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Thematic Research Summary

Water transport

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Transport

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Preface

This Thematic Research Summary (TRS) has been produced as part of the activities of the Transport Research and Innovation Portal (TRIP). The purpose of TRIP is to collect, structure, analyse and disseminate the results of EU-supported transport research and research financed nationally in the European Research Area (ERA), and by selected global research programmes. The main dissemination tool used by TRIP is the public web portal www.transport-research.info.

The Thematic Research Summaries provide a structured guide to the topics and results of research projects carried out mainly at EU level, either as part of a framework programme or as a study commissioned by the European Commission (EC). These summaries are intended for policy makers at European, national and local levels, stakeholders and researchers.

This Thematic Research Summary covers Water Transport which is one of the 24 themes in TRIP, and provides:

- an overview of research on water transport focusing on EU-funded projects;
- analysis and compilation of research findings and recommendations.

An overview of all Thematic Research Summaries is presented in Table 1.

Table 1: Transport themes used in TRIP

Domains	TRIP Themes
Sector	Passenger transport
	Freight transport
Mode	Air transport
	Rail transport
	Road transport
	Urban transport
	Water transport (sea and inland)
	Multimodal transport
Policy	Financing, pricing and taxation
	Regulation, competition and public services
	Infrastructure and TEN-T
	Land use and transport planning
	Climate policy and energy efficiency
	Security and safety
	International cooperation and EU Neighbourhood Policy
	Awareness, information and user rights
Technology	Intelligent transport systems
	Innovative technologies
	Transport management
Evaluation	Long-term perspectives
	Assessment and decision support methodologies
	Environmental impacts
	Economic and regional impacts
	Accessibility, social and equity impacts

Executive Summary

This Thematic Research Summary (TRS) on Water Transport provides an overview of research projects financed under the EU Sixth and Seventh Framework Programmes (FP6 and FP7), the TEN-T programme including Motorways of the Seas, and highlights some projects from other EU financed programmes, such as the Programme MED and Marco Polo. The research is directed to supporting decision making in improving water transport throughout the EU, contributing to making transport more efficient and competitive, safer, more user-friendly, and reducing the environmental impact.

Research projects are grouped in **four sub-themes** according their key focus as follows:

- Maritime transport
- Inland water transport
- Short Sea Shipping and Motorways of the Sea
- Ports and Port Operations.

Research on **Maritime transport** is focused on innovative techniques to cope with current and future EU rules regarding clean shipping. Main issue is emission reduction, reducing the sulphur content of marine fuel, and alternative fuels. Another research area is ship design, construction and maintenance. Other research projects deal with safety and security in maritime transport.

Research on **inland waterway transport** focuses on modernisation of vessels, waste management, creation of 'green corridors' and the effects of climate change. Other research topics include cooperation and information exchange between stakeholders via ICT systems, and studies on stimulating the use of inland waterway transport.

Research on **short sea shipping and 'Motorways of the Sea'** focuses on new concepts for vessels and loading units, and implementation and operation of intermodal links. In the field of environmental impact, research examines the potential of LNG as an alternative fuel for vessels. Research on ICT focuses on improving navigation systems, data exchange between ports and vessels, and improving logistic chains and the role of short sea shipping.

Research on **ports and port operations** focuses on the environmental impact of ports, energy management, and air quality in port areas. Research is also carried out on ICT systems to facilitate communication between stakeholders and to improve security in port areas.

Future challenges for maritime transport policy and research are to maintain the competitive position of the European maritime industry, and to maintain the achievements in reducing accident rates against the expected massive increase in waterborne transport and volumes transported. Research is also needed on reducing the environmental footprint of waterborne transport and operations. Furthermore, designers and operators should continue to research ways of limiting exposure to security threats. Research is essential in meeting the challenges of the growing demand for maritime transport, which includes the accelerated development of new ports, terminals and inland waterways, and capacity expansion of existing facilities. Planning tools also need to be developed to optimise logistic chains and hinterland connections. In the field of inland waterway transport, research to strengthen the competitiveness needs to focus on shipbuilding technologies, innovative vessel design, vessel refitting, technologies for power supply and propulsion, hydrodynamics, energy-efficient navigation, and safety. Following the results of previous research, efforts are needed to establish advanced RIS services and security standards. Research related to short sea shipping should focus on intermodality, placing port operation and maritime transport in the perspective of the total supply chain, and considering logistic issues, reliability, cost and total door-to-door time. Other issues are the marketing of short sea shipping services, environmental issues, and the policy framework. Specifically, research is needed to support implementation of modern information and telecommunications technologies and systems, and the potential of standardising port interfaces and enhancing hinterland connections. Research on innovative and efficient cargo handling systems and optimising turnaround times for large vessels is needed to strengthen the competitive position of European ports. Research also needs to focus on Port Information Technology (IT) to enable integration of ports and port operations into the 'smart supply chain'. Research on environmental sustainability needs to focus on facilitating achieving a balance between protection of natural habitat and species, social need and economic issues.

1. Introduction

This report updates the previous Thematic Research Summary (TRS) on Water Transport, which was produced in 2010 and covered 21 projects under FP5, FP6 and INTERREG III. This update covers FP6 research projects not included in the previous report, and FP7 projects, and other relevant projects under the European programmes for Territorial Cooperation MED, TEN-T, Motorways of the Seas, and the Adriatic CBC Programme 2007-2013.

The scope includes strengthening the competitive position of water transport, and the safety, security, and sustainability of this transport mode. It also includes research on sector management focusing on facilitating efficient operations, anticipating projected economic growth, and changing trade patterns.

The projects reviewed are grouped in four sub-themes:

- Maritime transport
- Inland Water Transport
- Short Sea Shipping and Motorways of the Sea
- Ports and Port Operations.

Maritime Transport

Maritime transport is a key contributing factor to the economic success and prosperity of the European Union and an important source of revenue and employment. Today, almost 90% of the EU external trade is seaborne, while each year more than 400 million passengers pass through European ports. Research ranges from the development and construction of clean, safe and quiet ships through the use of alternative fuels, new materials and new propulsion systems to innovative IT systems and traffic management, safe ship operations and security.

Inland Water Transport

The inland waterway network in the EU includes about 37.000 km inland waterways in 20 Member States, with 12 Member States directly interconnected through inland waterways. Around 140 billion ton-kilometres of transport work is performed annually on inland waterways. The inland waterway network has a huge spare capacity and is capable to alleviate the busiest parts of the EU road and rail network. Research is focused on improvement of technical and economic performance, improvement of cooperation through IT information exchange systems, environmental issues and safety.

Short Sea Shipping and Motorways of the Sea

Short Sea Shipping means the movement of cargo and passengers by sea between ports situated in geographical Europe or between those ports and ports situated in non European countries. Research is focused on the factors still hindering the further development of Short Sea Shipping, such as complex administrative procedures, better integration into the door-to-door transport logistics chain, including inland destinations, the required high level of efficiency in ports, and facilitated access thereto, and the development of hinterland transport links.

Ports and Port Operations

European ports handle 40% of the tonne-kilometres carried out in intra-Community trade. They are a key to cohesion in Europe, through the development of passenger and ferry services. Research is directed to improving capacity and accessibility, and to sustainable territorial development and environmental protection.

This Thematic Research Summary starts with an overview of the policy background to the four research sub-themes. Each sub-theme begins with a brief background and research overview, followed by an overview of the research projects.

All research projects included in this TRS are listed in the Annex.

2. Policy Background

Water Transport is an essential theme in EU transport policy because most trade with non-EU countries is seaborne, while short sea shipping and inland water transport carry a large volume of intra-Europe freight. Covering a wide spectrum of subsectors, this section presents the key EU guidelines on Water Transport as a framework for current and future research in this area.

