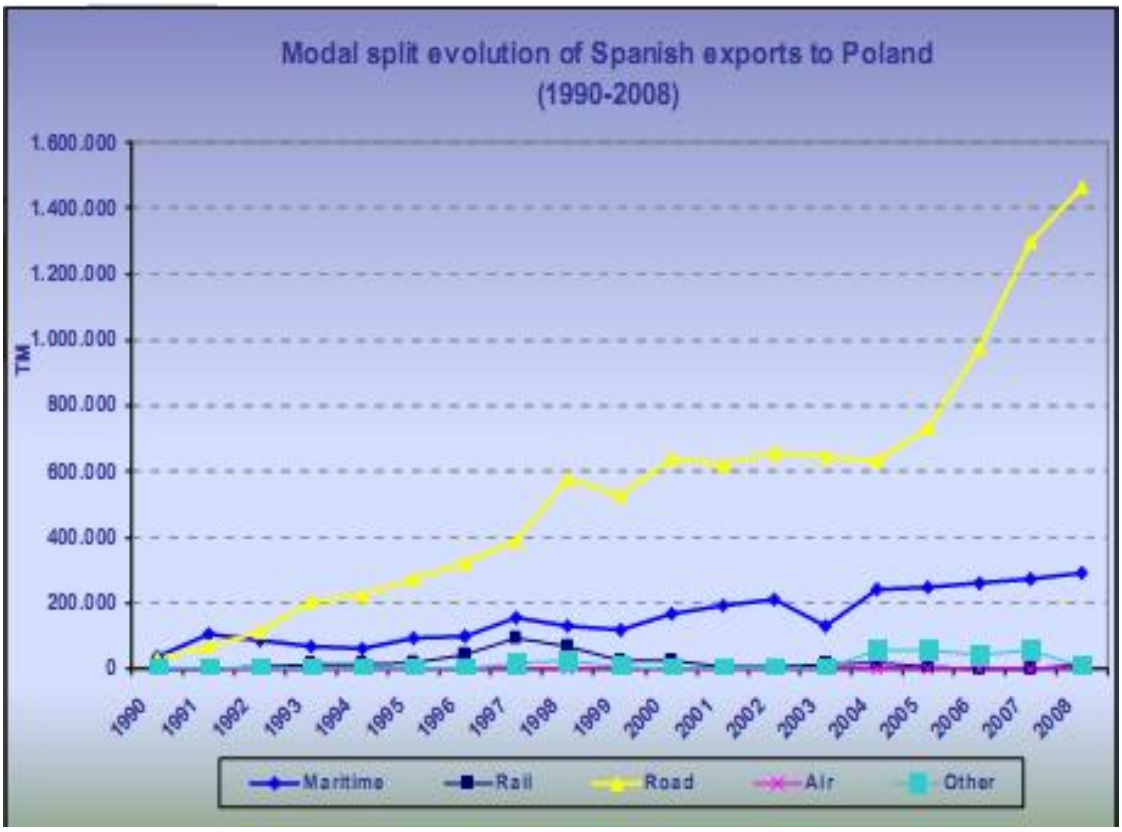

Fig. 7. Modal split evolution of Spanish exports to Poland in 1990-2008

Source: www.transport-research.info

Within the framework of EU Transport Policy assumptions (rebalancing of different modes, sustainable development of the transport system) with reference to from road to sea, a research project has been initiated in order to develop an integrated short-sea shipping service for handling refrigerated products between Spain and Poland[56].

Main goal of the project was to determine the optimum configuration of a short sea shipping (SSS) line dedicated to refrigerated products connecting the Iberian Peninsula with Poland and countries located in its area of influence.

According to the results of the interviews, SSS would be considered as a viable option if:

- Maximum acceptable transit time: 7 – 8 days (d2d) (6 days for transit time + 2 days for handling),
- In general, transport in containers is preferred but pallets transported on a refrigerated vessel could be acceptable, 4 days of free storage in a refrigerated warehouse in Poland needed,

[56] Motorways of the sea and logistics fostering Spanish export competitiveness in Central and Eastern European markets (2007-2009). Project awarded by the Spanish Ministry for Public Works. Research Teams: Valencia University, Maritime Institute of Gdansk (additional financing from Polish Ministry of Science) Fundación Valenciaport.

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- Required frequency in high-season: twice weekly,
- Costs savings between 4 and 7 Euro cents / kg door to door (d2d),
- D2d road transport price in high season: 0.17 €/kg,
- Max. acceptable d2d SSS price: 0.13 €/kg,
- Total price for d2d transport service (WORST CASE SCENARIO):
- Door to Port transport in Spain: 150 Euros / container (18 tonnes)
- Costs at Spanish port: 300 Euros / container (18 tonnes)
- Costs at Polish port: 200 Euros / container (18 tonnes)
- Port to door transport in Poland: 350 Euros / container (18 tonnes).

In the comparative analysis of transport quality based on given criteria, most companies assessed road transport as very good or good. Using ranks: 1 (very bad), 2 (bad), 3 (medium), 4 (good) and 5 (very good), road transport received highest notes.

Generally opinions in this matter differ a lot. Concerning main criteria (cost of transport, time and promptness of deliveries) ranks are between 3 and 5. Appearance of indirect handling places in the deliveries chain was judged as very unfavourable (very low rank), together with level of complications in the documentation and administrative procedures and flexibility (very low and medium ranks).

The rail is gaining more importance in links with sea ports, particularly in container transport. The rail container services are being developed and appreciated. The share of rail in Polish transport market in ton-km comes to nearly 30%. For rail transport 75 licenses were granted in 2007 and private operators hold 20% share in the rail cargo transport market.

High fees for access to the infrastructure are considered as the major barrier in development capabilities. The fees are among the highest in Europe, while the technical condition and standards of infrastructure are very poor and require urgent and large scale renovation and modernization.

The rail freight transport in Poland increased remarkably and PKP Cargo initiated development of rail terminals planning them i.e. in Gdansk, Gdynia, Szczecin, Szczecin, Wrocław.

One train with planned speed of 160km/h, composed of 30 wagons on the route, for example from Poznań, with daily frequency, can replace 1800 lorries. The cargo handling-logistics centre in Franowo near Poznan is expanding rapidly. There are operating cargo trains on the route Poznań–Franowo–Antwerpia Noord in cooperation with German and Belgian rail.

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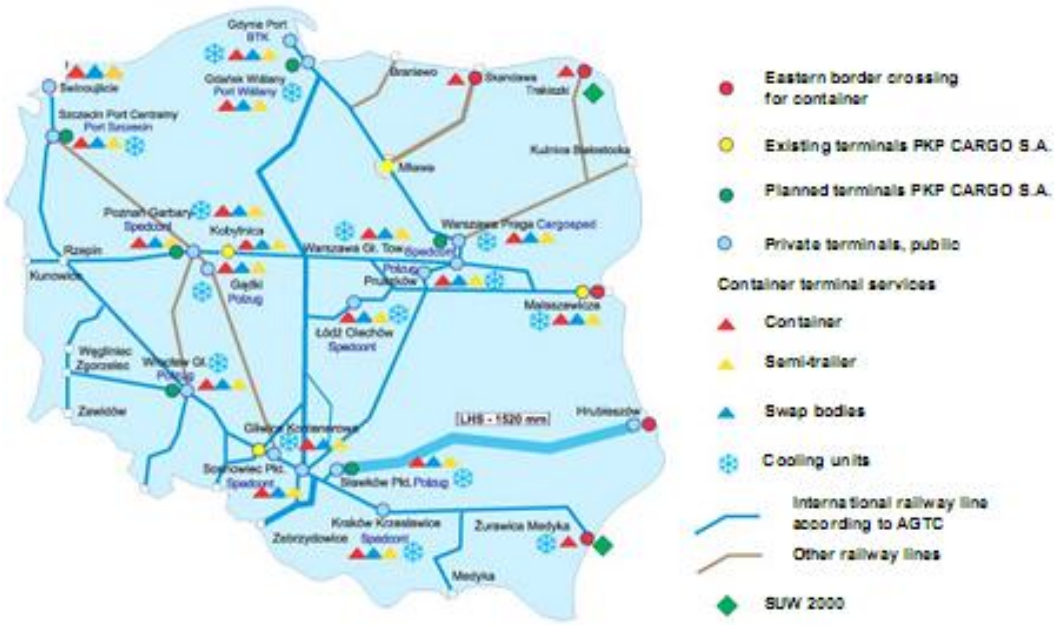

Fig. 8. Projected development of rail terminals

Source: Polish Railways

The presented project is a good example of cooperation between different sectors and institutions, a platform that connects science, business and administration. To large extend the cooperation regards the small and medium enterprises since they are mostly involved in production and trade and their preferences and expectations make the biggest impact on the demand on transport services. The growth of the trade exchange also depends on the availability and quality of transport infrastructure as well as logistics services.

Nevertheless, the reality of European freight is that despite long lasting promotion of the many benefits that multimodal transport brings into the economy, it is still not commonly used. Perhaps what we are missing is an institution that would take the responsibility, risk and costs of introducing intermodality into transport. However, in recent years many maritime transport operators consider undertaking the role in question.

Road transport is satisfying and to reach its current shape it required many years. Obviously, it has big disadvantages when it comes to the impact to the environment but the road transport, due to its effective organisation, offers appropriate flexibility in taking quick decisions. More flexible operations in the road transport are significant advantage over the sea mode.

The outcome of the project is addressed to shippers who currently use a well-organised road transport, that allows “door-to-door” delivery, but every concept that would wish to challenge the status quo, should also have to consider the existing behaviour of shippers and benefits granted from road transport. The road transport also evolves and adapts to ever changing market conditions and its domination is a logical consequence of its inherent traits. At the same time we are witness

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to dynamic changes in technologies and techniques of maritime transport operations. The vessels parameters have changed as well as cargo handling and logistics technologies. The logistics-distribution terminals have introduced a new quality and new possibilities to maritime transport. For the purpose of establishing logistics supply chain we should also consider the importance of recipients as well as preferences of importers as to their choice of transport mode. Also the legal and administration issues may have a significant impact, i.e. port charges, tax regulations, customs procedures, financing capacities etc.

4.6 Environment oriented initiatives in supply chain management[57]

In the past companies believed the path to profitability lays in forward-moving production rather than concern over waste and social responsibility. Both, supply chain management and environmental initiatives were cast supporting but not really imperative supplement. This attitude has completely changed along with socio-economic and technological development. Perceptions of green awareness and supply chain management gained a new picture. Concern over carbon emissions has added a new dimension to traditional two dimensions in supply chain management's - cost and service quality. Carbon emissions always existed, but until recently, businesses have not had the means or the inclination to factor them in.

Environmentally friendly initiatives will take supply chain management to different business surrounding by rendering decision making as socially responsible, and fuelling innovative research and collaboration to find more energy-efficient ways of doing business.

Heavy industries use the most energy and they will carry the cost burden from carbon emissions compliance which they will pass it on to their customers. Generally consumers rather are willing to pay more in the short term, if it means companies can be more efficient in the long term. This will ultimately restore pricing to sustainable levels through technology and process innovation.

Companies that make a commitment to reduce carbon should use less resources and be more efficient as well as look for alternatives. Using less, whether it is fuel, electricity, or shipping miles converts directly into cost savings. Buying less fuel and use less electricity, reduces the costs, which helps the bottom line.

Currently there is a growing consideration among global business entities regarding financial and environmental good ethic which equals successful business and ultimately growth. This innovative approach is turning in more and more popular behaviour. Some are consistent with their internal corporate values of environmental responsibility; others look at cost reductions, knowing that

[57] For presentation of specific initiatives please see Appendix II

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environmentally efficient suppliers pass savings along to customers by having competitive prices; and still others look to meet pressures from the market or requests from their customers.

More businesses today use environmental policies and approach to monitor suppliers than previously. Apart from good public relations, they companies introduce green policies for a number of reasons, among others, to be make the supply chain more transparent.

In many cases the business turns to sustainability when clients are concerned about company's environmental standpoint and products' impact on the environment. Addressing impact on the environment by enterprises often results in improved business – client relationship and eventually in growth.

