European Commission

Smart and sustainable logistics

for a competitive Europe

COMMUNICATING TRANSPORT RESEARCH AND INNOVATION

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Transport

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Preface

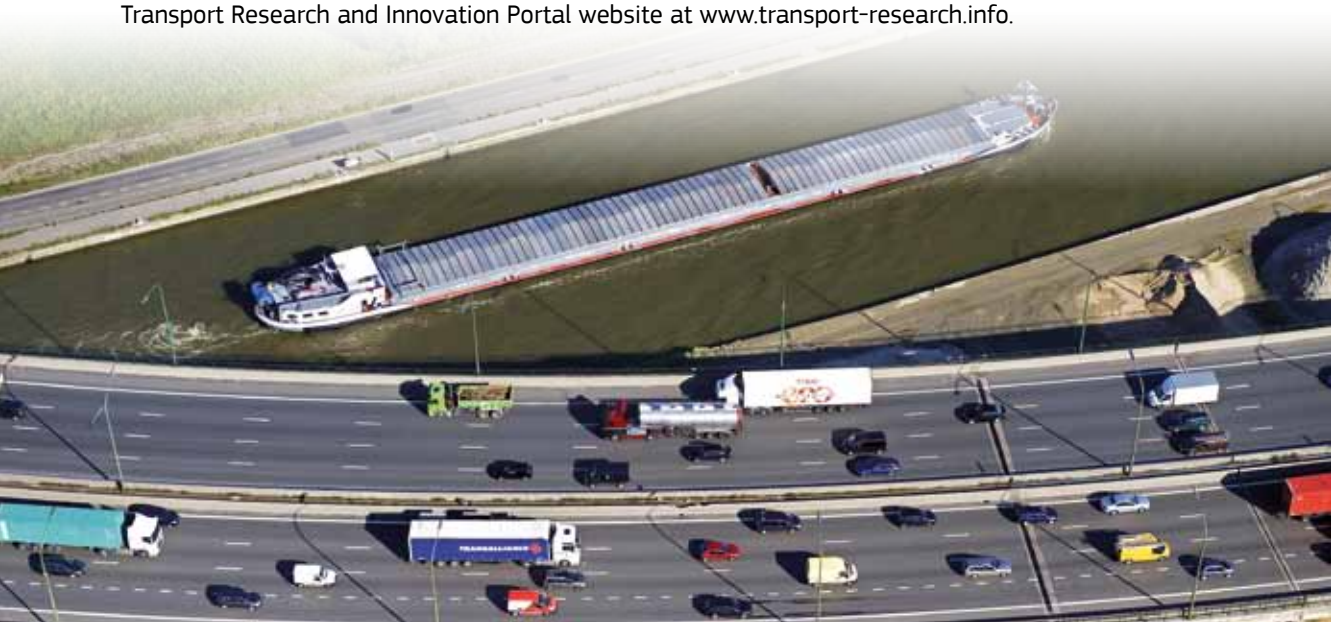
Logistics is one of the most dynamic sectors of the economy, contributing to economic growth and international competitiveness. In the face of the steady growth in freight volumes throughout Europe, EU policy focuses on increasing the efficiency of freight logistics and reducing environmental impacts.

As a significant area of EU transport policy, logistics has been selected for the TRIP series of policy brochures to highlight the contribution of EU-funded research to policy and the implications for future policy and research.

This series of policy brochures is an essential component of the comprehensive Transport Research and Innovation Portal (TRIP) that provides open access to the results and best practices of research programmes and projects in the European Research Area (ERA). A central theme of research policy under the Treaty of Lisbon, the European Research Area has been identified to foster the free circulation of researchers, scientific knowledge, and technology.

TRIP serves policy makers and research managers involved in all aspects of the transport sector. The Portal is developed and maintained by the TRIP Project Consortium and funded by the Directorate-General for Mobility and Transport (DG MOVE) under the Seventh Framework Programme for Research and Innovation.

This policy brochure presents an overview of current and future policy on smart and sustainable logistics and EU-funded research to support development and implementation of this policy. Additional information on transport research programmes and related projects is available on the Transport Research and Innovation Portal website at www.transport-research.info.



1 INTRODUCTION

Challenges in logistics

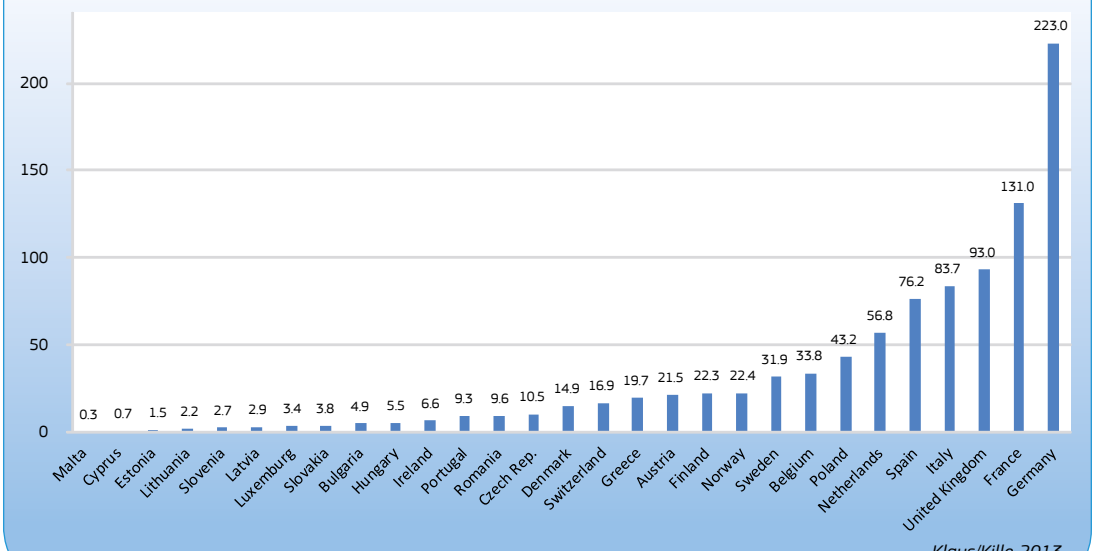
Logistics is central to the EU economy, contributing to economic growth and playing a key role in international competitiveness. With the predicted growth in freight transport, the challenge is to raise the efficiency and competitiveness of the logistics sector and to reduce the sector's environmental impacts.