Water transport is a key factor in the economic growth and prosperity of the European Union and an important source of revenue and employment. Today, almost 90% of the EU external trade is seaborne while short sea shipping represents 40% of intra-European freight in tonne-kilometres. Furthermore, each year more than 400 million passengers pass through European ports. Via inland waterways approximately 145 billion tonne-kilometres and 515 million tonnes of cargo is transported, which is 44% of the total transport in the catchment areas of Europe's major seaports. The sector is estimated to employ nearly 2 million people.

Despite the recent economic crisis, international trade is expected to continue to grow in the near future. To accommodate this growth, water transport has to remain competitive and deliver the promised advantages and efficiencies.

With the publication of the White Paper (EC, 2011a), the European Commission adopted a Roadmap to a Single European Transport Area: towards a competitive and resource efficient transport system, the Transport 2050 Strategy. The strategy is to develop the European Transport Area for the future by increasing mobility, reducing dependence on oil, limiting the effect of transport on climate change, and ensuring competitiveness of the transport sector.

The Transport 2050 Strategy (EC, 2011a) sets a target for water transport of reducing CO_2 emissions from maritime bunker fuels by 40% (50% if possible) by 2050. Additional targets have been set to improve the efficiency of transport and reduce congestion with implications for water transport:

- A shift of 30% road freight over distances of 300 km or more to other transport modes, such as rail and water transport, by 2030 and by more than 50% by 2050;
- Adequate connection of all key seaports to rail freight transport and where possible to inland waterway systems by 2050;

- Establishment of a framework for a European multimodal transport information, management and payment system by 2020;
- Implementation of a management system for water transport by 2020;
- Europe becomes the leader in transport safety and security.

As underlined in the White Paper (EC, 2011a; 2011b), innovation is essential for implementation of the Transport 2050 Strategy. In the last few decades, the European Commission has consistently supported innovation by providing funds for research. Between 1994 when the fourth Framework Programme (FP4) was published to the initiation of the European Research Area in 2000 and the current Seventh Framework Programme (FP7), the Commission has supported large research programmes that have substantially contributed to improving the performance of transport in Europe.

The key transport research priorities in the current FP7 that address the objectives of the Transport 2050 Strategy for waterborne transport are classified in the following broad categories:

Greening surface transport

Research concentrates on vessels and infrastructure, and their interactions with special emphasis on system optimisation, minimising energy consumption, and reducing greenhouse gas emissions, noise hindrance, and shifting to renewable energy sources.

Encouraging and increasing modal shift and decongesting transport corridors

Research addresses interoperability and optimising operation of local, regional, national, and European transport networks, systems and services, and modal integration. Activities aim at European wide-strategies for optimising use of infrastructure including terminals and specialised networks; improving transport, traffic and information management; enhancing freight logistics, passenger intermodality; and modal shift strategies to stimulate energy-efficient transport.

Improving safety and security

Research has developed technologies and intelligent systems directed to protecting vulnerable transport users including passengers and crew. Advanced engineering systems and risk analysis methods have been developed for the design and operation of vessels and infrastructure. Emphasis is placed on integrative approaches that link human elements, structural integrity, preventive, passive, and active safety including monitoring systems, rescue, and crisis management.

Strengthening competitiveness

Research contributes to improving the competitiveness of the transport industry, to ensuring sustainable, efficient, and affordable transport services, and to creating new skills and job opportunities. Technologies for advanced industrial processes include design, manufacturing, assembly, construction and maintenance, and aim to reduce life cycle costs and reduce lead-times. An essential element of this strategy is strengthening the competitiveness of the manufacturing sector by improving ship design, construction processes, and engine efficiency.

3. Sub-Theme: Maritime Transport

Research on maritime transport focuses on vessel efficiency by improving design, increasing security, and decreasing energy consumption. The overall focus is to maintain the leading position of maritime transport in Europe and the sector's competitive position worldwide.

Background

Maritime transport is essential in trade between European countries and between continents, contributing to security of supply of energy, food, and commodities and is a main vehicle for trade with the rest of the world. The Transport 2050 Strategy is directed to reducing emissions from maritime transport, establishing efficient and reliable connections between key seaports and other transport modes, and to the creation of a 'Blue Belt' area without barriers.

Research

Research ranges from the development and construction of clean, safe and quiet ships through the use of alternative fuels, new materials and new propulsion systems to innovative IT systems and traffic management and safe ship operations and security. The research projects are presented in clusters as follows.

The cluster **Clean Shipping Rules** concerns research on the environmental impact of maritime transport and EU policy on this subject. Research covers the sulphur content of marine fuel, environmentally sound recycling of vessels and waste disposal, and reduction of greenhouse gas emissions. Other research on environmental impact focuses on optimising ship resistance and drag, propulsion systems and on-board energy use, alternative fuels, after treatment of exhaust gasses, green ship operations, and noise reduction. Research on emergency intervention explores innovative methods for spill collection.

Ship design, construction and maintenance concerns innovative ship concepts, new design tools, the use of new materials, reduction in life cycle costs, and more efficient inspection methods.

Design for safety, safe shipping operations and security explores ways of improving the safety of ships sailing in extreme weather conditions and in arctic areas. Other topics include navigation systems, fireproof design, evacuation, and flooding.

Miscellaneous covers a range of research projects that do not fit into the categories above.

Clean Shipping Rules

ARGOMARINE (Automatic oil-spill recognition and geo-positioning integrated in a marine monitoring network, FP7, 2009-2012) developed and tested a Marine Information System (MIS). This integrated system monitors marine traffic and pollution events caused by carriers/commercial vessels and recreational boats in environmental sensitive sea areas.

AQUO (Achieve QUieter Oceans by shipping noise footprint reduction, FP7, 2012-2015) is preparing a benchmark for noise reduction measures.

CASMARE (Coordination Action to maintain and further develop a Sustainable MAritime Research in Europe, FP7, 2009-2012) raised awareness of the water transport research strategy and broadened stakeholder consensus, with a special emphasis on engagement with national programmes and industry activities.

DEECON (Innovative After-Treatment System for Marine Diesel Engine Emission Control, FP7, 2011-2014) is developing a novel, modular, on-board, after-treatment unit which combines sub-units, each optimised to remove a specific primary pollutant (SO_x, NO_x, PM including BC, VOC, and CO). The unit uses a new concept of Electrostatic Seawater Scrubbing to capture submicron PM, SO_2 and other water-soluble compounds; and an innovative Non Thermal Plasma Reactor, using Electron Beam and Microwave, to remove NO_x, VOC and CO.

EMAR²RES (Support Action to initiate cooperation between the Communities of European MARine and MARitime REsearch and Science, FP7, 2009-2012) supported interaction between marine scientists and maritime transport research communities in the creation of the marine component of the European Research Area (ERA).

EMAR (e-Maritime Strategic Framework and Simulation based Validation, FP7, 2012-2014) is facilitating extensive participation of the European maritime public, business and research community in a knowledge development process leading to the specification of the e-Maritime Strategic Framework.

GHG-TransPoRD (Reducing greenhouse-gas emissions of transport beyond 2020: linking R&D, transport policies and reduction targets, FP7, 2009-2011) showed that improving the energy efficiency of conventional diesel engines for commercial marine propulsion and using gas turbines (running on LPG) are promising options for significant long-term reduction of CO_2 and air pollutant emissions. A 50% reduction in energy intensity would be feasible by 2050.

GRIP (Green Retrofitting through Improved Propulsion, FP7, 2011-2014) is studying promising energy-saving devices (ESD) for ship owners. The aim is to achieve an average reduction in fuel consumption of 5% and up to 10% on individual ships. This will reduce exhaust gas emissions. Furthermore, these reductions will contribute to making shipyards in Europe competitive in retrofitting vessels.

HELIOS (The Development of a New Ship Engine Generation, FP7, 2010-2013) is developing a new generation of electronically controlled two-stroke low speed marine diesel engines that operate on high-pressure Compressed Natural Gas (CNG) or Liquefied natural Gas (LNG). This new technology will reduce emission footprint compared to present diesel engine technologies.