Green politics may not necessary be particularly innovative but a good supply chain management can go a long way to reaching environmental compliance. The need to reduce carbon drives an examination of alternatives that can lead to cost savings.

When environmental innovations are implemented in supply transport chains, the businesses invests in new equipment, modernises old engines to reduce pollution and use alternative fuels such as biodiesel and other blends that lower emissions[58].

A good supply chain should comprise three primary components:

- creating partnerships,
- reducing all unnecessary engine idling,
- and increasing the efficiency and use of rail and intermodal operations[59].

It should foster better environmental awareness within the supply chains, and learn to apply logistics best practices to reduce fuel waste and carbon emissions, while reverse-engineering these efficiencies to evolve better supply chain networks.

[58] Green Thumbs Up, J. O'Reilly, http://www.inboundlogistics.com
[59] SmartWays Partnership Program, www.epa.gov/smartway

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5. Recommendations for EU transport policies

Strict cooperation between all transport modes is essential to create safe, profitable and effective supply chains. Imbalance between different transport branches causes growth of congestion especially on main trans-European networks and in cities. The potential of rail or water transport is not sufficiently exploited, while access to peripheral regions and markets is limited. As a result, the EU has to find a solution to overcome a large number of barriers to sustainable transport.

Traditionally, the remedies were focused on optimising individual modes of transport, since many problems are specific for that particular mode. Application of **co-modality** would allow more effective shares between transport modes and should provide sustainability within different transport modes. To exemplify, legislative initiatives at the EU level have addressed the opening of rail freight services to competition and the establishment of a framework for charging of international heavy goods traffic on roads. A policy objective today should be to aim at rebalancing modal preference, promoting alternative and "greener" transport modes and introducing intelligent solutions for door-to-door transport. Implementing differentiated charging systems for heavy vehicles should improve the efficiency and environmental performance of road transport. It will also contribute significantly to reducing CO_2 emissions. End users should be convinced by operators and infrastructure managers of the attractiveness of alternative modes and possibilities that intermodal transport brings[60].

However, achieving a balance between transport modes requires efforts from all stakeholders and not just the Commission. Complementary measures need to be worked out to lead to a change in transport behaviour and mobility. The transport policy ought to incorporate **the social component**, by greater awareness towards environmental issues, prices of tickets and congestion.

Logistics and regional interoperability still need to be developed and modified depending on market changes and consumers demand in order to take out full synergies and effect of the potential environmental issues. Especially, a better co-operation between maritime corridors, ports and hinterland logistic activities need to be solved. **Freight transport nodal points**, such as seaports, logistics centres, dry ports and inland terminals, in spite of their significance for the entire EU economy, have been largely neglected in the previous transport policies. Such nodal points should become the focus of a competitive, sustainable and cohesive European transport network.

Overall, transport and logistics efficiency could also be enhanced by introduction of **key performance indicators**, a tool that has not been yet elaborated. Construction of basic set of indicators in close cooperation with concerned parties, would allow registration and measurement of logistics chains efficiency. This tool, if adequately developed, could encourage using more

[60]Research and Innovation – Transport, European Commission website: http://ec.europa.eu

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effective and more environmentally friendly transport modes and solutions. Moreover, the EU Commission should then formulate a catalogue of proven solutions and guidelines. This tool should be particularly carefully elaborated for the intermodal terminals in order to increase their efficiency. However, due to different characteristics it is vital to differentiate between land terminals, seaports, airports and inland waterway ports.

Moreover, modern global trends such as the rapid development of information and communications technology, has facilitated exchanges among users, carriers and government regulators. This trend has revolutionised the interdependence between logistics management and multimodal transport, which on the whole evoked the **need for improved policy coordination** among three main players closely involved in the transport sector:

- the **Government** (e.g. ministries of transport, trade and finance, customs agencies and related institutions), passing and implementing regulations concerning trade and transport;
- the **Services Providers** (unimodal carriers, freight forwarders, multimodal transport operators, banking institutions, insurance companies, etc.), providing market-oriented trade and transport services;
- the **Traders**, i.e. the transport users (importers and exporters), beneficiaries of new solutions in their international trade practice[61].

Closer relationship between the three player groups requires establishment of **effective cooperation mechanism**. It could be formalised in some kind of accepted form and serve as a national or regional forum to propose, negotiate and reach consensus between commercial parties and governmental authorities on facilitation measures to improve international trade and transport. The forum could enable to join public and private parties and create a coordinated and harmonious environment in order to enhance the competitiveness and quality standards of trade and transportation system[62].

Additionally, cooperation of the above listed main players groups towards sustainable development of the Baltic Sea Region should be supported by **coordinated and multidisciplinary research** activities. The research should focus on efficiency of the entire logistical chain, with particular attention to maritime transport.

The green transport corridor concept will constitute a crucial element of the EU transport policy in the coming decade. It must be stressed, that it is of great importance to precisely elaborate this idea and fulfill it with concrete actions. First of all, the interested parties should focus on the analysis of the existing cargo flows, selecting European transport routes that concentrate most

[61]UNCTAD Technical Assistance in Trade Facilitation, Division for Services Infrastructure for Development and Trade Efficiency, Geneva, Switzerland, http://www.asycuda.org
[62] (TRADE/CEFACT/2000/8), March 2000.

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cargo and implementation of "pilot" corridors where various business models and new transport solutions could be tested.

However, although there is no doubt the green corridor approach is a step forward, it should be noted that this scheme may also at some point become a barrier on its own in the context of transport infrastructure development in the Central and Eastern Europe. It is after all the low quality of infrastructure and missing links that are major obstacle for seamless transport communication in Europe. If the "greening" is to take place only in the corridors with highest cargo concentration, **this may lead less economically developed regions to become even more peripheral**. So the idea of sustainability in the European perspective should be at the basis of the "greening" actions.

Thus, the success of green freight corridor development in Europe and the Baltic Sea Region depends on the **enhanced cooperation** between engaged parties as well as political support at all levels[63]. There is a need to implement the idea of creation the political and technical platforms for discussions and making agreements concerning mutual or coordinated development of transport infrastructure, logistic solutions, exchanging of experiences of implementation a new solutions etc. From this point of view, essential contribution could be delivered by such projects as EWTC II, SCANDRIA OR TRANSBALTIC. Thanks to these projects it would be possible to obtain a lot of necessary, tangible data and information concerning such aspects as: development strategies and plans of transport systems in BSR countries, forecasts cargo volume and its structure, bottlenecks in BSR transport system, necessary investments, obstacles caused by administrative requirements etc. Obtained information should be the first step to the strong political impulse from EU officials and establishing the permanent bodies, with participation of Russia, Ukraine and Belarus, which would be platforms for coordination actions for sustainable transport development in the Baltic Sea Region.

In order to secure sustainable economic growth the daily **business environment must be improved to ensure global competitiveness of companies**. The companies underline the need for well-defined laws, regulations and instructions, custom-oriented information services and prompt binding preliminary rulings especially in customs, competition, taxation and environmental issues. This and a wider use of e-services will also help in cutting expenditure in companies and public administration[64].

The problems of sustainability and threats for the environment are still a major challenge for policy, science and business, despite enormous progress in design and propulsion of transport means (cars, ships, trains, planes). The major improvements within the past decades were primarily

[63] This was emphasised during seminar held in Stockholm on 24 November 2009. The meeting was attended by a multitude of participants from different backgrounds. However, no concrete result was achieved.
[64] The Baltic Sea Strategy and economic growth in the Baltic Sea Region, by Timo Laukkanen. Baltic Rim Economies 2/2010.

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achieved through the reduction of fuel and energy consumption by single transport means, improved reliability and safety, and substantially limited emission of fumes and noise. In the context of the new EU 2020 agenda, it seems appropriate to initiate the review of the existing **legal and administrative regulations** as regards the European transport policy. The large amount of EU initiatives, actions or recommendations may become counterproductive in attaining the sustainable transport development. As the practice shows, despite many actions and financing instruments directed towards removing or alleviating barriers of sustainable transport development, the targeted goals were only partially achieved. Overlaps, contradictions, collision with regulations by other sectors or misinterpretation may, from the real business perspective, lead to very high costs and discourage any business activity and investments.

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The main recommendations for EU transport policies focus on several major issues:

- A need for more effective use of transport modes puts **co-modality** in heart of the EU transport policy; however, combating the barriers to sustainable transport development must be complemented by additional measures, such as in **social and educational field,** to achieve a change in transport behaviour and mobility;
- In order to implement cohesive and sustainable European transport network more attention should be given to **the role of nodal access points**, such as seaports (with their hinterland connections), logistics centres, inland terminals and dry ports;
- Commonly agreed **key performance indicators** (KPIs) measuring efficiency of logistics chains may encourage solutions to green the transport operations;
- An **effective cooperation mechanism** between the government, service providers and traders to secure an improved transport and trade policy coordination would benefit from **coordinated and multidisciplinary research** focusing on the entire logistical chain;
- The **green corridor concept** should be further developed and supported yet with due attention given to appropriate policy tools in less economically developed EU regions and inclusion of EU neighbouring countries (such as Russia, Belarus and Ukraine);
- **Business environment** should be supported in introduction of **innovative transport and logistics solutions,** which will improve their global competitiveness as well as competitive position of the entire European economy;
- There are currently **too many legal and administrative regulations in the EU** regarding transport sector, this can discourage achieving expected policy targets; the focus shall thus be placed on effective implementation of already chosen targets before selecting new ones.

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Appendix I

Green corridor terminology around the world

The term 'green corridor' is applied in various contexts. As an introduction to the subject, the following subchapters deal with the different meanings of the term, exemplarily covering Asian, US American and European perspectives on what 'green corridors' can look like. Concluding remarks will then extract and summarize the key findings.

Green corridors as (recreational) nature reserves

Ashford (Kent), UK (2000/2003)

In Ashford, Kent (UK) green corridors have been established as a recreational nature reserve. It consists of a combination of parks, recreation grounds and other green spaces alongside the rivers that flow through Ashford[65]. Twelve areas have been declared as Ashford Green Corridor Local Nature Reserves and are under active management. The project is based on the Ashford Green Corridor Action Plan (2000) and is managed by the Kentish Stour Countryside Project (KSCP). Funding was established through English Nature, Ashford Borough Council, Brett Environment Trust, the Environment Agency, Kent County Council, New Opportunities Fun and Rail Link Countryside Initiative.[66]

The Ashford Green Corridor Project aims to:

- Involve the local community in innovative nature conservation activities;
- Carry out access, interpretive and educational work appropriate to the site;
- Manage and promote management of wild species protected under the UK and Kent Biodiversity Action Plan;
- Enhance sites for people and wildlife and;
- Promote the project to the widest possible audience.[67]

The areas identified within the Ashford Green Corridor Action Plan can be seen in **Figure 1**. It shows how urban initiatives proposed 'Regional Parks' and 'Green Links' supplement the green corridor areas and other sites of nature conservation interest to reduce the fragmentation of existing open spaces and to provide the means for wildlife to disperse through Ashford and beyond.

[65] Ashford Green Corridor, n.d.