The logistics sector is a key driver of EU economic integration and growth. Access to internal and global markets depends on efficient and cost-effective logistics throughout the EU for long-term economic prosperity.

Logistics covers planning, implementing and controlling the movement of raw materials, semi-finished products and finished goods (EC, 2007a). The efficiency of freight logistics has a direct impact on product prices and security of supply. Estimates put logistics at 12 % of the total cost in the manufacturing sector and at more than 20 % in the retail sector (EC, 2007b). This makes logistics a key determinant of the competitiveness of the EU economy.

Europe is currently a leader in logistics, with six EU Member States in the global top 10 in logistics performance in 2014 (World Bank, 2014). With the steady growth in freight volumes throughout Europe, the long-term forecast is 80 % growth in freight transport by 2050 (EC, 2012a).

Figure 1. **Expenditure on logistics in Europe in 2011 (in billion euros)**



Klaus/Kille 2013

Reducing environmental impacts

In the last two decades, transport-related greenhouse gas emissions have increased substantially, one third of these emissions is attributed to freight transport (EC, 2012b; 2007c). With increasing growth in freight transport, EU policy is to improve freight logistics while simultaneously minimising the negative impacts of this growth.

The policy focus is to reduce the heavy dependence on fossil fuels (EC, 2011a). Constant high levels of CO_2 emissions threaten the EU target of 60% reduction in greenhouse gas emissions in the transport sector by 2050 with respect to the 1990 level (EC, 2011a).

Freight logistics also places additional burdens on society in the form of safety risks, noise hindrance and air pollution. Traffic safety has significantly improved in the last decade and this trend is set to continue. However, traffic noise and emissions of nitrogen oxides (NO_x) and particulates still have negative impacts on public health and the environment (EC, 2008a). These impacts could be reduced substantially by converting freight vehicles to sustainable fuels and propulsion systems, and by employing advanced information and communication technologies for more efficient logistics.

Urban logistics

Currently, 74% of Europe's population lives in urban areas, and the percentage is expected to increase (UN World Urbanization Prospects, 2011). As a result, high density urban areas are increasingly confronted with the impacts of freight logistics in the form of congestion, noise hindrance and air pollution.

The urban environment also presents a specific challenge for logistics companies. The last mile of the logistic chain, which accounts for a large proportion of shipment costs and complexity of operations, is often the most inefficient. Thus, distribution and logistics from production sites to distribution warehouses and to customers in urban areas need to be improved.

Logistics in urban areas can be improved by implementing new organisational concepts in combination with innovative vehicles. For example, electric vehicles that are particularly quiet are highly suitable for night deliveries to reduce road congestion during rush hours.

Enhancing efficiency and competitiveness

Europe is the home of many companies that are world leaders in logistics (EC, 2012a). But volatile fuel prices and infrastructure congestion are putting logistics costs under pressure (EC, 2007c). Road traffic congestion affects 10 % of the road network, resulting in an annual cost of 0.9 to 1.5 % of GDP in the EU (EC, 2008b).

The challenge is to safeguard and to increase the competitive edge of the logistics sector because the sector's performance is directly linked to productivity in other economic sectors. It is estimated that 10 to 30 % improvement in efficiency could result in annual savings of EUR 100 to 300 billion for the European industry (EC, 2013a; 2013c).

Currently, road haulage dominates freight logistics. However, other transport modes and combination of modes, such as rail, short sea shipping and inland waterways, can be more efficient from an overall economic perspective.

Advances in technology are needed to integrate freight transport modes more efficiently and to overcome the complexity of multimodal supply chains, which is considered to be a major barrier compared to the single-mode, door-to-door road delivery. The challenge is to use all transport modes, where appropriate, to achieve optimum and sustainable use of resources (EC, 2006b; 2011a).

2 POLICY CONTEXT

Policy and research on resource-efficient logistics

A priority goal in EU transport policy is to improve the efficiency and to reduce the environmental impact of freight logistics. In support of this policy, research priorities include development and launch of smart logistics concepts especially in urban areas, using advanced information and communication technologies, and promoting eco-innovation in freight transport.

"Efficient and competitive logistics is essential for both, the European and the world economy."

Violeta Bulc, EU Commissioner for Transport, speaking at the European Rail Freight Days Conference (November 2014)

Dedicated EU policy on logistics

The concept of co-modality has long been a focus in EU policy on freight transport and logistics. This concept encourages the use of different transport modes, either separately or in combination, to achieve optimal and sustainable utilisation of transport resources (EC, 2001; 2006b).

The Transport White Paper (EC, 2011a) emphasises multimodal transport in green freight corridors, especially waterborne and rail transport for long-haul freight. The focus is on eco-innovation in freight transport by supporting deployment of new vehicles and vessels, and retrofitting vessels. A priority objective is to develop and deploy information technology for efficient transfer of information throughout the supply chain (e-Freight). Moreover, the White Paper has a dedicated section on urban logistics, and underlines the high priority to improving urban freight transport (EC, 2011a; see text box).