HERCULES-B (Higher-efficiency Engine with Ultra-Low Emissions for Ships, FP7, 2008-2011) developed technologies and tools that contribute to reducing fuel consumption and thus CO_2 and other emissions from marine engines. These technologies and tools include next generation engine components, fuel injection systems, multi-stage charging arrangements, variable geometry charging arrangements, exhaust gas recirculation, selective catalytic reductions, scrubbers, and friction components.

HERCULES-C (Higher Efficiency, Reduced Emissions, Increased Reliability and Lifetime, Engines for Ships, FP7, 2012-2014) is directed to achieving further substantial reductions in fuel consumption, while optimising power production and usage, through advanced engine developments in combustion and fuel injection, as well as through the optimisation of ship energy management and engine technologies supporting transport mission management. The focus is to achieve near-zero emissions by integrating technologies developed in the previous HERCULES projects.

HOVERSPILL (Multi-environment air cushion oil spill fast response & post emergency remediation system, FP7, 2009-2013) is developing an innovative procedure and system for oil spill emergencies, quick to react and with effective remediation. New operational procedures and protocols are to be defined to match the new technological approach and the characteristics of hovercraft.

HYMAR (High efficiency hybrid drive trains for small and medium sized marine craft, FP7, 2009-2012) developed marine hybrid systems for small vessels to reduce their environmental impact by reducing fuel consumption, noise, and vibration.

INOMANS²HIP (INOvative Energy MANagement System for Cargo SHIP, FP7, 2011-2014) is developing an innovative energy management system using real-time data based on a preferred DC network and integrating all potential sources of energy. This proposed system will be able to anticipate and optimise a ship's energy requirements taking into consideration the operational risks and favour less polluting and cost-efficient sources of energy.

KITVES (Airfoil-based Solution for Vessel On-board Energy Production Destined to Traction and Auxiliary Services, FP7, 2008-2012) developed the KITVES system, an onboard wind powered generator, capable of transforming high altitude wind into electrical power for onboard services and motors.

POSE²IDON (Power Optimised Ship for Environment with Electric Innovative Designs on Board, FP7, 2009-2012) developed new technologies in all aspects of marine electrical engineering in order to reduce the size of generating equipment and propulsion motors. This size reduction contributes to the adoption of the electric ship concept in smaller merchant ships.

REFRESH (Green Retrofitting of Existing Ships, FP7, 2012-2015) is developing dynamic energy modelling routines (production, consumption and losses over time) for a decision support tool. This tool will enable onboard and onshore personnel to monitor the ship performance and adopt appropriate practices as a function of its operational profile.

SILENV (Ships oriented Innovative soLutions to rEduce Noise & Vibrations, FP7, 2009-2012) developed a proposal for an 'acoustic green label' that includes recommended target levels for noise and vibration emission and associated design guidelines. All effects of noise and vibrations were considered and a wide range of ships were included in the study.

STREAMLINE (Strategic Research For Innovative Marine Propulsion Concepts, FP7, 2010-2014) is developing radically new propulsion concepts with the potential to increase efficiency by at least 15%. In addition, current propulsion concepts are being optimised, where gains can be achieved in a short time period on many ships and have a major impact.

SUSY (Surfacing system for ship recovery, FP7, 2009-2012) developed technologies, systems and procedures for preventive and emergency accident interventions on vessels. Instead of cleaning up after a disaster, the SUSY system prevents spillages by stabilising a vessel immediately after an incident.

TARGETS (Targeted Advanced Research for Global Efficiency of Transportation Shipping, FP7, 2010-2013) is developing a simulation system for global energy consumption to be applied during new vessel design as well as during operation. The project will provide designs, tools, and operational guidelines for energy efficient operation of cargo ships.

TEFLES (Technologies and Scenarios For Low Emissions Shipping, FP7, 2011-2014) is developing technologies and operation strategies for reducing emissions from roll-on/roll-off ferries (RoRos) and ferries under all operating conditions.

TRIPOD (TRIple Energy Saving by Use of CRP, CLT and PODed Propulsion, FP7, 2010-2013) is developing and validating a new propulsion concept for improved energy efficiency. Ship propulsion efficiency is being optimised through the advanced combination of three existing propulsion technologies: PoDed propulsion and tip loaded end plate propellers in combination with energy recovery based on the counter-rotating propeller (CRP) principle.

SONIC (Suppression Of underwater Noise Induced by Cavitation, FP7, 2012-2015) is developing tools to investigate and mitigate the effects of underwater noise generated by shipping, both in terms of the footprint of an individual ship (a noise footprint) and of the spatial distribution of sound from a large number of ships contribution to the sound (a noise map).

BaWaPla (Sustainable Ballast Water Management Plant, FP6, 2006-2009) developed a new hybrid ballast water (BW) treatment technology (UV, filters and electrolysis) into a self-controlled BW treatment system. The BaWaPla system was scaled-up to a full/large-scale plant and intensive land-based tests were carried out at different locations.

CLEANENGINE (Advanced Technologies for Highly Efficient Clean Engines Working with Alternative Fuels and Lubes, FP6, 2007-2009) evaluated the impacts on modern engines of liquid biofuels derived from biomass (such as biodiesel and bio-ethanol) and environmentally friendly and ash-free lubes and/or lubrication concepts. Based on available data and using two evaluation methods, it was concluded that the main environmental benefit of the proposed system is a reduction in the use of fossil fuel resources.

DIFIS (Double Inverted Funnel for Intervention on Ship Wrecks design for emergency interventions, FP6, 2005-2010) studied, designed (including costing, planning, and deployment procedures) and validated an EU reference method for prompt and cost-effective intervention and remediation of tanker wrecks, dealing with leaks and recovery of fuel trapped in tanks even at considerable depths.

FLAGSHIP (European Framework for Safe, Efficient and Environmentally Friendly Ship Operations, FP6, 2007-2011) developed a tool to enable onboard and onshore personnel to monitor energy production and consumption. The Energy Efficiency Monitoring Tool shows the current consumption and efficiency of operation on board, giving the crew a tool to develop awareness for energy efficient operation through direct feedback on their actions.

FOUL-X-SPEL (Environmentally Friendly Antifouling Technology to Optimise the Energy Efficiency of Ships, FP7, 2011-2014) is developing environmental friendly surface protection that will minimise surface roughness and thus improve hydrodynamic properties of hulls.

SHIPDISMANTL (Cost-Effective and Environmentally Sound Dismantling of Obsolete Vessels, FP6, 2005-2009) proposed a model to prepare an inventory of hazardous materials and their location on board together with other material properties that are significant potential risks to the crew's health and to the environment. The model indicates aspects of materials that are difficult to identify immediately but need to be known prior to dismantling a vessel.

ULYSSES (The Future Propulsion as ONE System, FP6, 2006-2013) is constructing a platform for information exchange and strategic planning of EC-funded research projects on new propulsion technologies/concepts based on IC engines running on an ameliorated fuel, including alternative and renewable fuels.

Ship design, construction, and maintenance

The following research projects have been directed to improving ship design, construction and maintenance.

ADAM4EVE (Adaptive and smart materials and structures for more efficient vessels, FP7, 2013-2015) is focusing on developing and assessing applications for adaptive materials and structures in the shipbuilding industry.

BESST (Breakthrough in European Ship and Shipbuilding Technologies, FP7, 2009-2013) is designing ships with the objective of increasing the competitiveness of shipbuilding in Europe by decreasing life cycle cost, drastically reducing environmental impact, and improving safety.

CO-PATCH (Composite patch repair for marine and civil engineering infrastructure applications, FP7, 2010–2012) developed composite patch repair technology for large steel structures with defects, namely marine structures and steel civil engineering structures. The proposed technology is expected to reduce maintenance costs of many large steel structures, and to extend their design life.

CORFAT (Cost effective corrosion and fatigue monitoring for transport products, FP7, 2008-2012) developed a final prototype of monitoring equipment for transport products, which consists of sensors, an acquisition and evaluation unit as well as evaluation software and accessories for sensor mounting and cabling.