[66] Environment Agency Southern Region, 2005

[67] Environment Agency Southern Region, 2005

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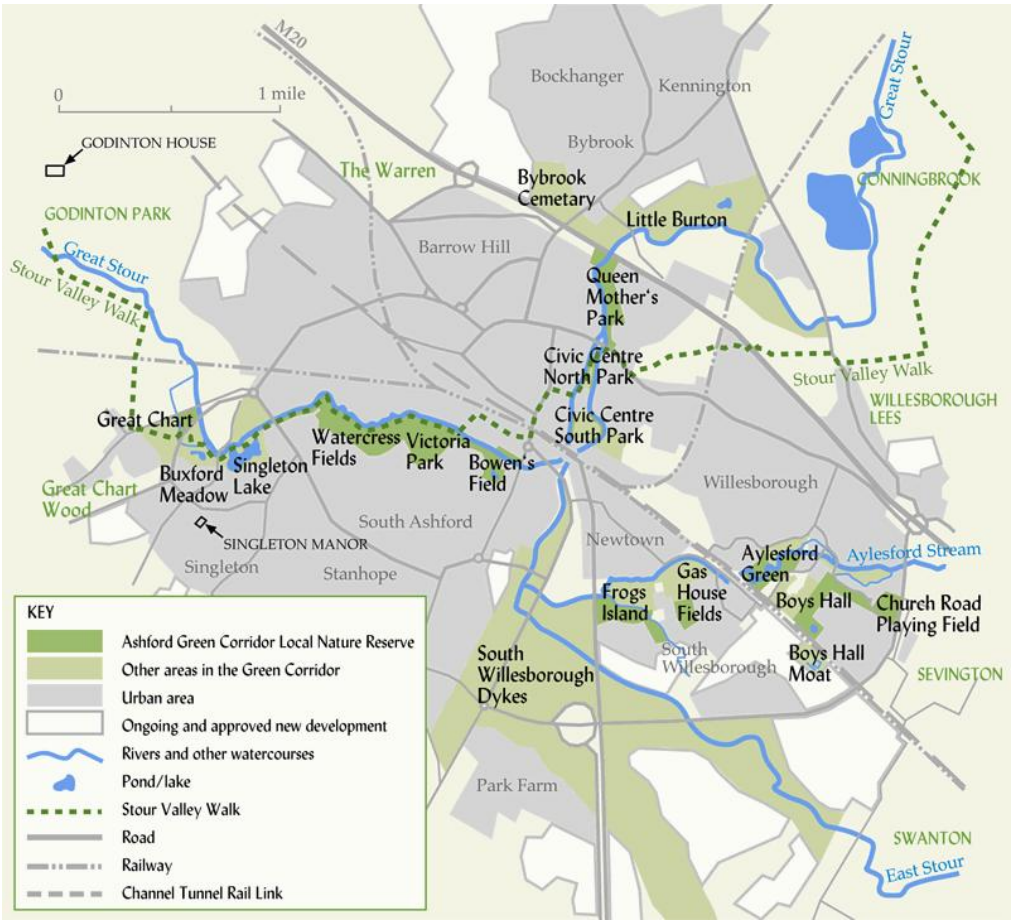

Figure 1: Map of Ashford green corridor area[68]

Singapore (1991)

A comparable approach can be found in Singapore. Here, green corridors (known as the Park Connector System) have gradually been set up in various parts of the city state by the National Parks Board. The Park Connector System consists of greenways linking major parks, nature reserves, natural open spaces and other places of interest, hence function as 'links' for recreational activities in a 'green' environment. Thereby it enhances the quality of life in urban Singapore, a planning objective of the Urban Redevelopment Authority, as outlined in their revised concept plan of 1991.[69] The target is to provide 0.8 ha of parkland per 1000 persons. When completed, the greenways will increase the accessibility of parklands in Singapore and provide a green matrix of connected park space. Another objective of the urban greenway initiative is to enhance biodiversity in the environment. It is intended to give birdlife and other fauna the opportunity to traverse such corridors from one refuge to another in their search for food and breeding sites.[70]

Green corridors for spatial regeneration and urban landscape transformation

Green corridor in Barnsley, Doncaster and Wakefield, UK (2005)

[68] Ashford Green Corridor, n.d.
[69] Briffett, Kong, Yuen, & Sodhi, 1997
[70] Tan, 2006

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The green corridor project carried out by Barnsley, Doncaster and Wakefield local authorities tackles problems of low housing demand and market vulnerability in adjoining areas. Major characteristics of the region are its history as a former coal mining area within a green and rural context. The green corridor initiative aims to link these green elements in a coherent network and to brand this as the 'Green Corridor'. The overall vision is to develop *'An area with its own identity, green and rural in focus, with a pleasant and well served hierarchy of settlements that offer a choice of housing and a high quality of life.'* Therefore the green corridor initiative has developed a spatial framework for delivering a comprehensive regeneration strategy. The green corridor is located between two major city regions (Leeds City Region and Sheffield City Region), with a high level of motorway accessibility and good rail links.[71]

Until the early 1980s, the region's economy had a strong focus on coal mining activities with associated chemical and mining engineering industries located alongside textile manufacturing activities. With the decline of these industries communities were left with unemployment, dereliction and in ill health. However, the years after industrial decline attracted new industrial sectors (distribution and warehousing industries) and associated investment. High profile companies such as ASDA (Wal-Mart), Wickes Plc, Next Plc, B&Q, Pioneer Plc, Burberry, Linpac Plc, Bombardier Transportation and Kingston Communications as well as a large number of small and medium sized enterprises settled in the region. Further colliery closures in 2001 and 2004 again caused employment loss within the area. This again fostered the process of restructuring the former coalfield areas into sustainable communities with a competitively skilled workforce to attract and retain investment in the area.[72]

Six major lines of action have been identified:

1. Build strong economic foundations in the strong primary centres – investing in opportunities which will create future economic stability for the area.
2. Maximise the accessibility to and from the city regions of Leeds and Sheffield.
3. Recognise the potential of excellence in education to contribute to driving housing markets across the area.
4. Address health inequalities.
5. Raise the image and quality of the environment through the highest standards of design and public realm.
6. Implement a landscape strategy which makes the most of the countryside 'on the doorstep' of the green corridor towns and villages.[73]

The green corridor's geographic location can be seen in Figure 2.

[71] Councils of Wakefield, 2005

[72] Councils of Wakefield, 2005

[73] Councils of Wakefield, 2005

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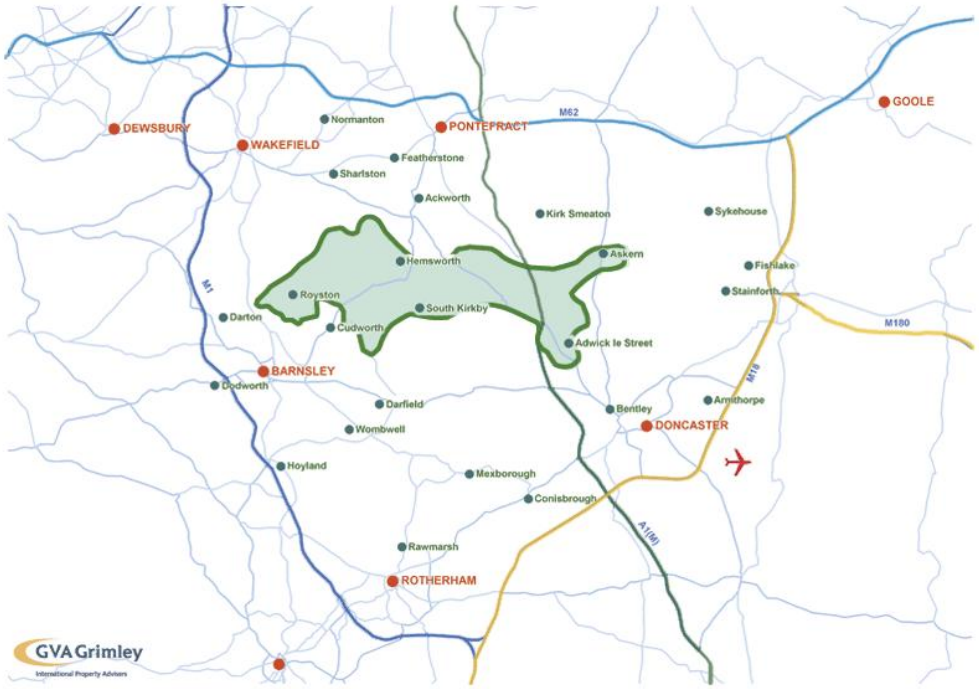

Figure 2: Geographical context of green corridor between Barnsley, Wakefield and Doncaster[74]

Green corridor initiated in Windsor, Canada (2003):'Green Corridor - Defining the Ambassador Bridge Environmental Gateway'

The green corridor project in Windsor, Canada has a regional focus with emphasis on urban landscape transformation. Windsor is the largest trade gateway between Canada and the USA and the busiest international border crossing in the world. Along the 2 km multi-lane roadway including the Ambassador Bridge border crossing a series of interdisciplinary projects combines public art, sustainable technologies, scientific monitoring and public information. The goal is to shift the area from a concrete jungle to a 'regenerative green zone' by generating a green redevelopment of the international bridge corridor. Thereby, landscape is understood as an interactive 'drive-thru museum', displaying environmentally aware, multi-faceted 'art and science' public projects[75]. The initiative follows a multi-stakeholder approach where local creative, residential, educational and business communities participate. The project team includes science and engineering researchers, environmentalists, artists, politicians, city planners, educators, and community residents[76].

The green corridor initiative pursues the following objectives:

- Initiate public projects that build community around the issues of environment and quality of life.
- Enhancing tourism and improving the appearance of Windsor University campus and nearby properties.
- Educate community and students by demonstrating technologies, displaying information and creating sites for environmental research.
- Harness the creative capacity of multidisciplinary collaboration in implementing initiatives of environmental merit and partner with residential, university, and commercial interests.

[74] Councils of Wakefield, 2005

[75] University of Windsor, n.d.

[76] University of Windsor, n.d.

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- Foster sustainable environmental practices (e.g. appropriate materials selection, full-cost accounting, use and implementation of renewable energy)[77].

Green corridors to strengthen green and sustainable industries

East Bay Green Corridor (2007) in California, USA

In 2007, the East Bay Green Corridor Partnership was established between the cities of Oakland, Berkeley, Richmond and Emeryville, along with the UC Berkeley and the Lawrence Berkeley National Laboratory. It aims to promote the East Bay Region in California as a global center for 'green' research and manufacturing.

Key goals of the East Bay Green Corridor include:

1. Create conditions that attract and retain green and sustainable businesses and industries.
2. Promote research and technology development and transfer (e.g. alternative energy research and healthy built environment).
3. Strengthen workforce development programmes.
4. Secure federal funding for job training and energy research.
5. Build a more cohesive regional identity in energy-related green business sectors.
6. Protect economies from climate change and energy shocks.
7. Improve the living environment and quality of life[78].

Strong emphasis is on sub-regional cooperation. The project aims to concretely demonstrate how local entities can put aside individual concerns and adopt policies that will ultimately strengthen all of them.

As the Obama administration was rolling out its Stimulus package in 2009 (American Recovery and Reinvestment Plan), participants of the green corridor partnership received US$ 76 million in grants from the federal government for energy research and jobs related programmes.

This included amongst others:

- A US$ 30 million grant to Lawrence Berkeley National Laboratory and the University of California at Berkeley to develop carbon sequestering techniques or capturing carbon dioxide from the air and storing it permanently underground.
- A US$ 4 million in Stimulus grants for research at the Joint BioEnergy Institute from the U.S. Department of Energy.
- A US$ 24.5 million grant for Lawrence Berkeley Lab to study how nanotechnology can be used to clean up underground contaminants.
- Around $18 million USD awarded to green jobs programmes in Oakland, Richmond, and Berkeley – expanding the Oakland Green Jobs Corps, the RichmondBUILD and its Solar Richmond component and Rising Sun Energy.[79]

Green Corridors to facilitate green trade initiatives across North America

NASCO, (North American SuperCorridor Coalition) is a non-profit organization, organized by private (small, medium and large businesses) and public (cities, counties, states, provinces and agencies)

[77] Canada Green Corridor, 2004

[78] East Bay Green Corridor, 2007

[79] Grady, 2010

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sector members, that seek to develop an international multi-modal transportation system along the International Mid-Continent Trade Corridor. NASCO (like other trade corridors e.g. CANAMEX, CASCADIA or LEAP) was founded after the signing of the North American Free Trade Agreement (NAFTA) between Canada, Mexico and the US.[80] NASCO's geographic focus is shown in Figure 3.