Freight Logistics Action Plan

The Freight Logistics Action Plan (EC, 2007a) sets out actions to stimulate freight and traffic management, to improve quality and efficiency, to simplify administrative processes and to review loading standards. To promote innovation, the Action

GOALS FOR FREIGHT TRANSPORT IN THE EUROPEAN UNION

- Shift 30 % of freight transport over 300 km from road to rail and waterborne transport by 2030, and 50 % by 2050
- Develop multimodal freight corridors and support multimodal transport
- Promote eco-innovation in freight transport
- Support deployment of new vehicles and vessels, and retrofit those already in operation
- Improve the energy efficiency performance of vehicles
- Optimise the performance of multimodal logistics chains
- Create an appropriate framework for seamless flow of information in the supply chain (e-Freight)
- Achieve essentially CO_2-free logistics in major urban centres by 2030
- Produce best practice guidelines on monitoring and managing urban freight flows.

Transport White Paper (EC, 2011a)

Plan encourages extensive use of information and communication technologies in freight transport. The policy document outlines a vision for paperless information flows accompanying the physical shipment of goods to simplify administrative processes.

ALICE: ALLIANCE FOR LOGISTICS INNOVATION THROUGH COLLABORATION IN EUROPE

The European Technology Platform (ALICE) is developing a comprehensive strategy for research, innovation and market deployment of innovations in logistics and supply chain management in Europe. This industry-led stakeholder platform is developing short- and long-term research and innovation agendas and roadmaps for action at EU and national level, using private and public funding. Actions contribute to specific targets set in the Horizon 2020 Work Programme (EC, 2013c) and the Transport White Paper (EC, 2011a) and include:

- developing and applying new concepts in freight transport and logistics
- contributing to low-carbon supply chains
- achieving virtually CO_2-free logistics in major urban centres by 2030
- better and efficient utilisation of transport modes.

(ETP ALICE, 2014; EC, 2013a).
http://www.etp-alice.eu

The Action Plan introduces the concept of green freight corridors between major hubs to improve energy efficiency and to reduce the environmental footprint of the transport sector. Along these corridors, the logistics sector is encouraged to adopt co-modal solutions for optimum and sustainable use of transport resources.

Greening Transport Package

The Greening Transport Package (EC, 2008a) adopted in 2008 steers transport logistics towards greater sustainability. The package includes a strategy to make pricing of freight transport better reflect the real cost to society in terms of air pollution, noise hindrance and congestion. Member States are encouraged to introduce charging systems that give logistics operators the right price signal to bear the real costs and thus incentives to change behaviour, for example, by modernising their fleet with cleaner vehicles (EC, 2008a).

Green Paper on Urban Mobility and Action Plan on Urban Mobility

Freight logistics has a prominent place in the Green Paper on Urban Mobility (EC, 2007d), which is complemented with targeted actions in the Action Plan on Urban Mobility (EC, 2009). Improving freight logistics is also taken up in sustainable urban mobility plans (SUMPS).

Action Plan and Directive for the Deployment of Intelligent Transport Systems in Europe

The Action Plan for the Deployment of Intelligent Transport Systems (ITS) in Europe is contributing to accelerating the pace of ITS deployment in freight logistics (EC, 2008b). The legal framework, Directive 2010/40/EU (EU, 2010) adopted in 2010, is a key instrument for the coordinated implementation of interoperable and seamless ITS services, in both road transport and interfaces with other modes. The deployment of such services is not mandatory but the specifications adopted under the Directive are binding.

Research and innovation in logistics

Achieving the objectives outlined in the Transport White Paper and the Freight Logistics Action Plan requires investment in research, development and innovation. The EU supports implementation of sustainable logistics solutions through targeted research funding under EU Framework Programmes (EC, 2012c; 2013b; 2013c). EU-funded research and innovation in logistics are conducted on behalf of the Directorate-General for Mobility and Transport (DG MOVE), the Directorate-General for Research and Innovation (DG RTD), and the Directorate-General for Communications Networks, Content and Technology (DG CNECT).

Research includes activities to introduce new logistics concepts and to develop interfaces between transport modes based on co-modality (EC, 2012c; 2013b). Under the Seventh Framework Programme, research focused on efficient use of advanced technology for communication between infrastructure and vehicles.

EU-funded research on seamless exchange of traffic data contributes to better planning and coordination of other transport processes, for

instance, by improved load matching with vehicle capacity. Research also contributes to facilitating the provision of information required by inspection authorities, thus reducing administrative processes in monitoring compliance with regulations.

Research addresses the last mile in freight transport and logistics in urban areas. New delivery concepts are being investigated to reduce the number of vehicle movements especially in urban areas, and concepts for more environmentally friendly vehicles for use in urban logistics (EC, 2012c).

Horizon 2020

Under the new EU Framework Programme for Research and Innovation, Horizon 2020 (EC, 2013c) that runs from 2014 to 2020, logistics-related research concentrates on increasing the efficiency and sustainability of the logistics supply chain. Research focuses on developing innovative solutions to overcome the challenges arising from the increasing length, complexity and vulnerability of many supply chains. Effective use of information technology offers the flexibility to use different modes in freight transport. A key aspect is the development of the new concept of synchro-modality, which is the use of the right transport mode at the right time taking into consideration the entire transport and logistics chain (EC, 2013c).