DIVEST (Dismantling of vessels with enhanced safety and technology, FP7, 2008-2011) developed a database with a decision support tool to provide holistic understanding of ship dismantling.

ECO-REFITEC (Eco innovative refitting technologies and processes for shipbuilding industry promoted by European Repair Shipyards, FP7, 2011-2013) is improving the competitiveness of European shipyards and SMEs involved in shipbuilding, ship repair and recycling through technological developments and new tools to help shippers to benchmark their performance, to improve retrofit processes and products, and to assess environmental and life cycle cost impacts.

EU-CARGOXPRESS (Greening of surface transport through an innovative and competitive CARGO-VESSEL Concept connecting marine and fluvial intermodal ports, FP7, 2009-2012) developed a sustainable and competitive cargo vessel for medium and small marine and fluvial ports. This new cargo vessel has been developed to contribute to greener transport in Europe by reducing congestion on roads and by reducing environmental pollution.

EXCITING (EXaCt geometry sImulaTIoN for optimised desiGn of vehicles and vessels, FP7, 2008-2012) delivered a new class of iso-geometric computational tools for vessel design, simulation and optimisation of vehicle and vessel components. Since an exact representation of the geometry is essential, even small variations (such as simplifications of the true shape) may have a significant impact.

FAROS (Human Factors in Risk-Based Ship Design Methodology, FP7, 2012-2015) is integrating the human element into the ship safety framework and delivering ship concepts (ro-pax and tanker) that are safe, economic and green. It is expected that the societal and personal risks on tanker and ro-pax ships can be reduced by at least 30%.

HILDA (High Integrity Low Distortion Assembly, FP7, 2012-2015) is delivering a cost effective, low distortion welding process to enable EU shipyards to maintain competitiveness and to produce light, strong, more fuel-efficient vessels.

LEAF (Low Emission Anti-Fouling coatings based on the novel discovered post settlement penetration triggered antifouling, FP7, 2012-2015) is developing a method to remove hard foul such as barnacles. This will improve drag resistance and consequently decrease fuel consumption and prevent corrosion of the protective layer of marine vessels and constructions.

MINOAS (Marine INspection rObotic Assistant System, FP7, 2009-2012) developed an innovative approach to improve ship inspection methodology, complementing personnel with cutting-edge robotic platforms able to carry out inspection tasks autonomously, and enabling operators to make 'virtually' inspections from a control room.

MOSAIC (Materials Onboard: Steel Advancements and Integrated Composites, FP7, 2012-2015) is developing two novel ideas concerning ship structures: the introduction of High Strength Low Alloyed Steels (HSLA) in specific structural details and the replacement of specific structural parts of the ship with composite materials, in order to reduce the risk of cracks developing in stress concentration areas.

RISPECT (Risk-based Expert System for Through Life Ship Structural Inspection and Maintenance and New-build Ship Structural Design, FP7, 2008-2012) developed and demonstrated an improved decision support method for the ship repair sector.

TULCS (Tools for Ultra Large Container Ships, FP7, 2009-2012) developed and validated design tools and guidelines for analysis of all hydro-structure interactions relevant to ultra large container ships.

Safety, safe shipping operations and security

AMASS (Autonomous maritime surveillance system, FP7, 2008-2011) developed a leading-edge system for early warning of illegal activities at sea. The system provides reliable 24/7 surveillance giving border agencies early, accurate warnings. Providing a 3600 view of the area above water level, the sensors significantly improve situational awareness for coast patrols. The platforms are fully functional in all weather conditions.

ARIADNA (Maritime assisted Volumetric Navigation System, FP7, 2009-2012) developed a new series of navigation support systems based on the Volumetric Navigation System (VNS) concept. This system facilitates optimisation of maritime and inland infrastructure; navigation in dense traffic in ports, rivers, channels, lock and port access areas; traffic separation schemes; risk control including grounding; and efficient and environmentally-friendly operations.

AZIPILOT (Intuitive Operation and Pilot Training when using Marine Azimuthing Control Devices, FP7, 2008-2011) improved the man-machine interface and the training of maritime pilots, specifically in operating ships equipped with azimuthing control devices.

A technical manual was published, as well as guidelines for a maritime training programme, data for an engineering lecture series and recommendations for specific regulations and criteria.

CYCLADES (Crew-centred Design and Operations of ships and ship systems, FP7, 2012-2015) is focusing on the impact of the human element on ship safety in all phases of the design and operational life cycle. Approaches, technologies, and innovative solutions are being identified to aid the design process, overcome implementation barriers, and improve operational procedures.

EXTREME SEAS (Design for ship safety in extreme seas (EXTREME SEAS, FP7, 2009-2012) has enabled the European shipping industry to improve the design of ship structures that are exposed to rough climate.

FIREPROOF (Probabilistic framework for onboard fire-safety, FP7, 2009-2012) contributed to fire engineering and to improving fire safety regulations. Recommendations were made to relax the current prescriptive regulation-based constraints on new designs and proposed new design degrees of freedom in order to develop cost-effective designs.

FLOODSTAND (Integrated flooding control and standard for stability and crises management, FP7, 2009-2012) increased the reliability of flooding simulation tools in design and onboard use by establishing modelling principles and uncertainty bounds. A flooding prediction tool was developed, for instance, classification of the severity of ship flooding.

GOALDS (GOAL Based Damage Stability, FP7, 2009-2012) improved the survivability formulation of large cruise ships and ROPAX ships in general.

HORIZON (Research into Effects on Cognitive Performance of Maritime Watch-Keepers under Different Watch Patterns, Workloads & Conditions, with Reality Usage of Ships Bridge, Engine & Cargo Control Simulators, FP7, 2009-2012) measured fatigue in realistic seagoing scenarios using bridge simulators, engine-room simulators and cargo simulators. The impact of fatigue on decision-making performance was also measured. Optimal settings for minimising those risks to both ship and seafarer were determined.

ICEWIN (Innovative Icebreaking Concepts for Winter Navigation, FP7, 2009-2012) identified ways to improve the service level of icebreaking assistance in order to prevent long waiting times for the ships and thus to improve the competitiveness of countries on the northern Baltic Sea.

MUNIN (Maritime Unmanned Navigation through Intelligence in Networks, FP7, 2012-2015) is developing a technology concept for an autonomous and unmanned ship, including the ICT architecture and the cooperative procedural specifications. MUNIN will provide efficiency, safety and sustainability advantages for existing vessels in short term, without necessitating the use of autonomous ships.

NAVTRONIC (Navigational system for efficient maritime transport, FP7, 2009-2012) developed a sail planning system that shows appropriate near real-time sea state and sea ice observations directly in an integrated bridge system (IBS). Because information is integrated in the bridge's route planning and manoeuvring tool, sea masters can directly access the sea state and the sea ice at all times when navigating the ship.

SAFEGUARD (Ship evacuation data and scenarios, FP7, 2009-2012) collected sea-based data on passenger response times and assembly times for calibration and validation of ship-based evacuation models. The data serve as the basis for improving evacuation analysis protocols.

SAFEWIN (Safety of winter navigation in dynamic ice, FP7, 2009-2013) is developing an efficient system for ice compression and ice dynamics forecasting, which will increase the safety of winter navigation in dynamic ice conditions. This system will be particularly effective for large oil tankers navigating in arctic seas.

SECTRONIC (Security system for maritime infrastructures, ports and coastal zones, FP7, 2008-2011) developed an integrated system for the ultimate security of maritime infrastructure, including ports, passenger transport and safeguarding energy supply from damage, destruction, or disruption by acts of terrorism, natural disasters, negligence, accidents or computer hacking, criminal activity and malicious behaviour.

OPERAMAR (An Interoperable Approach to European Union Maritime Security Management, FP7, 2008-2009) assessed the challenge of increasing seamless information exchange and sufficient interoperability of maritime security management systems, with a specific emphasis on technical constraints (legacy systems).