Figure 3: Geographic focus of NASCO[81]

NASCO has three strategic objectives, which is to promote:

(1) Transportation efficiency and security,

(2) Energy efficiency and environmental quality, and

(3) Logistics workforce development.[82]

In the second focus area, NASCO follows a strategy of 'Greening the NASCO corridor'. This includes a strategy to **promote 'good practices'** in the environmental area and to enter into **cooperation with environmental sustainability initiatives**. Partners comprise North American environmental authorities (e.g. CEC[83] and EPA[84]) as well as city, state, provincial and national environmental enforcement and compliance officials. Collaborative activities include joint research, implementation initiatives and promotion activities.[85]

'Greening the Trade Corridors of North America'

[80] Commission for Environmental Cooperation, 2009a; NASCO, 2008

[81] NASCO, 2010

[82] NASCO, 2010

[83] Commission for Environmental Cooperation

[84] U.S. Environmental Protection Agency

[85] NASCO, 2010

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Through its ties with the EPA and its role as leader in promoting good practices in the environmental area, NASCO became a (research) partner of the Commission for Environmental Cooperation in North America (CEC)[86]. CEC follows the vision of 'Greening the Trade Corridors of North America'. NASCOs inland port network (NAIPN) and its other environmental initiatives thereby serve as role models. As a first research approach CEC (amongst others together with NASCO) carries out a study on 'Sustainability in Freight Transportation in North America', which constitutes a first of its kind attempt to map carbon and greenhouse gas emissions on the NASCO corridor. Also, measures to reduce emissions by the development of improved policies and practices in transport are examined. The final report is expected by mid-2010[87].

- **SmartWay Transport program**

  SmartWay is a voluntary fuel efficiency improvement and emissions reduction programme initiated by EPA. Programme partners commit to improve the environmental performance of their freight delivery operations. Carriers agree to use recommended fuel efficient technologies and incorporate fuel saving strategies into their fleet operations. Shippers commit to ship the majority of their goods with SmartWay Transport carriers. SmartWay transporters and shippers can label their business with the SmartWay brand. NASCO is an affiliate of the SmartWay Transport program and fosters to extend SmartWay's relations with NASCO partner members (especially beyond US borders) to promote and advance transportation industry sector good practices developed by the SmartWay program.[88]

- **Blue Skyways Collaborative**

  Blue Skyways is a voluntary emissions improvement programme. The Blue Skyways programme initiates public-private partnerships that aim to reduce air pollution through networking, recognition, project implementation, and tracking measurable results. NASCO acts as a cooperation partner to promote good practices in various environmental areas along the tri-national corridor.[89]

[86] The Commission for Environmental Cooperation (CEC) is an organization founded under the North American Agreement on Environmental Cooperation (a NAFTA side-treaty) by Canada, Mexico and the United States. It aims to promote environmental law enforcement, addresses regional environmental concerns, and helps to prevent trade and environmental conflicts.

[87] NASCO, 2010; Commission for Environmental Cooperation, 2009b

[88] U.S. Environmental Protection Agency, 2004; NASCO, 2010

[89] Blue Skyways Collaborative, 2008; NASCO, 2010

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Conclusions

Comparing the different green corridor initiatives it becomes clear that although for example objectives, time horizon or participating players may differ extremely, there are still common characteristics. To a great extend there exists unanimity concerning the wording:

The term 'corridor' in 'green corridor' stresses the fact that it has a **spatial dimension**, representing the initiatives' local, regional, national or trans-national focus. The presented examples range from projects with a city context or regional initiatives to international cooperations spanning different countries and languages. Also, being closely related to spatial component an often mentioned objective is to **improve accessibility**, for example of city regions, logistic hubs or commercial centres. Further, 'green' exclusively means **'environmentally sound'** or **'sustainable'**. The majority of initiatives aim to mitigate negative impact to the environment with an emphasis on the conservation of resources and energy efficiency. Thereby, arguments are to tackle climate change, enhance biodiversity and support nature conversion to maintain or improve people's **quality of life**.

Within the green corridor initiatives recurring strategies and key elements could be identified.

Green corridor initiatives are often realized as **collaborative business and research activities**. Thereby research in many cases has been performed within interdisciplinary teams. Business activities e.g. comprise funding and lobbying to attract green and sustainable business and industries as well as the promotion of good practice solutions. Also, strong emphasis is on the development and application of **innovative, green technologies** that help to mitigate environmental impact.

Further, **communication** is an important instrument to make green solutions available to a wide audience. Therefore various approaches such as public information to build community around the issues of environment and quality of life have been used. Furthermore, public awareness was raised through the participation of and cooperation with different stakeholder groups, e.g. local residents, environmentalists, politicians, artists or researchers. Another strategy is to use brand-building for labelling 'green' initiatives and products.

Education and workforce development also plays a major role in promoting green corridor initiatives. In addition to green collar jobs that produce products and services which directly improve environmental quality, initiatives aim to raise awareness and sensitivity for environmental stewardship within the workforce and during education.

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Appendix II

Good practice compilation 'environmental friendly transport chain

Ballast Water Treatment at Beluga Shipping

General information

Title/Short description	**Ballast water treatment** The "travelling" ballast water, which serves to stabilize the ships, constitutes a great risk to the marine ecosystem. Beluga Shipping GmbH installs the environmentally friendly ballast water treatment system "CleanBallast", which filtrates the water before it is poured into the tanks, disinfects it and cleans it before it is discharged again.
Transport aspects	Focus on ocean shipping
Involved players	• Shipping company: Beluga Shipping GmbH • Specialist in Water Treatment: RWO - Marine Water Technology
Geographic range	worldwide
Time frame	-

Planning and Implementation

Initial situation	Ballast water was not filtered/ cleaned.
Objective(s)	Protection of the marine ecosystem by preventing the introduction of alien species (which can eliminate the domestic sea dwellers, disrupt the whole food chain and disperse dangerous pathogenic germs).
Measure description	Installation of the ballast water treatment system **"CleanBallast"**. The ballast water treatment occurs by filtration of particles, sediments and organisms with a size of more than 50 micrometers, before the water is poured into the ballast water tanks. Also, an electrolytic disinfection of the ballast water takes place. As it is possible that organisms proliferate naturally, the ballast water is cleaned another time before it is discharged again.
(Estimated) Impact	• Use of the environmentally friendly ballast water treatment system protects the marine ecosystem • In 2004, the International Maritime Organization (IMO) of the United Nations adopted the Ballast Water Convention, which establishes binding rules on the treatment of ballast water. The Convention requires a ballast water management system to be installed on board every ship from 2009 onwards, yet - depending on keel laying and ballast water capacity - by 2016 at the latest.
Implementation process	-
Current state	Installation of 'CleanBallast' on all new vessels of Beluga.

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Background information

Funding	-
Sources of information	• http://www.beluga-group.com/en/company/research-innovation/ballast-water/?cHash=0bcb49d704ba9e09f896620a444162ef • http://www.rwo.de/de/leistungen/Ballast_Water_Treatment/ • https://www.nordlb.de/fileadmin/Volks_und_Regionalwirtschaft/pdf/Veranstaltungen/Vortraege/10112009/Woestmann.pdf
Contact data	**Beluga Shipping GmbH** P.O. Box: 10 72 69, 28072 Bremen, Germany Phone: + 49 (0) 421 - 3 33 22 – 0 Fax: + 49 (0) 421 - 3 33 22 – 700 E-Mail: info@beluga-group.com **RWO GmbH – Marine Water Technology** Thalenhorststrasse 15A, 28307 Bremen, Germany Saskia Ringat (Marketing & Communications) Phone : +49(0)421 53705-214 Fax: +49(0)421 53705-442 E-Mail: saskia.ringat@veoliawater.com **Veolia Water Solutions & Technologies** **Germany, Austria, Switzerland** Lueckenweg 5, 29227 Celle, Germany Stefan Jakubik (Marketing & Communications) Phone : +49(0)5141 803-174 Fax: +49(0)5141 803-385 E-Mail: stefan.jakubik@veoliawater.com

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Betuweroute

General information

Title/Short description	**Betuweroute (Modal shift in Dutch port hinterland)** Construction of a 160 km double track freight railway from the sea port of Rotterdam to the German border. This modern train line is dedicated solely to freight transport and is a fast, efficient and reliable alternative to other transports modes, especially on long to medium range routes. With a capacity of 10 trains per hour per direction, the Betuweroute constitutes the Dutch part of the Trans European Rail Freight Network (TERFN), which connects the ports of Rotterdam and Genoa.
Transport aspects	Rail transport
Involved players	• Operator: Keyrail • ProRail (Dutch infrastructure operator) • Port Authorities of Amsterdam and Rotterdam
Geographic range	Connection between Maasvlakte (Rotterdam) to Zevenaar (near German border).
Time frame	• 1985: First idea of the Betuweroute • 1990: Initiated by the Dutch ministry of traffic • 1991: Begin of planning phase • 1995: Final decision for the project • 1998: Construction of track started • 2006: Construction of a rail linkup between The Port of Amsterdam and the Betuwe Line • 2007: Construction finished and opening of the route

Planning and Implementation

Initial situation	Hinterland of Port of Rotterdam mainly serviced by road transportation due to a capacity bottleneck in the initial railway network.
Objective(s)	• Accelerate the transport from Rotterdam to the European hinterland • Increase capacity of railway network due to the increase of freight traffic • Relieve of road haulage, specially on the highways A1 and A15
Measure description	Construction of a high speed freight railway between the sea port of Rotterdam and the German border.
(Estimated) Impact	• Target (till 2013): 150 freight trains per day (10 trains per hour per direction)
Implementation process	-
Current state	• First quarter of 2008: 1000 trains in total • First quarter of 2010: 4000 trains (around 44 per day) • Extension of the route on German side.

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Background information

Funding	Government of the Netherlands
Sources of information	• http://www.wdr.de/themen/verkehr/schiene02/betuwe/index.jhtml • http://www.rail.dbschenker.de/site/railion/de/service/kundeninfos/betuwe__route.html • http://www.uni-muenster.de/HausDerNiederlande/zentrum/Projekte/NiederlandeNet/NRW-BeNeLux/einleitungbetuwe.html • http://www.rail.dbschenker.nl/site/logistics/railion/railionnederland/en/company/need__to__know/need__to__know.html • http://www.keyrail.nl/keyrail-key-to-europe • http://www.infrasite.net/news/news_article.php?ID_nieuwsberichten=3411&language=en&refresh=1
Contact data	**Keyrail** Develsingel 11 3333 LD, Zwijndrecht, The Netherlands Mayke Modderman (*Public Affairs)* Phone: +31(0)78-6777530 E-Mail: info@keyrail.nl

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Optimization of pre- and post-haul at Bosch and Siemens Household Appliances

General information

Title/Short description	**BSH (Bosch and Siemens Household Appliances) optimizes pre- and post-haul together with logistics service provider** BSH shifted transports on the pre- and post-haul between sea ports and the company site in Giengen from road to rail. Transports are organized by DHL Global Forwarding and up to 120 truck loads per week could be avoided.
Transport aspects	Rail transport (pre- and post-haul from sea ports to company site)
Involved players	• BSH: German manufacturer of home appliances • DHL Global Forwarding: Logistic service provider
Geographic range	Germany: Transports between sea ports (Hamburg and Bremerhaven) and BSH site Giengen via transhipment terminals in Stuttgart and Kornwestheim.
Time frame	Implemented since 10/2009

Planning and Implementation

Initial situation	Pre- and post-haul has been split into two parts: 1. Transport between sea ports and transhipment terminals by rail. 2. Transport between company site in Giengen and transhipment terminal by road.
Objective(s)	• Reduction of CO_2-emissions by 60% • Shift of 13.000 TEU from road to rail
Measure description	Transports between the company site and sea ports are solely handled by DHL Global Forwarding
(Estimated) Impact	• Measure saves up to 120 trucks per week • Decoupling of the loading processes due to generation of buffers at reloading point of the company site. This creates a new achieved independence between loading and driving time and a better flow at this place of transhipment.
Implementation process	• First step in 2006/2007 with € 1 mn investments into a new transhipment centre and container lifter (Reach Stacker). • Afterwards search for a logistic partner, finally contract with DHL • Implementation 10/2009 • Since 13/12/09 extension of the timetables from three to six runs a week on the route seaport – Kornwestheim • Now extension of Giengen's terminal tracks and container storage for the future plan of complete trains instead of train parts Furthermore, plans to transfer the concept to the domestic distribution and providing the infrastructure to other companies.
Current state	In the moment two stage rail transport via the routes: • Seaport – Kornwestheim – Giengen • Seaport – Stuttgart Harbour - Giengen