Research is also directed to improving interaction between logistics stakeholders to enhance the potential for horizontal cooperation and to foster synergies. New concepts for regional logistics platforms to be run cooperatively by industry actors are being developed. The key goals are to enhance utilisation of equipment and seamless connectivity between transport modes. Another research priority is to develop a communication and navigation platform for real time information exchange and cooperation between logistics operators (EC, 2013c).

From research to market take up

An essential element in making logistics more sustainable and efficient is market take up of innovations and new concepts. The EU has various instruments in place to support the deployment of new innovations in logistics (EC, 2012c; 2013b; 2013c).

Interaction between industry and the research community is encouraged through the European Technology Platforms (ETPs) that develop joint visions, set strategic research and innovation agendas, and contribute to defining research priorities (EC, 2013d). ETPs that involve the logistics sector are the European Road Transport Research Advisory Council (ERTRAC), the European Rail Research Advisory Council (ERRAC), and the ETPs Waterborne and Manufuture. The European Technology Platform on Logistics (ALICE) was launched in June 2013 (see text box).

3 POLICY PRIORITY

Environmentally sustainable and **efficient solutions** in logistics

Research is developing new and innovative solutions to enhance the environmental sustainability and efficiency of the logistics chain. Significant gains have been achieved by optimising freight transport infrastructure, by efficiently combining transport modes, and by identifying potential performance improvements for logistics companies.

With ever-rising demand for freight transport, increasing congestion and environmental impacts are major challenges for both policy makers and logistics companies. Unchallenged, CO_2 emissions from freight transport in 2050 will be one third higher than 1990 levels, and congestion costs are estimated to increase by about 50% in the same period (EC, 2011a). EU transport policy identifies research initiatives and new logistics concepts to meet key environmental challenges throughout the logistics chain.

"Green transport corridors will reflect an integrated transport concept where short sea shipping, rail, inland waterways and road complement each other to enable the choice of environmentally friendly transport."

EC, 2007a

Efficient co-modality is needed. The EU needs specially developed freight corridors optimised in terms of energy use and emissions, minimising environmental impacts, but also attractive for their reliability, limited congestion and low operating and administrative costs.

Transport White Paper (EC, 2011a).

Green transport corridors

Optimising freight transport logistics is an essential component in reducing vehicle emissions. In 2007, the European Union launched the concept of green transport corridors for long-distance freight transport between major hubs.

Green corridors are not mode-specific and are not limited to intermodal solutions (EC, 2007a). A corridor comprises infrastructure and transport operations in a wide geographical area. The infrastructure is characterised by the use of innovative solutions and new techniques that contribute to greener transport logistics. Transhipment facilities and supply points for alternative fuels are strategically located along a green corridor to promote eco-innovation in freight logistics (EC, 2007a). In addition, smart traffic management enables better use of transport infrastructure and contributes to reducing congestion and distances travelled.

EU-funded research has led to the development of green corridors to meet environmental, technical, economic, social and spatial planning requirements. Furthermore, research has identified strategies for implementing green technologies, such as novel propulsion systems, alternative fuels, cargo handling technologies and new terminal technologies (see Success Story).

SUSTAINABLE FREIGHT TRANSPORT IN THE CORE NETWORK

In December 2013 the TEN-T Guidelines established a core transport network as the backbone of the Single Market (EC, 2013g; 2014b). The network consists of nine key corridors to be completed by 2030 (EC, 2014b). For freight transport, the key objectives are to:

- improve sustainable use of transport infrastructure, including efficient management
- promote deployment of innovative transport services
- facilitate multimodal transport services and improve cooperation between transport service providers
- improve links to the most vulnerable and isolated parts of the European Union
- support and promote transport decarbonisation through transition to innovative and sustainable transport technologies.

EC, 2013g

Efficient co-modality

Currently, road haulage dominates freight logistics in Europe with a market share of around 45 % of total freight transport (EC, 2012b). Switching freight flows from road to other transport modes can have significant environmental benefits, especially in reducing greenhouse gas emissions. In essence, research on intermodal transport is directed to facilitating this seamless transfer. EU-funded research on developing and implementing co-modality in freight transport has led to a range of organisational and technology solutions.

Research has contributed to improving and implementing intermodal freight transport by disseminating innovations, best practices and

intermodal transport opportunities for potential users. Moreover, EU-funded research has supported exchange of experience between logistics companies and has established an active information and coordination platform for intermodal logistics.

A research emphasis has been put on innovative solutions in collaborative transport, often referred to as "carpooling for cargo". Logistics companies are encouraged to bundle freight flows on transport modes to increase load factors, reduce empty movements and stimulate co-modality. This horizontal collaboration between industry partners increases capacity use in freight transport, thereby reducing transport costs and transport externalities, such as greenhouse gas emissions. EU-funded research has analysed various options for horizontal flow bundling and co-modality scenarios in test cases. Logistics companies are using the services that have emerged from research to identify potential bundling partners. Moreover, research has contributed to developing a legal framework and to active coaching in horizontal collaboration.

Benchmarking performance

Another approach to improving the environmental performance and efficiency of the logistics sector is to benchmark individual performances against industry best practices. Benchmarking supports the development and implementation of elements of sustainable transport policy because it encourages identification of strengths and weaknesses, and thus the potential for performance improvement (EC, 2006a).

Supported by research, benchmarking is used to compare the performance of transport modes in a region or country, and that of national transport systems. Large differences in performance imply significant potential for improvement.