Miscellaneous

CSA OCEANS (CSA Healthy and Productive Seas and Oceans, FP7, 2012-2015) is providing dedicated support to JPI Oceans (Joint Programming Initiative for Healthy and Productive Seas and Oceans) and its governing bodies to reduce the time to the implementation phase.

EUROVIP (Virtual Integrated Partnering (VIP) for SME service, technology and information providers in the European maritime sector, FP7, 2011-2014) is co-ordinating small and medium maritime enterprises (SMEs), associations, larger companies and research institutions to exploit innovations by making them widely available and supporting their use throughout Europe. This is being pursued through service, technology and information transfer in operational and technical collaboration.

INTEGRITY (Intermodal global door-to-door container supply chain visibility (INTEGRITY, FP7, 2008-2011) developed a methodology and an IT system to create visibility in the supply chain. Enhanced security measures, shared data on vehicles, cargo and inspection results facilitate trade and pre-arrival customs clearance, thus improving the reliability and performance of transport chains.

KNOWME (The European Academic and Industry Network for Innovative Maritime Training, Education and R&D, FP7. 2011-2014) is developing a maritime industry knowledge network to enrich the quality of information on the sector's human resources, to improve opportunities for education and training, and to carry out research on image improvement.

MARTEC II (ERA-NET MARitime TEChologies II, FP7, 2011-2014) is developing a strong network to improve and broaden cooperation in maritime research, where flexible procedures are needed. Information will be exchanged with MARTEC and WATERBORNE-TP, other ERA-NETs (e.g., TRANSPORT II) and other initiatives, such as the SURSHIP network. Structures will be established for building and maintaining a sustainable network.

SKEMA (Sustainable Knowledge Platform for the European Maritime and Logistics Industry, FP7, 2008-2011) developed a platform containing a Knowledge Base of project studies and outputs from workshops and case studies, addressing key challenges for the European maritime transport and logistics industry.

VISIONS-OLYMPICS (The next generation products and procedures for vessels and floating structures, FP7, 2009-2012) followed the FP6 VISIONS project boosting innovative thinking through three contests in ships and offshore structures, linking university research to industry practice.

4. Sub-Theme: Inland Waterways

Research on inland waterways focuses mainly on the environmental impacts and cooperation to enhance the use of inland navigation especially in intermodal transport.

Background

Inland waterway transport is an obvious choice for energy-efficient, safe and environmentally sound movement of freight. The inland waterway network in the EU includes about 37,000 km waterways in 20 Member States, with 12 Member States directly interconnected through inland waterways. Transport performance of the sector is around 140 billion tonne-kilometres or around 500 million tonnes of cargo annually. Although this is only a modest percentage of the overall EU transport network and activity, it remains a formidable volume of freight transported over a network with a huge spare capacity capable to alleviate the busiest parts of road and rail networks in the EU.

Using the potential of inland waterway transport could contribute significantly to achieving the Transport 2050 Strategy. The White Paper includes a prominent role in moving goods to the hinterland and in linking the European seas, integrating into intermodal logistics chains. Preferably, inland waterways should be connected to all core seaports and barriers of any kind need to be removed. The creation of an EU register and EU flag for maritime and inland waterway transport is included as well as the examination of mandatory application of internalisation charges on all inland waterways on EU territory.

Research

Research and development are the drivers to enable and speed up innovation and modernisation in inland water transport. Research is focused on improvement of technical and economic performance, environmental issues and safety. Research projects are presented in three clusters.

Research projects on **Environmental Impact** include modernisation of vessels, waste management, creation of green corridors, and the effects of climate change.

Cooperation and information exchange concerns research directed to improving the performance of inland water transport through better cooperation between national authorities and through improved information exchange between authorities and shippers.

Miscellaneous includes the EU NAIADES Action Programme with measures to promote inland navigation, and the Platform for Implementation of NAIADES (PLATINA) with the Strategic Research Agenda (SRA) for Inland Waterway Transport.

Environmental impact

WANDA (Waste Management for Inland Navigation on the Danube, SEE Transnational Cooperation Programme, 2009-2012) implemented pilot actions for the management of ship waste in the Danube Region. Various workshops, meetings and international cooperation actions were conducted directed to protecting the Danube River from pollution and so preserving its ecosystem and water resources.

SUPERGREEN (Supporting EU's Freight Transport Logistics Action Plan on Green Corridors Issues, FP7, 2010-2013) is supporting the development of sustainable transport networks by meeting requirements on environmental, technical, economic, social and spatial planning. Methodologies are being developed for benchmarking Green Corridors and identifying potential areas for improvements.

ECCONET (Effects of climate change on the inland waterway networks, FP7, 2010-2012) gathered expertise in meteorology, hydrology, infrastructure operation, transport and economics to assess the effect of climate change on the transport network, taking the inland waterway network as a case-study. As a result, policy guidelines and a development plan for inland waterway transport were established. This provides targeted input for an infrastructure development plan for inland waterway transport in Europe which is to be prepared in the FP7 PLATINA project.

BB GREEN (Battery powered Boats, providing Greening, Resistance reduction, Electric, Efficient and Novelty, FP7, 2011-2014) is developing battery-powered boats that emit zero greenhouse gases and thus provide a climate friendly travel option for public services. This transport system could contribute to reducing traffic congestion and improving traffic flows in and around cities and densely populated areas with waterway access.

MOVE IT (Modernisation of Vessels for Inland waterway freight Transport, FP7, 2011-2014) is developing a set of options for modernising inland waterway vessels to meet the challenges of an aging fleet, climate change, and stricter environmental targets. Decision support will be provided for application of these options.

Cooperation and information exchange

NEWADA (Network of Danube Waterway Administrations, SEE programme, 2009-2012) increased the efficiency of the Danube River as a European transport corridor through intensifying cooperation between waterway administrations. The focus was on promoting inland navigation as a cost-effective and environmentally friendly transport mode, improving infrastructure, and developing means of communication.

NELI (Cooperation-Network for logistics and nautical education focusing on Inland Waterway Transport in the Danube corridor, SEE programme, 2009-2012) developed the Danube Knowledge Network, which connects all inland water transport education and training institutions identified in the participating countries.

RISING (River Information Services for Transport & Logistics, FP7, 2009-2012) identified, developed and demonstrated new River Information Services (RIS) to support inland waterway transport and logistics operations.

IRIS Europe I and II (Implementation of River Information Services in Europe, TEN-T, 2006-2014) are preparing a specification for cross-border RIS data exchange and are executing several pilots. The IRIS Europe III project started in 2012 and builds on the results of the previous projects.

Miscellaneous

PLATINA (Platform for the implementation of NAIADES, FP7, 2008-2012) supported the European Commission, Member States and other countries in implementing the NAIADES action plan. This plan is a Commission initiative to enhance the use of inland navigation in intermodal freight transport. Together with the European Commission, PLATINA identified policy actions, brought together stakeholders and developed knowledge and tools. In addition, the project established synergy at the European level through networking and knowledge exchange.

EWITA (European Web Platforms and Training Concepts for Intermodal Inland Waterway Transport, MARCO POLO, 2008-2010) developed up-to-date training concepts and e-learning web platforms for intermodal inland water transport in Europe to meet the demand for skilled workforces.

Analysis of the Impact of Current Economic and Financial Crisis on the EU Inland Waterways Transport Sector (European Commission – DG MOVE, 2009–2010) provided the European Commission with an up-to date overview of the impacts of the financial and economic crisis on the inland waterways transport. Furthermore, policy measures were evaluated, and conclusions and recommendations were made on suitable measures to improve or relieve problems currently facing the sector.

Medium and long-term perspectives IWT EU (European Commission - DG MOVE, 2011) presented an outlook for the medium and long term on the potential of inland waterway transport. A gap analyses identified areas for intervention by means of EU policy, and policy measures were identified and detailed.