Background information

Funding	Financed through involved private companies
Sources of information	• Newspaper article ‚Aus Gelb wird Grün' (05/12/09): http://www.bsh-group.de/index.php?1136 • http://www.mm-logistik.vogel.de/distributionslogistik/articles/233587/ • http://bonnsustainabilityportal.de/?p=1756
Contact data	**BSH Bosch und Siemens Hausgeräte GmbH** Logistics and Traffic Carl-Wery-Str. 34, 81739 Munich, Germany Phone: +49 (89) 4590-01 Fax: +49 (89) 4590-2868

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Sustainable load carrier at Craemer

General information

Title/Short description	**Craemer ECOmax (Load carrier from recycled plastic)** Development of a half pallet made from recyclable plastic with higher durability and functionality than wooden version.
Transport aspects	Focus on road haulage
Involved players	**Craemer Holding GmbH:** German company with business activities in metal forming, tool construction and plastic processing
Geographic range	Europe
Time frame	-

Planning and Implementation

Initial situation	Use of conventional wooden 'Dusseldorfer' half pallets which create often additional costs caused by damage and maintenance
Objective(s)	Cost savings combined with higher level of functionality and durability
Measure description	-
(Estimated) Impact	**Advantages:** out of recyclable material, system-usable for automatic roller and chain conveyor, RFID-tagged, completely washable, less costs over the long term because of higher durability **Disadvantages:** higher acquisition costs, heavier than wood (with bearing capacity and size being equal), slide characteristics, lower melting point, four times higher energy use in production
Implementation process	Development of a bigger network of producers to install and establish a wide pallet pool
Current state	In the implementation phase; presented at LogiMAT 2010 (International Trade Fair for Distribution, Materials Handling and Information Flow) 2010

Background information

Funding	Financed through involved private company
Sources of information	• www.craemer.de / www.craemer.com • http://www.rfid-im-blick.de/20100407571/ressourcenschonende-ladungstraeger-mit-rfid.html • http://www.materialfluss.de/lager-und-kommissioniertechnik/behalter-boxen-paletten-lager-und-kommissioniertechnik/pro-und-contra-kunststoffpalette-versus-holzpalette/ • http://www.industrie-service.de/?noscript=/content/KB_Craemer_ECOmax/9952260#/content/KB_Craemer_ECOmax/9952260 • http://www.marktplatz-rfid-im-blick.de/201003121880/craemer-ecomax-die-erste-kunststoff-halbpalette-fuer-eine-nachhaltige-logistik.html • http://www.craemer.com/ecomax/
Contact data	**Craemer Holding GmbH** 33442 Herzebrock-Clarholz, Germany Frank Bücker (Sales Manager) Phone : +49 (0) 5245 43-137 E-Mail: info@craemer.com

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Danube Nordic Shuttle at DB Schenker

General information

Title/Short description	**Danube Nordic Shuttle (Multimodal transport between North and Southeast Europe)** DB Schenker introduced a multimodal traffic route which connects Scandinavia and North Europe with Austria and Southeast Europe. The main carriage is by train and runs between the German East seaport of Rostock and the Austrian City of Wels. The provided train transports whole trailers which are used for pre- and post-carriage by truck and ferry.
Transport aspects	Road, rail and sea transport.
Involved players	Initiated by Schenker Deutschland AG, Schenker & Co AG, Hangartner AG Austria, DB Intermodal and the German Society for combined traffic GmbH & Co KG.
Geographic range	Main carriage trough Germany and Austria, pre- and post-carriage also in Scandinavia and Southeast Europe.
Time frame	Implemented in June 2008

Planning and Implementation

Initial situation	Most of the main carriage was road transport
Objective(s)	Reduction in road traffic and savings in CO_2 emissions
Measure description	Introduction of a multimodal connection between North and Southeast Europe. The focus is on combined transport, e.g. main carriage by train between Rostock and Wels. Both cities have strategic locations and high developed infrastructure, Rostock for the connection to Scandinavia and Wels for the growing importance of the Southeast European markets.
(Estimated) Impact	Every train saves 30.000 km of road haulage. That equals savings in CO_2 emissions of two thirds.
Implementation process	• The train runs twice a week and can carry 32 trailer. • High demand from paper and automobile industry • Southwards the utilization rate is nearly 100 %
Current state	implemented

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Financed through involved private companies
Sources of information	• http://www.schenker.de/deutsch/news/newsOrdner/2008_06/pidanub.html • http://www.verkehrsrundschau.de/db-schenker-baut-in-rostock-multimodale-verkehre-weiter-aus-792838.html • http://www.dbschenker.com/site/logistics/dbschenker/com/de/umwelt/leuchturmprojekte/green__logistics__network/kombinierter__verkehr.html • http://www.lauf-kundschaft.de/index2.php?option=com_docman&task=doc_view&gid=52&Itemid=44 • http://www.schenker.at/deutsch/dienstleistungen/lkw-landverkehr/kombinierter-verkehr/index.html
Contact data	**Schenker Deutschland AG** Langer Kornweg 34 E, 65451 Kelsterbach, Germany A. Josef Lederer (Communication) Phone: +49 (0)6107 74-00 Fax: +49 (0)6107 74-199 E-Mail: josef.lederer@dbschenker.com **Schenker & Co AG** Gottfried Schenker Straße 1, 1110 Wien, Austria Robert Berkovics Phone: +43 (0)5 7686 211214 E-Mail: robert.berkovics@schenker.at

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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DB Eco Program at Deutsche Bahn AG

General information

Title/Short description	**DB Eco Program for climate protection** Climate Protection Program which consists of a large range of measures in different business fields of DB. The target is to reduce the specific CO_2 emissions until 2020 by 20 % compared to 2006.
Transport aspects	all transport modes
Involved players	Deutsche Bahn AG: German railway and logistics company:
Geographic range	worldwide
Time frame	Start of the programme in April 2009

Planning and Implementation

Initial situation	
Objective(s)	Reduction of the specific CO_2 emissions until 2020 by 20% compared to 2006.
Measure description	• Train and truck driver training for energy-efficient driving • Research and implementation of new vehicle technologies (Euro 5 classification, double-decker trailers, gas, biodiesel and hybrid propulsion systems) • Improvement in empty run management with bundling consignments • Green networks like 'Skybridge' – split of the former air freight from Asia to Europe into a intermodal transport.(Asia to Dubai by ship, Dubai to Europe by plane) • CO_2 free transport with Eco Plus Program – DB feeds electricity required for a specific transport generated from renewable energy sources into the railway system's electrical network • Environmental friendly stations with energy saving light systems and photovoltaic • Service to provide an annual ecological footprint for customers. It documents the CO_2 savings by choosing rail transport and can be used for company reports • Brake Energy Recovery – Converting the released energy during breaking into electricity and feed it back into the catenary
(Estimated) Impact	• Overall estimated impact: CO_2 emissions reduction until 2020 by 20% compared to 2006. • 'Skybridge' – combining 30-50% of time reduction compared to sea freight alone with 50% CO_2 emission reduction compared to air freight alone • Brake Energy Recovery - in 2008 this technology saved about 820 GWh (almost 8% of the total power consumption of the railway system)
Implementation process	-
Current state	In implementing

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Financed through involved private company
Sources of information	• http://www.dbecoprogram.com/ • http://www.deutschebahn.com/site/bahn/en/sustainability/environment/db__eco/dbecoprogram__introduction.html • http://www.bahnaktuell.net/BA2/wordpress/?p=7999 • http://bewegtbild.deutschebahn.com/btvo/site/index.php?s=3200&ids=143285
Contact data	**Deutsche Bahn AG - DB Environment Center** Caroline-Michaelis-Str. 5-11 10115 Berlin, Germany Phone: +49 (0) 3029756501

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Re-utilization of fatty acid methyl ester at HAVI Logistics

General information

Title & short description	**FAME (Recycling and re-utilization of fatty acid methyl ester)** Using diesel obtained from fatty acid methyl ester (FAME) e.g. recycled shortening from deep-fryers, as fuel for the truck fleet.
Transport aspects	Road transport
Involved players	HAVI Logistics: Global logistics company (food and non-food) Service + Distribution + Logistik(SDL): Austrian Subsidiary of HAVI Logistics McDonalds: Food retailer
Geographic range	Austria
Time frame	Launch of biodiesel pilot project in 2001. Truck fleet conversion for FAME has been completed in April 2002

Planning and Implementation

Initial situation	Truck fleet was fuelled with standard diesel.
Objective(s)	Using renewable, environmentally friendly fuels and recycling waste.
Measure description	SDL delivers fresh shortening to the restaurants and collects the used frying oil. A biodiesel-producer converts the frying oil into FAME, which is fed into SDL petrol stations and then eventually serves as fuel for SDL trucks.
(Estimated) Impact	• Proportion of biodiesel in 2004 was 51,9% (SDL environmental statement 2005) • Results in 4 years (2002- 2006): 1.3 million litres of saved fossil fuel; CO_2 and SO_2 emissions were reduced by 2.3 million kg and 4,000 kg respectively; energy cost savings of 28,000 € (Best of Green 2009 – statement/ McDonalds)
Implementation process	-
Current state	Implemented

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Financed through involved private companies
Sources of information	• http://media.havi-logistics.com/Top_Navigation/Publications/Brochures/_docs/Havi_Logistics_ITS_EASY_TO_BE_GREEN.pdf • http://www.havi-logistics.com/EN/Content/TOPNavigation/Company/History.asp • http://media.mcdonalds.de/MDNPROG9/mcd/files/pdf1/McD_RZ_Umweltflyer.pdf • http://www.aboutmcdonalds.com/etc/medialib/csr/docs.Par.8633.File.dat/MCD046_BestOfGreen09_sansemails.pdf • www.sdl.at
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Sustainable antifouling varnish for vessels at Fraunhofer Institute

General information

Title/Short description	**GANaS (Antifouling varnish out of nanocomposites for vessels)** Project to develop an environmental friendly antifouling varnish out of nanocomposites for vessels. The coating shall minimise the growth of algae and mussels on the vessels hull, which leads to an improvement in flow and corrosion resistance. Hence, there are opportunities to achieve savings through a longer durability and reduction in energy consumption.
Transport aspects	Sea transport
Involved players	• Project coordinator: Fraunhofer Institute for Mechanics of Material • Project partners: Helmholtz-Centre for Environmental Research, Schiffswerft Barth GmbH, Nano Tech Coatings GmbH, bioplan GmbH, Heppe Medical Chitosan GmbH, ASV Innovative Chemie GmbH, BEC GmbH BIOTECHNIC, EverQ GmbH
Geographic range	worldwide
Time frame	Planned project period: 01.01.2009 - 31.12.2011

Planning and Implementation

Initial situation	Use of varnish which contains environmentally critical copper ions or tributylzine (TBT).
Objective(s)	Good flow and corrosion resistance with an environmental friendly method. Consisting out of electrochemical and not toxic nanocomposite varnish.
Measure description	Development of environmental friendly antifouling varnish out of nanocomposites for vessels to reach a better flow and corrosion resistance.
(Estimated) Impact	Opportunities for application also in other fields like water purification, air conditioning systems and water desalination
Implementation process	-
Current state	In experimental phase.