EU-funded research has developed a methodology for quantitative assessment of the performance of transport logistics in Europe and worldwide. Benchmarking tools enable comparison of alternative transport chains on criteria, such as time, cost, flexibility, reliability, quality and sustainability. Small and medium-sized enterprises can compare their transport performance with that of companies of similar size in order to identify improvement opportunities. EU-funded research has also developed tools to obtain information on connections between intermodal freight terminals in Europe, and to assess transport and logistics performance.

SUCCESS STORY

SuperGreen

Supporting EU Freight Transport Logistics Action Plan on Green Corridors Issues

Project reference: FP7-233573
Project type: Coordination and Support Action
Status: completed
Total cost: EUR 3 453 747
EU contribution: EUR 2 634 698
Coordinator: National Technical University of Athens
Website: http://www.supergreenproject.eu

SuperGreen brought the concept of green corridors for freight transport a step closer with the development of a methodology for benchmarking potential corridors in Europe. The methodology was used to identify and evaluate nine freight corridors in representative regions and main transport routes in Europe. In contributing to putting the green transport corridors concept into practice, recommendations were made on green technologies best suited to freight transport and logistics in the EU.

BACKGROUND

In 2007, the European Commission launched the concept of green transport corridors to combine economic efficiency and environmental sustainability in freight logistics in the EU (EC, 2007a). SuperGreen was a Coordinated Action supported by the European Commission (DG MOVE) under the Seventh Framework Programme. The project objective was to promote the development of green freight logistics using all transport modes by identifying and evaluating green corridors in representative regions and main transport routes in Europe.

RESULTS

SuperGreen developed a benchmarking methodology based on Key Performance Indicators (KPIs) that reflect criteria to evaluate corridor performance. Based on detailed

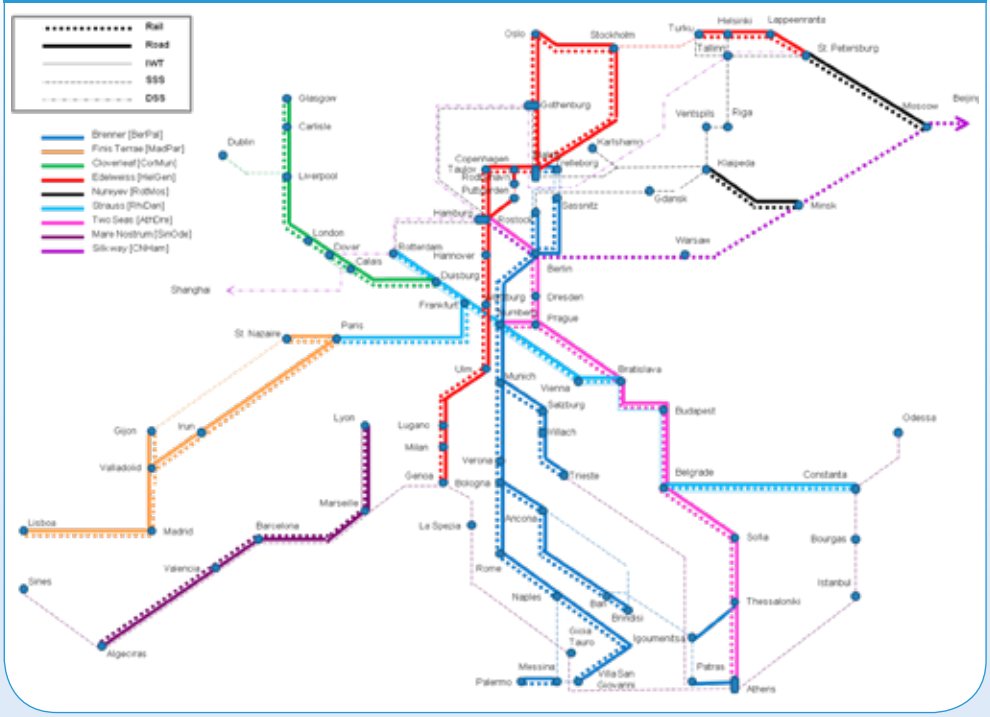
analysis and the outcome of stakeholder workshops, the potential KPIs were reduced to:

- transport cost
- transport time
- reliability
- frequency of service
- CO_2 emissions
- SO_x emissions.

The methodology was applied in benchmarking nine corridors selected on the basis of several of these criteria. This benchmarking methodology can form the basis for monitoring current performance of green corridors being implemented in Europe, and also corridors in the freight section of the TEN-T core network introduced in transport infrastructure policy (EC, 2014b).

To further improve the sustainability of freight transport, green technologies, such as smart ICT applications, were identified and benchmarked in the selected corridors. Policy recommendations were made for further development of the green corridor concept, and the Green Corridors Handbook was produced outlining fundamentals, best practices and governance aspects of green corridors.