5. Sub-Theme: Short Sea Shipping

Improving short sea shipping (SSS) entails various factors including design, energy use, infrastructure use and coordination. Research focuses on these aspects in order to provide a viable alternative to land transport and alleviate the land networks.

Background

Short sea shipping means the movement of cargo and passengers by sea between ports in Europe and between these ports and ports on the coastline of bordering Europe. Short sea shipping covers domestic and international maritime transport, including feeder services, along the coast, to and from the islands, rivers, and lakes. The concept of short sea shipping also extends to maritime transport between EU Member States and Norway and Iceland and other countries on the Baltic Sea, Black Sea and Mediterranean Sea. Short sea shipping is the modern alternative to road haulage in Europe.

The European Commission has policy to promote Short Sea Shipping because this form of transport is highly efficient in terms of environmental performance and energy efficiency. It has the potential to overcome road congestion, which is affecting many parts of Europe. Numerous studies indicate the necessity to stimulate short sea shipping in meeting the objectives of sustainable transport policy.

In addition to a strong promotion policy and supporting coordination centres for short sea shipping in all coastal EU Member States, in the White Paper the Commission states the following policies:

- Removal of barriers to short sea shipping;
- Creation of more and efficient entry points and logistics centres along the coast, with adequate hinterland connections to European markets, thus eliminating unnecessary traffic crossing Europe.

In addition, the Commission proposed in the Transport White Paper 2001, development of 'Motorways of the Sea' as a 'real competitive alternative to land transport'.

The 'Motorways of the Sea' concept aims to introduce new intermodal maritime-based logistics chains in Europe, which will be more sustainable and commercially more efficient than road-only transport. The European Union has recognised the Motorways of the Sea as the path forward in its new 2050 transport policy.

Research

The research presented includes FP6 and FP7 projects, relevant projects under the framework of the TEN-T programme, and the Programme MED. The TEN-T programme intends to re-create the road and rail network on the water by concentrating freight flows in viable, regular sea routes. Projects in this programme are directed to improving port facilities and infrastructure, as well as electronic logistics management systems, safety and security and administrative and customs procedures, and access routes for year-round navigability.

Research projects under **Design of ships and loading units** aim at innovative ship concepts and loading units that can be more easily transferred from and to short sea vessels.

Research projects under **Environmental Impact** are concerned with the use of LNG in short sea shipping, including infrastructure, exhaust gas cleaning technologies and the effects of using more electric power while vessels are berthed.

Research projects under **Information Technology & Corridors** explore ICT and range from navigation instruments to data exchange between parties involved in short sea shipping. Other research focuses on improving short seas shipping on key corridors by eliminating barriers and improving the logistics chain.

Miscellaneous presents research on topics that do not fit into the three categories listed above.

Design of ships and loading units

TELLIBOX (Intelligent megaswap boxes for advanced intermodal freight transport, FP7, 2008-2011) developed an all-purpose loading unit, the MegaSwapBox that can be used in intermodal transport of road, rail, inland – and short sea shipping. The MegaSwapBox combines the advantages of containers and semitrailers.

The MegaSwapBox can be stacked, is 3 metres in height and 45 metres long, has a loading capacity of 100 m³, can be opened on three sides, can be handled from the top, and is pilfer and theft-proof.

EU-CARGOXPRESS (Greening of surface transport through an innovative and competitive CARGO-VESSEL Concept connecting marine and fluvial intermodal ports, FP7, 2009-2012) developed a sustainable and competitive cargo vessel for medium and small marine and fluvial ports.

CREATE3S (Production to improve total efficiency of new generation Short Sea Shipping, FP6, 2006-2011) developed a new ship concept for carrying independent cargo modules, modules for different types of cargo, and a ship-shore interface with cargo loading/unloading systems. The CREATE3S dock ship/cargo barges (packages) reduces time in port by about 75%, handles cargo load efficiently without shore-based facilities for loading/unloading, and can be (after off-floating) directly linked with inland waterways transport without cargo handling from sea ship to inland ship.

Environmental shipping

COSTA (TEN-T, 2012–2014) is developing framework conditions for the use of liquefied natural gas (LNG) for ships in the Mediterranean, Atlantic Ocean, and Black Sea areas. This will result in a LNG Master Plan for short sea shipping between the Mediterranean Sea and North Atlantic Ocean, and for Deep Sea cruising in the North Atlantic Ocean towards the Azores and Madeira.

LNG in Baltic Sea Ports (TEN-T, 2012–2014) is harmonising an approach to bunker filling infrastructure for liquefied natural gas (LNG) in the Baltic Sea region. A more standardised process to planning and constructing LNG infrastructure will be achieved through the sharing of information by eight Baltic partner ports (Aarhus, Helsingborg, Helsinki, Malmö-Copenhagen, Tallinn, Turku, Riga, Stockholm) in five countries and their stakeholders.

Action LNG infrastructure of filling stations and deployment in ships (TEN-T, 2010–2013) is carrying out feasibility studies on filling station infrastructure for liquefied natural gas (LNG) and a full-scale pilot action.

Green Bridge on Nordic Corridor (TEN-T, 2011-2014) is reducing emissions from equipment in two Roll on-Roll off (RoRo) ships with exhaust gas cleaning technologies of scrubbers on two and a catalyst on one ship. Ferry berths in all three ports (Travemünde, Trelleborg, Rostock) involved will be adapted.

On-Shore Power Supply: an integrated North Sea network (TEN-T, 2012-2014) is establishing onshore power supply (OPS) at three DFDS freight ferry terminals for three freight ferries (RoRo vessels) that frequently call at the terminals. The power supply will enable vessels to be connected to onshore power for about 100 hours per week and thus significantly contribute to reducing emissions from auxiliary engines while vessels are berthed.

Information technology & Corridors

IBUK intermodal corridor, (TEN-T, 2011–2014) is establishing infrastructure, superstructure and Information Technology system for the MoS (Motorway of the Seas) route from Bilbao to Tilbury.

MonaLisa (TEN-T, 2010–2013) is contributing to efficient, safe and environmentally friendly maritime transport with the development, demonstration and dissemination of innovative e-navigational services.

ITS Adriatic multi-port gateway (TEN-T, 2010–2013) is creating a prototype for a common e-platform based on the web portal for data sharing of the Northern Adriatic Ports Association (NAPA)This system will be integrated with enhanced NAPA port community systems and with an Electronic Data Interchange (EDI) to enable the interconnection with port systems.

MIELE, (TEN-T, 2010–2013) is developing a pilot for an interoperable ICT platform (MIELE Middleware) to interface ICT systems (single windows, port community systems) in Italy, Portugal, Spain, Cyprus and Germany National Vertical Pilots).

MOS 24, (TEN-T, 2011–2013) will enhance the strategic role of the Priority Project 24 (Railway axis Lyon/Genova – Basel – Duisburg – Rotterdam/Antwerp) of the TEN-T network, as main gate to Europe for freight transported via the Mediterranean Motorways of the Sea (MedMos). The aim is to create a 'unique ICT multimodal Corridor between northern and southern Europe' by virtual connection of PP 24 and MedMoS.

MoS4MoS (Monitoring and Operation Services for Motorways of the Sea, TEN-T, 2011–2012) demonstrated with key stakeholders (ports and terminals, railways, rail freight stations, maritime carriers, short sea consolidation centres) ICT based solutions for improving short sea shipping, especially with regard to customs and compliance.

ADRIAMOS (Developing of Motorways of Sea system in Adriatic region, TEN-T, 2011–2014) is focusing on infrastructure and facilities investments (works and studies) to remove bottlenecks and to improve efficiency in the logistic chain on the Adriatic-Ionian corridor.

Adriatic gateway: the improvement of northern Adriatic ports and the building of a strategic corridor for multimodal transport project (TEN-T, 2011–2012) developed the cluster of North Adriatic ports (Ravenna, Trieste, Venezia, Koper, Ancona and Monfalcone) into a multiport gateway to provide an efficient system, competitive services and improved cargo interoperability, and thus to increase cargo flows.