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Total project costs of 762,422 € partly financed by the German Federal Ministry of Economics and Technology (557,406 €).
Sources of information	• http://www.vwb.fraunhofer.de/fhg/Images/iwmh-PM_Energiesparschiffe_tcm214-139389.pdf • http://www.vdivde-it.de/innonet/projekte/in_pp247_GANaS.pdf • http://www.forschung-sachsen-anhalt.de/newsletter/FoPortal_Newsletter03032009.pdf
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Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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GoGreen Program at DHL

General information

Title/Short description	**GOGREEN (Environmental protection program)** Program that aims to minimize the impact on the environment based on a precautionary approach and to improve resource efficiency. The main focus of GoGreen is on climate protection with the commitment to improve the CO_2 efficiency of the company's own operations and those of the subcontractors by 30 % by the year 2020, compared to the 2007 baseline.
Transport aspects	All different transport modes used in the mail, courier, express and parcel service
Involved players	Deutsche Post DHL: German Logistics Group
Geographic range	Depends on the product-range from Germany to Europe and Asia-Pacific
Time frame	Launch of the GOGREEN program in 2008

Planning and Implementation

Initial situation	Total CO_2 emissions in 2007: 33.3 million tonnes • 6.6 million tonnes – direct (e.g. fuel) and indirect (e.g. electricity) emissions from own operations • 26.7 million tonnes – from subcontracted transports
Objective(s)	Improvement of CO_2 efficiency across all internal operations, including subcontracted transportation service, by 30% until 2020 (compared with 2007). First milestone: 10 % efficiency improvement in internal operations until 2012.
Measure description	Extra charges for GOGREEN shipments supporting internal and external projects to reduce the Carbon emission and other environmental hazards • **Internal CO_2 reduction measures:** alternative fuels (biogas), alternative technologies (solar systems), alternative propulsion systems (hybrid- and fuel cell technologies) • **External climate protection projects:** hydroelectric power plant (Brazil), biomass energy project (India), wind farms (China)
(Estimated) Impact	The program increased the amount of CO_2 offset from 1,000 tonnes in 2006 to more than 16,000 tonnes in 2008.
Implementation process	Implementation of carbon management in three steps: • Calculation of the CO_2 emission effected by the customer's shipment • Initiating internal measures to reduce the carbon emission • Investing in external climate protection projects to offset the emission
Current state	Total CO_2 emissions in 2009: 24.1 million tonnes (33.3 t in 2007) • 5.6 million tonnes (6.6 t) – direct (e.g. fuel) and indirect (e.g. electricity) emissions from own operations • 18.5 million tonnes (26.7 t) – from subcontracted transports In summary, that equals a reduction of nearly 28 %.

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
SKÅNE

Background information

Funding	Financed through involved private company
Sources of information	• http://www.dhl-innovation.de/de/presse/downloads/Projektsteckbrief_GOGREEN_DE_Mai_2009.pdf • http://www.dp-dhl-gogreen.de/go/ • http://www.dp-dhl.de/NB2009/serviceseiten/willkommen.html • http://www.dhl-innovation.de/de/projekte/greentechnologies.php • http://www.dp-dhl-gogreen.de/en/responsibility-online_report_2010/performance/data/environment.html
Contact data	**DHL Innovation Center** Junkersring 55, 53844 Troisdorf, Germany Guido Sattler (Project Manager) Phone: +49 (0) 2241 1203-131 E-Mail: Guido.Sattler@DeutschePost.de Daniela Spießmann (Marketing) Phone: +49 (0)2241 1203-125 E-Mail: Daniela.Spiessman@DeutschePost.de

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Reduction of vessel flow resistance at Beluga Shipping

General information

Title/Short description	**Hai-Tech (Reducing flow resistance of vessels)** Maritime project to develop a low cost system solution based on a reliable process for coating hulls with a sharkskin-like structure. The objective is to reduce flow resistance of ships which leads to lower fuel consumption, higher speed of vessels and a decrease of greenhouse gas and noise emissions. Furthermore the coating should also contain an antifouling function, which minimises the growth of algae and mussels on the hull.
Transport aspects	Sea transport
Involved players	• Project Coordinator: Fraunhofer Institute for Manufacturing Engineering and Applied Materials Research • Project partners: Beluga Fleet Management GmbH & Co. KG, Blohm + Voss, Fahrion Produktionssysteme, Nordseewerke, Hamburgische Schiffbau-Versuchsanstalt (HSVA)
Geographic range	worldwide
Time frame	Planned project period: 01.09.2008 – 31.08.2011

Planning and Implementation

Initial situation	Traditional antifouling paint on hull
Objective(s)	The main objective is to reduce flow resistance which results in - lower fuel consumption - higher vessel speed - lower CO_2 emission - lower noise emission
Measure description	Developing a coating for vessel hulls in form of a riblet structured varnish which is using the 'Riblet-Effect' from shark skin to reduce the flow resistance.
(Estimated) Impact	More than 5% reduction of the frictional resistance. Also applicable in the fields of vehicle and aircraft construction.
Implementation process	-
Current state	In the experimental phase.

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Supported by the German Federal Ministry of Economics and Technology.
Sources of information	• http://www.beluga-group.com/en/company/research-innovation/hai-tech/?cHash=0bcb49d704ba9e09f896620a444162ef • http://www.ifam.fraunhofer.de/presse/2009/091027_Fraunhofer_IFAM_Presseinfo_HAI_TECH.pdf • http://www.ifam.fraunhofer.de/presse/2009/pressrelease_2009_HAI-TECH-Project_JEC_2010.pdf • http://www.relius.de/de/_dokumente/industrie/protective_coatings/Protective_Coating_D_E_0808.pdf • http://www.pro-physik.de/Phy/leadArticle.do?laid=8631 • http://www.fona.de/de/8451 • http://www.maritimes-forschungszentrum.de/news.php • https://www.nordlb.de/fileadmin/Volks_und_Regionalwirtschaft/pdf/Veranstaltungen/Vortraege/10112009/Woestmann.pdf
Contact data	**The Fraunhofer Institute for Manufacturing Technology and Applied Materials Research – Adhesive Bonding Technology and Surfaces (IFAM)** Wiener Straße 12, 28359 Bremen, Germany Anne-Grete Becker (Public Relations) Phone: +49 (0)421 2246-400 Fax: +49 (0)421 2246-430 E-Mail: anne-grete.becker@ifam.fraunhofer.de **Beluga Shipping GmbH** Teerhof 59, 28199 Bremen, Germany Dr. Ralf Wöstmann (Research & Innovation) Phone: +49 (0)42 – 133220 E-Mail: ralf.woestmann@beluga-group.com **Elsflether Zentrum für Maritime Forschung** An der Weinkaje 4, 26931 Elsfleth, Germany Dr. Ralf Wöstmann (Executive Director) Phone: +49 (0)4404 / 95 47 41 90 E-Mail: ralf.woestmann@maritimes-forschungszentrum.de

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Fleet management at Hermes Logistics

General information

Title/Short description	**Hermes Fleet management program (Vehicle transfer agreements with subcontractors)** Steady modernisation of the subcontractors' vehicle fleet through transfer agreements of Hermes leasing vehicles.
Transport aspects	Road transport, exclusively vehicles for the 'last mile'.
Involved players	• Hermes Logistik Gruppe: Logistic service provider • Subcontractors, mainly transport operators
Geographic range	Europe
Time frame	Implemented in 2004

Planning and Implementation

Initial situation	Loss of influence on the technical standards of the vehicle fleet after intensified use of subcontractors.
Objective(s)	Reduction of CO_2 and development of a steady modernized and uniform fleet. Also increased importance of fleet modernisation with regard to the upcoming environmental zones in Germany.
Measure description	Offering subcontractors modern vehicles with low-emission technology. Subcontractors benefit from Hermes attractive purchase conditions.
(Estimated) Impact	• Total number of vehicles use on the 'last mile': 10.300 (2008) • Total number of vehicles involved in the program: 700 (2007), 1300 (2008) • Total number of vehicles owned by Hermes: 500 (2008); Hence, total number with direct influence in technical equipment: 1800 (2008) • Since January 2009, 91 % of the 1800 fulfil the euro emission limits 4 and 5
Implementation process	• Problems of implementation: very small carriers with less financial possibilities having problems to implement the program, e.g. to constantly invest into a modern vehicle fleet.
Current state	-

Background information

Funding	Financed through involved private companies
Sources of information	• http://www.hlg.at/HLG/wg_hlg.nsf/vwFiles/UE-HLG/$FILE/Umweltbericht_HLG_2008.pdf • http://www.hlg.at/HLG/wg_hlg.nsf/contentByKey/KGRE-7A2D6G-DE-p • E-Mail contact with Stefan Hinz
Contact data	**Hermes Logistik Gruppe** **Hermes Logistik GmbH & Co. KG** Essener Straße 89, 22419 Hamburg, Germany Stefan Hinz (Organisation & Information technology) Phone: +49 (0)40 / 53 75 55 78 Fax: +49 (0)40 / 53 75 54 66 E-Mail: stefan.hinz@hlg.de

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CO2 incorporated route planning software of PTV AG

General information

Title/ Short Description	**Map&Guide (CO_2 emission offset function in route planning software)** Route planning software with integrated functions to offset the generated carbon emissions. The software calculates the optimal route and the emissions of the vehicles in use as well as the monetary compensation necessary to offset the pollution with financing an appropriate eco project. Map&Guide is working together with Tricorona and myclimate to estimate the emission and to coordinate diverse projects around the world. Due to normally high calculation and coordination costs in practice, the standard solution of map&guide enables affordable climate neutral transports for small companies and their customers.
Transport aspects	For all kinds of transportation modes.
Involved players	Planung Transport Verkehr AG (PTV): German logistic consulting and software company Tricorona: Swedish emission trading company Myclimate: Swiss non-profit organization
Geographic range	CO_2-Emission Calculation for Germany, Austria, Swiss, France, Norway and Sweden
Time frame	Available since Mai 2009 (version: map&guide professional 2009)

Planning and Implementation

Initial situation	So far, emission and cost calculation was too complex and expensive for small companies. Furthermore, access to appropriate offset projects was missing.
Objective(s)	CO_2 accounting and route optimization especially for SME.
Measure description	The software calculates the optimal route and the emissions of the vehicles in use as well as the monetary compensation necessary to offset the pollution with financing an appropriate eco project. Based on this calculation the companies can quote their customers two prices: a climate neutral and a regular price.
(Estimated) Impact	TÜV Süd, a recognized German inspection authority, has certified the software development process and the calculation method of Map&Guide as a verified solution to calculate and offset CO_2 emission. In 2010, it is the first software-based emissions calculator with a TÜV-certification.
Implementation process	-
Current state	implemented

Background information

Funding	Indirect by German, Austrian and Swiss Federal Office of Environment. These government authorities financed the HBEFA 2.1 (Handbook Emission Factors of Road Transport) from INFRAS AG, which is the numerical basis for Map&Guides's emission calculation.
Sources of information	• http://www.ptv.de/fileadmin/files_ptv.de/download/logistics/hintergruende/KlimaneutraleTransporte.pdf • http://www.ptv.de/fileadmin/files_ptv.de/download/logistics/hintergruende/GrueneTransporte.pdf • http://www.tricorona.com/ • http://www.myclimate.org/en.html • http://www.mapandguide.de/ • http://www.ptv.de/ • http://www.pressebox.de/pressemeldungen/ptv-planung-transport-verkehr-ag-karlsruhe/boxid/262649
Contact data	**PTV Planung Transport Verkehr AG** Stumpfstraße 1, 76131 Karlsruhe, Germany Phone: +49 (0)721/9651-0 Fax: +49 (0)721/9651-699 E-Mail: info@ptv.de / logistics@ptv.de **myclimate GmbH (Germany)** Borsigstr. 6, 72760 Reutlingen, Germany Phone: +49 (0)7121/ 9223 50 Fax : +49 (0)7121/9223 8050 E-Mail: info@myclimate.org **Tricorona AB** Box 70426, Kungsgatan 32 107 25 Stockholm, Sweden Phone: +46 (0)8-506 885 00 Fax: +46 (0)8-34 60 80 E-Mail: info@tricorona.se

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Railports at DB Schenker

General information

Title/Short description	**Railports (Multi-purpose logistics gateways)** DB Schenker is offering their customers with numerous Railports in Europe access to the rail network and let them transfer truck-based transports to rail, independent of the infrastructure, source and destination. With additional services from storage to Just-In-Time transports, Railports combine the benefits of rail and road.
Transport aspects	Rail and road transport (in single cases also connected to inland waterway or deep sea shipping)
Involved players	DB Schenker Rail Deutschland AG and partner companies in other European countries.
Geographic range	Europe wide (Railports in Germany, Switzerland, Italy, Greece, France, Netherlands, Spain, Denmark, Austria Turkey, Bulgaria and Romania)
Time frame	-