Figure 2. **Nine green freight corridors in metro format in Europe**



SUCCESS STORY

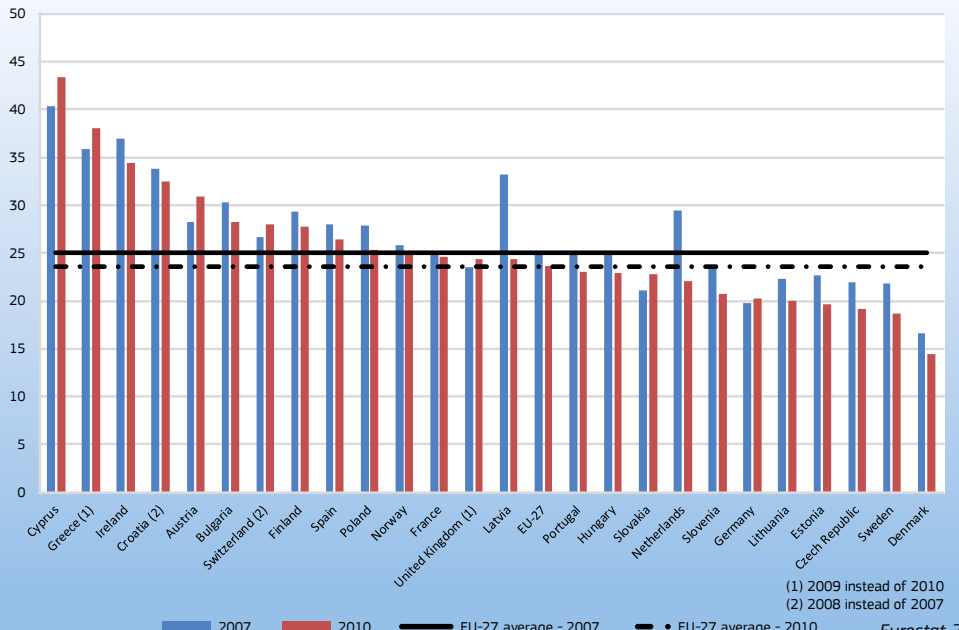
4 POLICY PRIORITY

Seamless flow and **exchange of information** in logistics

Application of information and communication technologies (ICT) in freight transport enables transport users to identify the services most suited to their purposes, and logistics operators to strategically manage freight shipments and deliveries. EU transport policy and research are targeted at the development and deployment of innovative ICT to contribute to more efficient and sustainable transport logistics in the European Union.

Increasing freight volumes and growing societal demands for sustainability challenge the logistics sector to improve operational efficiency. Currently, approximately 24% of heavy goods vehicles in Europe run empty (Eurostat, 2011). There is considerable potential to improve efficiency in

Figure 3. **European road freight transport: Share of empty vehicle-kilometres in the total vehicle-kilometres (% on vkm)**



Eurostat 2011

road haulage and in all other modes of freight transport.

Furthermore, traditional measures to respond to growing congestion, such as expanding transport networks, will only be feasible to a limited extent and innovative approaches to improve efficiency in the logistics sector are being explored (EC, 2008b).

Existing infrastructure and vehicles can be used more efficiently with the application of advanced information and communication technologies. EU transport policy and research are stimulating the integration of telecommunications, electronics and information technologies into transport and logistics activities (EC, 2008b). ICT applications are being developed for use in all transport modes and to interconnect all modes in logistics processes.

"Production and distribution of goods rely on efficient and cost-effective multi-modal logistic chains [...]. ITS tools constitute a core enabler for the management of such logistic chains."

EC, 2008b

ITS ACTION PLAN AND ITS DIRECTIVE

In 2008, the European Commission set up the ITS Action Plan to accelerate and coordinate deployment of Intelligent Transport Systems in road transport with interfaces with other transport modes. The objectives of the Action Plan are to:

- increase system interoperability to ensure seamless access
- foster continuity of services
- set up an efficient co-operation mechanism between all ITS stakeholders.

The legal framework for the Action Plan was adopted in 2010 (ITS Directive 2010/40/EU) with the following priority actions:

- optimal use of road, traffic and travel data
- continuity of traffic and freight management ITS services
- ITS road safety and security applications
- linking vehicle and transport infrastructure.

EC, 2008b; EU, 2010

e-Freight

To take full advantage of ICT applications in the logistics sector, innovative solutions in information management and exchange are required. A number of obstacles need to be overcome in order to achieve widespread and seamless use of ICT in freight logistics. Key challenges are standardisation of information exchange, legal and security requirements, and the ability of market actors to use these systems (EC, 2007a).

Information exchange is vital to collaborative, flexible and dynamic logistics. The goal is to establish paperless documentation with electronic flow of information linked to the physical flow of goods. The vision includes the ability to track and trace freight across transport modes and to automate the exchange of freight data (EC, 2007a; 2008b; 2011a).

The e-Freight concept supports the development of an overall framework for information exchange between actors in the logistics chain and includes standards, administrative, governance and legal matters. Related

developments are expected to facilitate Intelligent Cargo, making goods context and location-aware, and connected to a wide range of logistics services that can improve the efficiency and productivity of freight logistics (EC, 2007a).

Currently, the e-Freight policy initiative announced in the Transport White Paper (EC, 2011a) is being developed to simplify information exchange in the freight logistics chain. Directed to increasing efficiency, reducing costs, and building new market opportunities, applications include booking services, electronic documentation, cargo tracking, real-time traffic management, and reporting to the competent authorities. The e-Freight policy initiative goes beyond initiatives on information exchange in each transport mode, such as ITS for road, SafeSeaNet/Blue Belt for maritime, TAF TSI (Telematics Applications for Freight) for rail, SESAR (Single European Sky ATM Research Programme) for air, and RIS (River Information Services) for inland waterways (EC, 2013f).

Research on information exchange

EU-funded research is developing ICT tools and concepts for information and data exchange in the logistics sector. Research has led to a standard platform to support the design, development, deployment and maintenance of e-Freight solutions. EU-funded research also addresses interoperability of information systems, data sharing infrastructure, access rights, and business models. There are research initiatives to stimulate co-operation with EU and international standardisation organisations on joint standards for information exchange.

Research has focused on improving management of the global door-to-door intermodal container chain. ICT platforms have been developed for secure and interoperable data exchange by public authorities and logistics companies employing track and trace technologies. Technologies and solutions that enable monitoring of a container throughout the logistics chain have been tested in a real-life environment and have been demonstrated to enhance the reliability and predictability of global door-to-door container transport.