Baltic Sea Hub and Spokes (TEN-T, 2010–2013) is facilitating an efficient and environmentally friendly intermodal transport for the Baltic Sea Region. It consists of four activities: Marine Integration Project (MIP), port access to Aarhus, port access to Gothenburg, and port security for Tallinn.

Miscellaneous

PROPS (Promotional platform for short sea shipping and intermodality, FP7, 2008-2011) promoted short sea shipping (SSS) through the development of a methodology to support intermodal stakeholders to achieve the quality of services required by end-users and to market these services throughout Europe.

TrainMoS (TEN-T, 2011–2013) is developing a MoS knowledge base at EU university level by testing an e-learning knowledge platform (in an ICT learning infrastructure) in EU-wide pilot actions in Spain, Portugal, Sweden, Germany, United Kingdom, Italy, and Greece.

TERCONMED (Container Terminals as a key element in the Mediterranean Short Sea shipping, Programme Med, 2009-2012) has increased the efficiency of short sea shipping (SSS) in the Mediterranean, identified the level of efficiency of marine container terminals in territories of participating project partners, reduced obstacles to customs clearance, and improved training for workers in this transport mode.

6. Sub-Theme: Ports and port operations

Port facilities are vital links in efficient operation of transport systems. For this reason, research focuses on improving the operability of ports by improving planning, Master Plans and policy studies, compatible systems and exchange of information.

Background

Ports and port operations play a key role in the transport sector in Europe and in the strategic plans of the Commission. On the coasts, more and efficient entry points into European markets are needed to eliminate unnecessary traffic crossing Europe. Seaports have a major role as logistics centres and require efficient hinterland connections. Their development is vital to handle increased freight volumes by short sea shipping within the EU and with the rest of the world. In the White paper, the Commission refers to the creation of a maritime 'Blue Belt' and improved port access.

Measures include integrating the monitoring tools used by relevant authorities, ensuring interoperability between ICT systems in the waterborne sectors, guaranteeing the monitoring of vessels and freight (Blue Belt), and supporting the establishment of appropriate port facilities ('Blue Lanes'). Furthermore, a framework for the granting of Pilot Exemption Certificates in EU ports should be established.

Initiatives also include review of restrictions on provision for port services; making port financing more transparent (in terms of public funding) to prevent distortion of competition.

Research

The research projects included are financed under FP6, FP7, MED and Adriatic (Cross-Border Cooperation) CBC Programme. Projects in these programmes are directed to improving capacity and accessibility, and to sustainable territorial development and focus on the environmental protection.

Environmental Impact contains three projects on the relationship between ports and port operations, and energy management, air quality in port areas, and general climate conditions.

Information Technology covers research on ICT systems in communication between stakeholders, and for security.

Miscellaneous includes several research projects that do not fit into the two clusters above.

Environmental Impact

GREEN EFFORT (Green and Effective Operations at Terminals and in Ports, FP7, 2012-2014) is contributing to greener energy management in ports and terminals, as crucial nodes in intermodal transport. Strategic planning instruments are being developed to support cargo terminal managers and port authorities to reduce the carbon footprint of seaports and inland harbours. The instruments will contain a Port and Terminal Knowledge Landscape (PTKL), methods for carbon footprint calculation in ports and terminals, a simulation model for terminal energy consumption and supply, and a Virtual Green EFFORTS Container Terminal.

APICE (Common Mediterranean strategy and local practical Actions for the mitigation of Port, Industries and Cities Emissions, Programme MED, 2010-2012) assessed the relative contribution to air quality of pollution sources in five harbour areas. This was done by identifying differences and similarities between harbour areas and developing future scenarios. The air pollution analysis and trend scenarios were included in the urban master plans, port development plans and environmental regional strategies in order to guide political actions.

CLIMEPORT (Mediterranean Ports' Contribution to Climate Change Mitigation, Programme MED, 2009-2012) developed and implemented solutions to improve the general climate conditions.

More specifically, the project developed methodology for the diagnosis of the port effect on climate change and actions plans for reducing the environmental impact of port activities.

Information Technology

EFFORTS (Effective operation in ports, FP6, 2006-2009) established a Portable Pilot Unit (PPU) system, which enables silent communication between tugs, the pilot on the vessel and vessel traffic service system (VTS). The efficient digital communication between the PPU and other parties enables integration of the system into a VTS. The project results opened the way to other application such as tug operations, or lock and port operations from ashore or for a wide scope of applications in the offshore industry.

APC (The Adriatic Port Community, Adriatic CBC Programme, 2011-2013) is developing an IT system prototype to improve information exchange between the participating ports of Venice (IT), Ploče (HR) and Igoumenitsa (GR). The system will streamline administrative procedures on the arrival and departure of ships especially in terms of time, manage incoming and outgoing goods flows in port areas, and improve management of parking in port areas.

MEDNET (Mediterranean Network for Custom Procedures and Simplification of Clearance in Ports, Programme MED, 2011-2013) is establishing a network of port authorities and transport experts in the Mediterranean area. In the long term, the network will enhance exchange of experience and simplify customs procedures and clearances for vessels and cargo.

Miscellaneous

THROUGHLIFE (Development and proof of new approaches for through-life asset management based on next generation of materials and production technology, FP7, 2011-2014) is developing approaches for through-life asset management, considering all life cycle phases in terms of cost efficiency, environmental performance and safety. Innovative joint services of the main actors in the life cycle will be highlighted, primarily new building yards, repair yards and ship operators.

PORTA (PORTs as a gateway for Access inner regions, Programme MED, 2010-2013) is defining and implementing common strategies and integrated transport and land use planning procedures to increase the role of ports as strategic components in maritime and logistics development and gateways to the inner regions.

CAPOEIRA (Co-ordination Action of Ports for Integration of Efficient Innovations and Development of Adequate Research, Development and Innovation Activities, FP6, 2006-2008) resulted in recommendations for maximising the opportunities for RDI in freight transport in ports.

Ports and their connections within TEN-T (European Commission – DG MOVE, 2010) addressed interaction of port related traffic in the TEN-T, and how this is likely to evolve with time.

7. Future Challenges for Research and Policy

By external expert Professor Dimitrios A. Tsamboulas

The future challenges for transport policy and research are discussed on the basis of:

- Technology platform: Strategic Research Agenda (WATERBORNE,2011)
- Inland Waterway Transport: the Strategic Research Agenda (PLATINA, 2011)
- Maritime Transport: the Technology Gap Analysis (MARPOS, 2011).

Maritime transport

Competitive European Maritime Industry

European companies are world leaders in the maritime industry and water transport operations. To maintain this leading position, research is needed on innovative vessels and floating structures, all-weather vessels, innovative marine equipment and systems (power generation, propulsion, cargo handling), tools for design and analysis, and efficient construction processes. In addition, innovations are needed in ship operations to increase energy efficient and vessel speed, and to reduce vessel time in port for loading/uploading. In addition, holistic strategies need to be developed to reduce life cycle costs that include the future cost of carbon.

Safe, secure, sustainable and efficient waterborne operations

The challenge for the marine sector is to maintain the achievements in reducing accident rates against the expected massive increase in waterborne transport and volumes transported. To meet this challenge, research is needed on the underlying frameworks of risk-based design, operation, and regulation. This incorporates a range of aspects including the usability of vessels, their equipment and the ship-port interface, advanced cargo handling and lashing equipment and maintenance, and the crash worthiness of vessels.

Another issue is related to all-weather ships that can sail safely in high winds (up to 8 on the Beaufort scale) and waves of several metres, and can navigate icy seas in winter. Research is also needed on reducing the environmental footprint of waterborne transport and operations.

Furthermore, security is becoming increasingly important and European society must be aware that security affects European interests worldwide, as well as in European ports, coastal and inland waterways. Designers and operators should continue to research ways of limiting exposure to security threats.