Planning and Implementation

Initial situation	Only companies with direct rail access were able to use transport by train efficiently.
Objective(s)	Combining benefits of rail and road, to relieve the road traffic and reduce CO_2 emissions.
Measure description	With numerous Railports in Europe, companies without direct rail access get the possibility to use the rail network. DB Schenker offers Door-to-door transport where the main carriage is shifted from road to rail. The Railports are designed for a wide range of different freight. Here the load can be transferred from truck to rail and reverse. Also handling, picking and storage can be part of the service, so that Schenker offers not just environmental friendly rail-based transportation but also logistics solutions like Just-In-Time delivery or Vendor Managed Inventory solutions.
(Estimated) Impact	Combining the benefits of road and rail the use of Railports is environmental friendly, reliable and still flexible. In combination with the additional services it has also a cost-cutting potential.
Implementation process	Currently, expansion of the Railport network across Europe.
Current state	Total number of Railports: 45 (Germany(19), Italy(5), France(5), Austria(4), Netherlands (2), Switzerland(2), Greece(2), Romania(2), Spain(1), Turkey(1), Denmark(1), Bulgaria(1))

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Financed through involved private companies
Sources of information	• http://www.rail.dbschenker.de/site/logistics/rail/raildeutschland/en/business__activities/railports/railports.html • http://www.dbschenker.com/site/logistics/dbschenker/com/de/produkte__services/schienengueterverkehr/railports/railports.html • http://www.dmg-berlin.info/page/downloads/railport-info.pdf
Contact data	**DB Schenker Rail Deutschland AG** Masurenallee 33, 47055 Duisburg, Germany Customer Service Centre / Service Rail Transport Phone: +49 (0)203 454-6554 Fax: +49 (0)203 454-2063 E-Mail: freight@dbschenker.eu Frank Wolter Phone: +49 (0)6131 15 67806 E-Mail: frank.wolter@dbschenker.eu

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Reduction of shipping fuel oil through ocean current analysis of Gauss

General information

Title/Short description	**SatMeS (Satellite-based Analysis of Ocean Currents for the Reduction of Fuel Oil Consumption)** The idea is to avoid frontal water currents and use strong currents in the field of maritime shipping to achieve savings in fuel. To be capable of considering the different ocean currents for route planning at sea the best possible way, a kind of "counselling service" will be developed within the SatMeS project, which announces in what way data derived from high resolution and weather-independent radar satellites can be used to predict ocean currents. Together with meteorological and sea state models, the data is supposed to provide precise information systems and to forecast services.
Transport aspects	Ocean shipping.
Involved players	• Project Coordinator: GAUSS Environmental Protection and Safety in Shipping • Project Partners: Beluga Shipping GmbH, Carl Büttner GmbH & Co. KG, German Tanker Shipping GmbH & Co. KG, Team Ship Management GmbH & Co. KG, German Aerospace Center (DLR) in Oberpfaffenhofen • Deutscher Wetterdienst (DWD) • European Union support programme: Angewandte Umweltforschung Bremen
Geographic range	worldwide
Time frame	Planned project period: 01.02.2009 – 31.01.2011

Planning and Implementation

Initial situation	So far, only global atlases mapping ocean currents are used in ship routing. These atlases are based on empirical data as well as on punctual measurements and thus are imprecise.
Objective(s)	Reduction of fuel consumption and emissions.
Measure description	Analysis of ocean currents by high resolution satellites and directly send to ships and their 'Voyage Data Recorder' (VDR). With these collected data the main intension is the development of a precise information and forecast system to simplify the exploitation of the ocean currents in the shipping business.
(Estimated) Impact	Ocean currents can achieve speeds of up to five knots which results in corresponding savings of fuel costs and emissions.
Implementation process	Together with four shipping companies up-to-date measurements of ocean currents are made and, in that way, they help to calibrate the system that is to be developed. The relevant data is obtained directly from the 'Voyage Data Recorder' (VDR) of the respective ship.
Current state	In the experimental phase.

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Baltic Sea Region Programme 2007–2013
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Background information

Funding	European Union, Förderprogramm Angewandte Umweltforschung Bremen
Sources of information	• https://www.nordlb.de/fileadmin/Volks_und_Regionalwirtschaft/pdf/Veranstaltungen/Vortraege/10112009/Woestmann.pdf • http://www.beluga-group.com/de/unternehmen/research-innovation/satmes/ • http://www.umwelt-unternehmen.bremen.de/Binaries/Binary4561/FV197_080709.pdf
Contact data	**GAUSS Environmental Protection and Safety in Shipping** Werderstraße 73, 28199 Bremen, Germany Andreas Born (Project Manager) Phone: +49(0)421/590548-50 Fax: +49(0)421/590548-51

Project part-financed by the European Union (European Regional Development Fund)
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Sea-Air Transport at SAT Albatros

General information

Title/Short description	**Sea-Air Transport at SAT Albatros (Combining the advantages of sea and air transport)** SAT Albatros operates as a Sea-Air carrier and express courier service. Sea-Air Transport is a combination of sea and air freight. This hybrid mode of transport allows sending urgent goods, for example, from Asia via a transit point to Europe within 2 weeks. In comparison to the single usage of air freight up to 45% of CO_2 emissions can be saved. Sea-Air Transport applies especially to goods that are more time-critical than goods that are typically shipped via deep sea.
Transport aspects	Sea and air cargo
Involved players	SAT Albatros
Geographic range	Worldwide via the main transit point Dubai
Time frame	-

Planning and Implementation

Initial situation	Urgent goods were sent by air, less time-critical goods as deep sea cargo.
Objective(s)	Combining the advantages of air freight and sea cargo. Reduction of CO_2 emissions and costs, compared to regular air freight; and time, compared to regular deep sea cargo.
Measure description	Shifting regular air freight and deep sea cargo to a multimodal transport chain. For example, SAT Albatros is shipping the customer's cargo via container vessels from Far East to their main transit point in Dubai where the goods are transferred within a few hours from sea freight containers to airfreight pallets. The cargo then proceeds via plane to an international airport where trucks pick it up and deliver it to the customer's warehouse.
(Estimated) Impact	Cost savings and up to45 % reduction of CO_2 emission compared to regular air freight; quicker than regular sea freight.
Implementation process	-
Current state	implemented

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Financed through involved private company
Sources of information	• http://www.sat-albatros.com/home • http://www.sat-albatros.de/
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Project part-financed by the European Union (European Regional Development Fund)
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SkySails at Beluga Shipping

General information

Title/Short description	**SkySails (Propulsion system utilizing wind energy)** The SkySails-System is an innovative wind propulsion system for modern shipping. It aims to reduce fuel consumption of modern shipping by utilisation of environmentally friendly, free-of-charge wind energy.
Transport aspects	Focus on ocean shipping.
Involved players	• Applicant/Project coordinator: Beluga Fleet Management GmbH • Project partners: SkySails GmbH & Co. KG, OceanWaveS GmbH, ALDEBARAN Marine Research & Broadcast
Geographic range	worldwide
Time frame	Project period: 01.01.2006 – 30.06.2009

Planning and Implementation

Initial situation	-
Objective(s)	Savings in energy and emissions of greenhouse gas.
Measure description	The system consists of a fully automated towing kite propulsion and a wind-optimized routing system. It is used offshore, additionally to the propulsion of the ship's engine, if wind conditions allow.
(Estimated) Impact	• Depending on the prevailing wind conditions, a ship's average annual fuel costs can be reduced by 10% to 35% by using the SkySails-System. Under optimal wind conditions, fuel consumption can temporarily be cut by up to 50%. • The systematic and worldwide use of SkySails technology would make it possible to save over 150 million tons of CO_2 a year. • Virtually all existing cargo vessels and new builds can be retro- or outfitted with the SkySails auxiliary wind propulsion system.
Implementation process	The following SkySails projects have been implemented or initiated respectively: • Construction of MS 'Beluga SkySails' in 2008, a 10,000 ton multipurpose heavy-lift project carrier which operates primarily on routes between North America and Europe, but in the long term also across the Pacific. • Two 20,000 ton carriers that are currently under construction will both be equipped with a 600-square-metre towing kite, implying bunker savings of ten tons per day of operation.
Current state	Currently, SkySails is offering towing kite propulsion systems for cargo vessels with an effective load of between 8 and 16 tons. SkySails with an effective load of 32 tons are under development. The planned product program comprises towing kite propulsion systems with an effective load of up to 130 tons.

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Funded by different public authorities. Within the framework of the WINTECC project the European Union founded SkySails with 1.2 mn €. Furthermore funding from the public sector by the German Federal Ministry of Education and Research (BMBF), Federal Ministry of Economics and Technology (since 2005), Innovationsstiftung of the Hanseatic City of Hamburg and with funds from the Wirtschaftsbehörde of the Hanseatic City of Hamburg in 2003 and 2004. In 2001 SkySails was funded by 'hep', the Hamburg business start-up program, and also the first company to be funded by the IdeenFONDS of the Free and Hanseatic City of Hamburg.
Sources of information	• http://www.beluga-group.com/de/unternehmen/research-innovation/ • http://www.beluga-group.com/de/unternehmen/research-innovation/hai-tech/?cHash=54ee5b7211357493829eef7cd4506859#Unternehmen-Research&Innovation-WINTECC/SkySails • http://www.skysails.info/ • http://www.wintecc.de/
Contact data	**Beluga Shipping GmbH** Research & Innovation Dr. Ralf Wöstmann Teerhof 59, 28199 Bremen, Germany Phone: +49 (0) 421 - 333 22 0 E-Mail: ralf.woestmann@ beluga-group.com **ALDEBARAN Marine Research & Broadcast** Deichstrasse 48-50, 20459 Hamburg, Germany Simone Haderthauer Phone: +49(0)40 - 32 57 21-0 Fax: +49(0)40 - 32 57 21-21 E-Mail: buero@aldebaran.org **SkySails GmbH & Co KG** Veritaskai 3 / 10.OG, 21079 Hamburg, Germany René Meyer Phone: +49(0)40 - 702 99 30-1 Fax: +49(0)40 - 766 29 30-30 E-Mail: rene.meyer@skysails.de **Beluga Fleet Management GmbH & Co. KG** Teerhof 59, 28199 Bremen, Germany Anja Koutsoutos Phone: +49(0)421 - 333 22-181 Fax: +49(0)421 - 333 22-990 E-Mail: Anja.Koutsoutos@Beluga-Group.com **OceanWaveS GmbH** Munstermannskamp 1, 21335 Lüneburg, Germany Ina Tränkmann Phone: +49(0)4131 - 78 98-320 Fax: +49(0)4131 - 78 98-319 E-Mail: traenkmann@oceanwaves.de

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Slow Steaming Vessel integration at Tchibo

General information

Title/Short description	**Slow Steaming Vessel integration at Tchibo** Ordering 'Slow steaming' vessels for over sea transportation
Transport aspects	The measure focus on deep sea transport on the long haulage.
Involved players	• German retailer for coffee and consumer goods: Tchibo • Shipping line: Evergreen
Geographic range	The measure affects deep sea transportation between Asia and Northern Europe.
Time frame	• Planning: 08/2007-01/2008 • Implementing: 02/2008-05/2008 • Running: 05/2008-01/2009 (first contract)

Planning and Implementation

Initial situation	The company's transportation procurement (process) for over sea transportation did not comprise specific requirements considering speed/ fuel consumption.
Objective(s)	The measure's objective was to reduce CO_2-emissions by 5 % (in relation to overall company's emissions).
Measure description	The retailer assigns a shipping line using 'slow steamers' to reduce fuel consumption. One third of the consumer goods will be transported by slow steaming vessels.
Impact	A reduction of CO_2-emissions was achieved: • 4.2 % (in relation to overall company emissions), • 26 % (in relation to this part of over sea transportation). Due to the reduction of speed the transit time increased.
Implementation process	Firstly a market analysis of 'slow steaming' offers was done. At this time there was only one shipping line offering this special product. Secondly the tender process was conducted. Finally the chosen shipping line was assigned. There were two different types of vessels in operation, their reduction of speed was from 25 to 19.8 resp. 23.5 to 20.5 kn.
Current state	-

Background information

Funding	The research project (LOTOS) in which this measure was initiated mainly was funded by the Federal Ministry of Environment, the efforts for implementing and running the measure were taken by the company itself.
Sources of information	LOTOS – Project report
Contact data	**Hamburg Technical University** Institute for Transport Planning and Logistics Patric Drewes drewes@tu-harburg.de

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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'Planet Me' Environmental Program at TNT

General information

Title/Short description	**TNT - 'Planet Me'** A company's holistic environmental programme focused on improving the carbon efficiency of the global operations and furthermore engaging the employees and extended network in joining in their efforts.
Transport aspects	The measure involve road vehicles, aircraft and facilities
Involved players	International Courier, Express and Parcel Company: TNT
Geographic range	Worldwide
Time frame	Launched August 2007.