Research has also led to the development of an information platform for individual cargo items and their interaction with the infrastructure in the logistics chain. Various industry demonstrations have shown that the Intelligent Cargo concept contributes to faster, more efficient and environmentally friendly freight logistics.

A major research project has been carried out on the effectiveness of paperless information exchange in the logistics chain (see Success Story e-Freight).

SUCCESS STORY

e-Freight

European e-Freight Capabilities for Co-modal Transport

Project reference: FP7-233758
Status: Completed
Total cost: EUR 12 634 073
EU contribution: EUR 8 389 250
Coordinator: BMT GROUP
Website: http://www.efreightproject.eu

A standard framework for electronic data exchange has been developed which enables faster, seamless and paperless documentation closely linked to the physical movement of freight throughout the logistics chain. This framework is a key step in improving track and trace of goods in real time across transport modes and enhances planning, executing and completing intermodal transport operations.

BACKGROUND

The European Freight Logistics Action Plan (EC, 2007a) calls for co-modality and advanced information and communication technology in developing competitive freight transport and logistics. Contributing to the Action Plan goals, the e-Freight concept is paperless documentation linked to the physical flow of freight to further automate freight transport management. The e-Freight project brought together 30 partners from 14 Member States and Norway to develop, validate and demonstrate a standard framework for electronic information exchange covering all transport modes.

RESULTS

The project has provided an e-Freight platform to support the design, development, deployment and maintenance of e-Freight solutions. This platform will enable all parties in the logistics chain to communicate securely and reliably using electronic messages without the need for a centralised platform. It will enable logistics companies to trace goods in real time across

different transport modes, and to plan and execute intermodal logistics operations.

To operate the e-Freight platform, standards for data sharing have been developed and validated in business cases and pilots involving representatives of all stakeholders in surface transport including large and small logistics companies and transport authorities.

The project outputs have been widely disseminated and used in improving data exchange standards for freight logistics. Several of these standards have been approved as part of the revised Universal Business Language (UBL) standard for electronic business documents for various commercial domains. This is an essential step towards efficient global logistics chains.

SUCCESS STORY

5 POLICY PRIORITY

Urban logistics

Goods delivery accounts for a significant proportion of traffic in urban areas and contributes disproportionately to congestion, air pollution, and carbon emissions. EU policy and research are dedicated to developing efficient freight delivery concepts to reduce congestion and to lower emissions. Research focuses on the introduction of clean freight vehicles and innovative logistics concepts for urban areas.

Efficient logistics and delivery operations are vital to urban areas for the supply of goods to residents and commercial enterprises. Statistics indicate that urban freight volumes have been increasing faster than general economic activity, a trend that has further increased urban congestion and environmental impacts. Freight vehicles represent 8 to 15 % of total traffic flow in urban areas, but reduce road capacity and contribute disproportionately to congestion and noise emissions because of frequent parking for collections and deliveries (EC, 2012d).

Freight deliveries in urban areas require efficient interfaces between long distance trunk deliveries and short distance deliveries to final destinations. Solutions are required to improve load factors, while reducing CO_2 and noise emissions, and congestion and time loss.

> *"Achieve essentially CO_2-free city logistics in major urban centres by 2030."*
>
> *"Ten goals for a competitive and resource efficient transport system", Transport White Paper (EC, 2011a)*

Tackling the challenge of the last mile

An essential element in improving urban logistics is to limit deliveries to the shortest possible route. Often, the last mile is the most inefficient (EC,

CIVITAS: THEMATIC GROUP ON URBAN FREIGHT LOGISTICS

CIVITAS is a EU-funded programme to enable cities to learn from one another and to facilitate exchange of ideas. The CIVITAS Forum Network brings together CIVITAS and other cities committed to introducing ambitious, clean urban transport strategies.

The CIVITAS thematic group on urban freight logistics connects practitioners and city representatives in implementing new and efficient systems for goods distribution. The thematic group is elaborating strategies and carrying out case studies on cleaner and better urban freight logistics. Key focus areas are:

- urban delivery centres
- cleaner motorised vehicles and cargo bicycles
- partnerships of the operators.

http://www.civitas.eu/content/urban-freight-logistics-1

2011a). Distribution inefficiencies in urban areas stem from low load factors and running empty, long dwell times at loading and unloading points, as well as high numbers of deliveries to individual premises within a time period (EC, 2012d).

EU-funded research has developed new approaches to urban freight logistics that contribute to strategies to safeguard the 'liveability' of cities. These approaches include improving vehicle load capacity, raising the efficiency of transhipment operations, and integrating delivery operations in city traffic management.

These solutions have been validated in business cases and pilot studies with stakeholders including large and small companies, city authorities and transport authorities. The EU is providing implementation support through research projects and the CIVITAS initiative, which tests and evaluates measures to stimulate efficiency in urban transport logistics (see text box).

Innovations in city logistics

In addition to new freight delivery concepts, technical advances in city logistics are needed. The most promising alternatives for last mile deliveries are electric and hybrid freight vehicles to reduce noise, congestion, CO_2 emissions and to improve air quality in urban areas (EC, 2012d). These new vehicle concepts open the potential for logistics and delivery options, such as night deliveries to reduce urban road congestion. Innovative vehicle solutions have been tested. Currently, EU-funded research is evaluating the technical and logistics feasibility of large-scale introduction of electric and hybrid freight vehicles in cities. Critical success factors for market uptake of sustainable vehicle technologies and other innovations in the urban logistics are now being investigated.