Planning and Implementation

Initial situation	Since 1999 the company aims to reduce its carbon output with investing in vehicles with natural gas engines.
Objective(s)	Ambition to become the world's first zero-emission transport company with the three main objectives: • Measuring and monitoring the CO_2 performance and improving the carbon footprint transparency • Improve the CO_2 efficiency of the core operational activities and also collaborate with partners, who are called orange network, to arrive at innovative solutions • Engaging the employees to adopt sustainable behaviour at work and home.
Measure description	• 'Count Carbon' - Measuring and monitoring the CO_2 performance • 'Code Orange' - Improving CO_2 efficiency of core operational activities • 'Choose Orange' - Engaging the employees to adopt sustainable behaviour at work and home
(Estimated) Impact	Improving the company's CO_2 efficiency until 2020 by 45% compared to the year 2007.
Implementation process	Application of route optimisation software, environmental friendly vehicles and video conference systems (to reduce business trips).
Current state	In implementing

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	Financed through involved private company
Sources of information	• http://planetme.tnt.com/ • http://www.mm-logistik.vogel.de/distributionslogistik/articles/197956/index.html
Contact data	**TNT Express GmbH** Haberstraße 2 53842 Troisdorf, Germany Markus Gehmeyr(Senior General Manager Communications) Phone: +49(0) 2241/497-1300 Fax: +49(0) 2241/497-1305 E-Mail: Markus.Gehmeyr@tnt.de

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CO_2 calculator for short sea shipping at Unifeeder

General information

Title/ Short description	**Unifeeder CO_2 calculator for short sea door-to-door activities** As one of the largest short sea operators in Northern Europe, Unifeeder introduces a CO_2 Calculator for its short sea door-to-door activities. The calculator compares CO_2 emissions from land transportation with the more CO_2 efficient combination of land and sea transportation.
Transport aspects	Short sea door-to-door(sea and land transportation)
Involved players	Unifeeder: European feeder service provider
Geographic range	Northern Europe (North Sea and Baltic Sea)
Time frame	Implementation 2009

Planning and Implementation

Initial situation	Traditional truck transport for medium/short distances.
Objective(s)	Offering forwarders a basis for comparison for transport alternatives using different transport modes.
Measure description	The calculator compares CO_2 emissions from land transportation with the more CO_2 efficient combination of land and sea transportation. It is based on the model defined by the International Maritime Organization (IMO), a UN agency, for the calculation of CO_2 emissions at sea. Furthermore the calculation of Unifeeder's Energy Efficiency Operational Indicator is verified by Det Norske Veritas (DNV), a Norwegian independent foundation with the purpose of safeguarding life, property, and the environment.
(Estimated) Impact	• Saving up to 50% of CO_2 emissions compared to the pure truck transport • Relief of the overburdened streets
Implementation process	-
Current state	implemented

Background information

Funding	Financed through involved private company
Sources of information	• http://www.unifeeder.com/C125702600609F2D/%28AllDocsByDocId%29/CD6C182AF0A7204FC1257633002477FC • http://www.mm-logistik.vogel.de/distributionslogistik/articles/230085/index.htm • Calculator: http://www.unifeeder.com/C12570370049A01A/0/E1C5F5E477B4404DC125761D00506D61
Contact data	**Unifeeder A/S** Unifeeder Shortsea Service Simon Galsgaard (Director) Phone: +45 (0) 8883 0541 E-Mail: shg@unifeeder.com

Project part-financed by the European Union (European Regional Development Fund)
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Waste Heat Recovery at Maersk

General information

Title/Short description	**Waste Heat Recovery System (Reuse excess heat from the exhaust to generate energy)** Waste Heat Recovery (WHR) is a process where energy contained in the main engine's exhaust gas is recovered to provide power for propulsion as well as onboard electricity consumption. The system reduces the environmental impact by decreasing the required main engine power while maintaining the power available to the propeller. Less fuel is used and fewer exhaust emissions are generated for the same shaft power. It is i.a. implemented in the world's largest container vessels, the Emma Maersk.
Transport aspects	Sea cargo
Involved players	Maersk Line The WHR plant for Maersk vessels was developed in a joint effort, headed and integrated by Odense Steel Shipyard Ltd in cooperation with Wärtsilä, Siemens AG, Peter Brotherhood Ltd and Aalborg Industries Ltd.
Geographic range	Worldwide
Time frame	First installation in June 2005.

Planning and Implementation

Initial situation	Conventionally all the exhaust gas just passes through an engine turbocharger and exits unexploited.
Objective(s)	Reduction of energy use and greenhouse gas emissions
Measure description	The system reuses excess heat from the exhaust and thus generates energy that can be used to propel the vessel via the shaft engine or as general energy supply onboard. The energy is recovered in the following two ways: 1. When the exhaust gas leaves the engine, it is very hot and under pressure (typically 380°C and 2.2 bars). Conventionally, all this gas passes through the main engine turbochargers – but some of it can be bled away to drive a gas turbine that in turn drives an electrical generator. It contributes approximately 30% of the energy to the Waste Heat Recovery System. 2. After the turbochargers, the exhaust gas is still hot (250-300°C). It can then be passed through an exhaust gas boiler to provide steam under pressure, which can be used to drive a steam turbine-driven generator.
(Estimated) Impact	• A typical 10 % energy recovery will reduce all air emissions (e.g. CO_2, NO_X, and SO_X) from combustion. In practical terms, this would reduce the CO_2 footprint emissions of each large container vessel by about 15,000 tonnes each year. • Requires less auxiliary generator and main engine maintenance. • More cargo space caused by less bunker capacity needed.
Implementation process	First installation in June 2005 (Gudrun Maersk) and later further developed version in September 2006 (Emma Maersk).
Current state	implemented

Project part-financed by the European Union (European Regional Development Fund)
Baltic Sea Region Programme 2007–2013
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Background information

Funding	-
Sources of information	• http://www.maerskline.com/link/?page=brochure&path=/about_us/environment/reducing_gas_emissions • http://www.maerskline.com/globalfile/?path=/pdf/environmental_brochure • http://www.maerskline.com/globalfile/?path=/pdf/environmental_friendly_lady_en • http://www.maerskline.com/globalimage/?path=/about_us/Waste_heat_recovery_system • http://is.industry.siemens.com/broschueren/pdf/marine/siship/en/SISHIP_Boost_Hybrid_WHR.pdf • http://www.wartsila.com/Wartsila/global/docs/en/ship_power/media_publications/brochures/product/engines/low_speed/waste-heat-recovery.pdf
Contact data	**A.P. Moller - Maersk Group** Esplanaden 50, 1098 Copenhagen K, Denmark Phone: +45 (0)3363 3363 Fax: +45 (0)3363 4108 Communication Phone: +45 (0)3363 3534 E-Mail: press@maersk.com

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Double-decker semitrailer at Zeyer

General information

Title/ Short Description	**Zeyer Multi-Trailer (Introduction of a double-decker semitrailer)** The freight carrier Zeyer-Trans developed a double-decker trailer to increase the transport capacity of its truck fleet. As a result, fewer tours are necessary, which safes fuel and reduces emissions. Furthermore the new trailer concept entails savings in personnel costs, loading devices and handling time.
Transport aspects	Road transport
Involved players	Zeyer-Trans: German freight carrier
Geographic range	Affects road transportation in Germany and Europe
Time frame	Multi-Trailer introduced in 1998.

Planning and Implementation

Initial situation	Use of traditional trailers.
Objective(s)	Increase cargo capacity, saving costs (fuel, personnel, handling, etc.) and reducing emissions
Measure description	Use of multi-trailers in the freight carrier fleet.
(Estimated) Impact	• With 86 rolling containers and 52 euro-pallets the load volume has an increase of 62 % and so less tours are necessary (Reduction of CO_2 emission). • Savings in personnel costs and loading devices. • Integrated elevating-floor leads to savings in handling time caused by an optimal unbroken good flow between storage and trailer. • Higher load flexibility with an adjustable elevating-floor.
Implementation process	-
Current state	Implemented

Background information

Funding	Financed through involved private company
Sources of information	http://www.zeyer.de/multitrailer.html
Contact data	**Zeyer GmbH** Lilienthalstraße 30 74078 Heilbronn Biberach, Germany Phone: +49 (0) 70 66 - 96 60 - 0 Fax.: +49 (0) 70 66 - 96 60 – 20 E-Mail: info@zeyer-trans

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Outlook

In the months to come, the **collection of good practice examples will be expanded**. Thereby **three different directions for expansion** will be pursued.

The first expansion will pick up **most recent developments in EU freight policy**. As part of the TEN-T policy review the concept of co-modality becomes increasingly important. Also, co-modality is one of the major concepts of the green corridor approach. In this context, it is important to mention, that the **promotion of co-modality has important implications for the development of logistical nodes** in the European transport network. Physical transfer points between transport modes serve as prerequisite for making co-modality work in practice. These nodes (ports, airports and terminals) and open access logistic centres have to offer good multi modal connections with sufficient capacities and support seamless transport flows underpinned by standardized information flows. Also, logistical nodes constitute crucial parts within the **TEN-T core network**. Only with the integration of those constituent elements the efficient transfer between the various modes of transport is possible and transport demand can be satisfied in the most cost effective and environmentally sustainable way. These arguments call for a **further investigation of green logistic concepts that originate from or are driven by players of logistic nodes**. As centres of gravity for goods and trade, seaports are the logistic nodes with the highest impact on transport flows. Here, 90% of Europe's international trade and 40% of the tonne-kilometres of intra-EU trade is handled[90]. Also, ports have a growing impact on whole supply chains and networks. As elements in value-driven chain systems ports deliver value to shippers and to third party service providers, i.e. for the chains in which they are embedded[91]. This development hold outs the prospect that further investigation of **'green' concepts initiated by ports, terminal operators or other port actors** can lead to valuable insights for the EU green corridor concept as such.

The two other directions of action are **"groups of stakeholders"** and **"geographic focus"**. So far, the focus of the good practice collection is on company solutions. To complete the picture, also **measures of authorities** and public-private partnerships have to be considered. Additionally, the geographic focus, currently on European solutions, will be enlarged. Figure 4 displays the aspired structure of the good practice compilation.

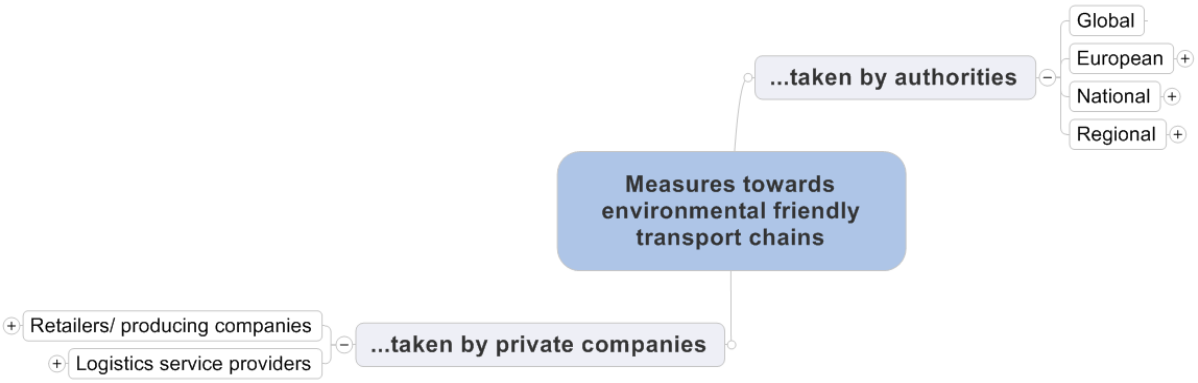

Figure 4: Aspired content structure of good practice compilation

[90] TEN-T Expert Group 2, 2010
[91] TEN-T Expert Group 2, 2010

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