ICT tools have been developed to improve the efficiency of door-to-door deliveries in cities using demand and supply side information systems. These systems enable operators to monitor the operational status of vehicles, and to plan delivery routes and schedules (EC, 2012d). Improved vehicle routing and scheduling systems have been shown to achieve savings in journey times of 10 to 15 %, and to estimate more accurately delivery times to customers (BESTUFS II, 2008).

A key research focus is integrating urban traffic and freight management systems with on-board systems in freight vehicles. By specifying, implementing and evaluating ICT solutions for urban freight management, research has contributed to providing accurate transport network information to improve last mile route planning for logistics companies.

SUCCESS STORY

BESTUFS II

Best Urban Freight Solutions II

Project reference: FP6-506384
Status: completed
Total cost: EUR 2 817 992
EU contribution: EUR 2 499 632
Coordinator: PTV Group
Website: http://www.bestufs.net/bestufs2.html

The city network participating in innovative transport solutions was extended under BESTUFS II to include small and medium size urban areas. To support urban areas of all sizes in implementing smart solutions in freight logistics, best practices, practical tools and case studies were developed and published in 17 languages to give access to all stakeholders in urban logistics chains.

BACKGROUND

Large cities tend to have the resources to access support for innovative transport solutions, to participate in city networks and to exchange experience with other cities. BESTUFS II, which is the follow up to BESTUFS under the Fifth Framework Programme (FP5), extended the city network to include medium and small urban areas and especially in the newer Member States. BESTUFS II disseminated as widely as possible practices in urban freight logistics developed in Europe and beyond.

RESULTS

BESTUFS II expanded and strengthened the network of urban freight stakeholders to address opportunities and barriers to effective and efficient freight logistics in urban areas, and analysed the strengths and weaknesses of possible urban logistics solutions.

A series of tangible deliveries was produced to support urban areas of all sizes in developing and implementing innovative city logistics solutions:

- A consolidated handbook, BESTUFS Good Practice Guide on Urban Freight Transport, containing information, guiding values, knowledge and best practices was published in 17 languages for all stakeholders in urban freight transport.
- Best practices handbooks were prepared with examples drawn from all over Europe on topics, such as e-commerce and urban freight distribution, road pricing and urban freight transport, urban freight platforms, and public-private partnerships in urban freight transport.
- Based on case studies of practitioners and stakeholder workshops, policy and research recommendations were prepared on aspects, such as urban consolidation centres, last mile solutions, urban freight in small and medium-sized cities, and urban freight transport management.
- The project also contributed to the development of urban commercial transport models. To this end, a platform for exchange between experts and practitioners was set up to facilitate harmonised data collection and quantitative analysis of the effects of transport policy measures on the urban transport system.

SUCCESS STORY

6 WHAT'S NEXT?

Policy and research outlook

In the coming decade, various trends will drive innovation in freight logistics. Changes from outside the sector are driven by the natural environment (energy transition), technology push (ICT) and customers of logistics services (mass customisation). Many of these are well known and are targeted in R&D, investment, innovation and policies. However, some are relatively recent and deserve a new focus by researchers, industry leaders and policy makers. While in the past, transport could be viewed separately from manufacturing and distribution, this is no longer the case. Developments, such as nearshore production, 3D printing, e-commerce and logistics cooperation between companies and supply chains, have profound effects on transport demand, and thus require a rethink of future scenarios.

Greening supply chains needs to go beyond efficiency improvement to achieve long-term reduction in greenhouse gas emissions. Rapid deployment of radical solutions for sustainable transport is required, such as innovative propulsion technologies and measures to influence customer behaviour through information and pricing.

Use of logistics data and ICT solutions will accelerate, including applications for dynamic transport management, freight movement information, cargo and capacity management, synchro-modality and security related applications. Simultaneously, differences in capabilities between large companies and SMEs, and harmonisation of ICT standards need to be addressed in policy and research.

The new TEN-T Guidelines and the Connecting Europe Facility support implementation of an EU freight network that connects TEN-T corridors for different transport modes at strategic hubs. Locations of nodes and freight facilities need to be closely aligned with investment in passenger transport. In addition, landside gateways to Eastern Europe, China and the Middle East will need to be developed.

Each of these developments has interrelated challenges. Common to all is the increasing pressure for the deployment of innovative solutions throughout the European Union. The European Technology Platforms that support the EU agenda for research and development in logistics (ALICE, ERTRAC, ERRAC, Waterborne and Manufuture) are working together to develop consistent roadmaps across transport modes and industry sectors.

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Glossary

ALICE	Alliance for Logistics Innovation through Collaboration in Europe
DG CNECT	Directorate-General for Communications Networks, Content and Technology
DG MOVE	Directorate-General for Mobility and Transport
DG RTD	Directorate-General for Research and Innovation
EC	European Commission
ERRAC	European Rail Research Advisory Council
ERTRAC	European Road Transport Research Advisory Council
ETP	European Technology Platform
ICT	Information and Communication Technologies
ITS	Intelligent Transport Systems
SME	Small and medium-sized enterprises
TEN-T	Trans-European transport networks
TRIP	Transport Research and Innovation Portal

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Smart and sustainable logistics are essential for the rapid, efficient movement of ever increasing freight volumes in the EU internal market and for competiveness in global markets. The challenge is to develop and deploy advanced logistics concepts and solutions that enhance efficiency and competitiveness while simultaneously reducing congestion, noise hindrance and air pollution from freight traffic, particularly in urban areas.

EU policy and research on freight transport and logistics give priority to smart deployment of information and communication technology, and to eco-innovation in freight transport. This Policy Brochure setting out EU policy and research on logistics is a component of the Transport Research and Innovation Portal (TRIP) that provides access to the achievements and best practices of transport research carried out in the European Research Area.

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