Manage & Facilitate Growth and Changing Trade Patterns

Research is essential in meeting the challenges of the growing demand for maritime transport which includes the accelerated development of new ports, terminals and inland waterways, and capacity expansion of existing facilities. Planning tools also need to be developed to optimise logistic chains and hinterland connections. There is a need for seamless interoperability between transport modes, effective ports with state-of-the-art equipment, automated operations, and other intelligent solutions resulting from the wider and sometimes mandatory application of IT systems.

Inland waterways

Research is needed to address the strategic objectives for inland waterway transport and includes strengthening competitiveness, increasing environmental sustainability, and managing growth and changing trade patterns.

Strengthening competitiveness

Research to strengthen the competitiveness of the inland waterways sector needs to focus on shipbuilding technologies, innovative vessel design, vessel refitting, technologies for power supply and propulsion, hydrodynamics, energy-efficient navigation, and safety. New technologies for fleet adaption to climate change and more efficient handling, maintenance and repair technologies could also contribute to the overall objective.

Environmental sustainability

Research on environmental sustainability needs to focus on ways to reduce emissions, new technologies for onboard power supply, energy efficient navigation, and hydrodynamics.

Matching growth and changing trade patterns

Research on economic growth and changing trade patterns needs to focus on intermodal solutions and new logistic approaches. Following the results of previous research, efforts are needed to establish advanced RIS services and security standards.

Short sea shipping and Motorways of the Sea

With the aim of achieving modal shift, the challenge is to stimulate short sea shipping by creating conditions that will stimulate shippers and logistic service providers to use these services. Thus, research related to short sea shipping should focus on intermodality, placing port operation and maritime transport in the perspective of the total supply chain, and considering logistic issues, reliability, cost and total door-to-door time. Other issues are the marketing of short sea shipping services, environmental issues, and the policy framework.

Specifically, research is needed to support implementation of modern information and telecommunications technologies and systems. Preferably, this should be done in combination with research on modernising administration procedures and on improving logistic organisation and operations. Smart decision-making tools could further facilitate the modal shift to short sea shipping.

Since ports are an integral part of short sea shipping and the concept of Motorways of the Sea, future research should examine the potential of standardising port interfaces and enhancing hinterland connections.

Ports and port operations

Strengthening competitiveness

The competitiveness of European ports needs to be strengthened with innovative and efficient cargo handling systems and optimising turnaround times for large vessels. The ports of tomorrow will have remote-controlled ship-to-shore cranes operating in parallel, and a fleet of Automated Guided Vehicles interoperating with the straddle carriers and/or automated stacking cranes and remote controlled/automated RMG. Automated road/rail trains are used for drayage to reduce transhipment times.

Research priorities are related to efficient co-operation and liabilities between actors, and logistic activities that are well developed and integrated into port operations. Ports need to able to handle various types of traffic, with high performance vertical handling equipment, and be able to handle new concepts of transport means (road, IWW) in an optimal way.

Research also needs to focus on Port Information Technology (IT) to enable integration of ports and port operations into the 'smart supply chain'. Sea ports IT are interconnected with inland ports (including the River Information Services), and sea ports are networked and exchange data on vessel locations, planned routes, cargo facilities and dates and times of movement, wastes, security and safety issues. This reduces the administrative burden to a minimum (single window) and information exchanges are paperless.

Environmental sustainability, safety and security

Research on environmental sustainability needs to focus on facilitating achieving a balance between protection of natural habitat and species, social need and economic issues. Ports need to manage sustainable integration of their operations in their environment (marine, coastal, fauna, flora, air, residents). Furthermore, research needs to focus on how ports should cope with climatic change, mainly rise of water levels.

Research is needed to make ports and port operations safer in a sense that there are less accidents and the impact of accidents is mitigated. Innovative strategies and procedures are needed to optimise security without impeding port operations and competitiveness. Systems need to continuously analyse threats and assess risks, while effective emergency and crisis management plans are ready.

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Glossary

BC	Black Carbon
CNG	Compressed Natural Gas
CO	Carbon Monoxide
CO_2	Carbon Dioxide
DG MOVE	Directorate General for Mobility and Transport
EC	European Commission
ERA	European Research Area
EU	European Union
ITU	Intermodal Transport Unit
FP6	Sixth Framework Programme
FP7	Seventh Framework Programme
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MIS	Marine Information System
ICT	Information and Communication Technologies
IT	Information Technology
ITS	Intelligent Transport Systems
NOx	Nitrogen Oxide
RIS	River Information System
RoRo	Roll-on Roll-off ship
PM	Particulate Matter
SME	Small and Medium Enterprise
SSS	Short Sea Shipping
TEN-T	Trans-European transport network

TRIP	Transport Research and Innovation Portal
TRKC	Transport Research Knowledge Centre
TRS	Transport Research Summary
VOC	Volatile Organic Compound

ANNEX: Projects by Sub-Theme

Sub-Theme: Maritime transport				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
AQUO	Achieve QUieter Oceans by shipping noise footprint reduction	FP7	http://en.dcnsgroup.com	2012-2015
ADAM4EVE	Adaptive and smart materials and structures for more efficient vessels	FP7	http://www.cmt-net.org	2013-2015
AMASS	Autonomous maritime surveillance system	FP7	http://www.amass-project.eu/amassproject	2008-2011
ARGOMARINE	Automatic oil-spill recognition and geo-positioning integrated in a marine monitoring network	FP7	http://www.argomarine.eu	2009-2012
ARIADNA	Maritime assisted volumetric navigation system	FP7	http://www.ariadna-fp7.eu	2009-2012
AZIPILOT	Intuitive Operation and Pilot Training when using Marine Azimuthing Control Devices	FP7	http://pilot.ncl.ac.uk	2008-2011
BESST	Breakthrough in European Ship and Shipbuilding Technologies	FP7	http://besst.it	2009-2013

BaWaPla	Sustainable Ballast Water Management Plant	FP6	http://www.bawapla.com	2006-2009
BESST	Breakthrough in European Ship and Shipbuilding Technologies	FP7	http://besst.it	2009-2013
CASMARE	Coordination Action to maintain and further develop a Sustainable MAritime Research in Europe	FP7	http://www.cesa.eu	2009-2012
CLEANENGINE	Advanced Technologies for Highly Efficient Clean Engines Working with Alternative Fuels and Lubes	FP6	www.crf.it	2007-2009
CO-PATCH	Composite patch repair for marine and civil engineering infrastructure applications	FP7	http://www.co-patch.com	2010-2012
CORFAT	Cost effective corrosion and fatigue monitoring for transport products	FP7	http://www.corfat.eu	2008-2012
CSA OCEANS	CSA Healthy and Productive Seas and Oceans	FP7	http://www.forskningsradet.no/prognett-jpi-oceans/Artikkel/CSA_Oceans/1253979959153?lang=en	2012-2015
CYCLADES	Crew-centered Design and Operations of ships and ship systems	FP7	http://www.cyclades-project.eu/CyClaDes/index.xhtml	2012-2015
DEECON	Innovative After-Treatment System for Marine Diesel Engine Emission Control	FP7	http://www.brunel.ac.uk	2011-2014
DIFIS	Double Inverted Funnel for Intervention on Ship Wrecks	FP6	http://www.difis.eu	2005-2010

DIVEST	Dismantling of vessels with enhanced safety and technology	FP7	http://www.divest-project.eu	2008-2012
ECO-REFITEC	Eco innovative refitting technologies and processes for shipbuilding industry promoted by European Repair Shipyards	FP7	http://www.eco-refitec.eu	2011-2013
EMAR	e-Maritime Strategic Framework and Simulation based Validation	FP7	http://www.emarproject.eu	2012-2014
EMAR2RES	Support Action to initiate cooperation between the Communities of European MARine and MARitime REsearch and Science	FP7	http://www.emar2res.eu	2009-2012
EU-CARGOXPRESS	Greening of surface transport through an innovative and competitive CARGO-VESSEL Concept connecting marine and fluvial intermodal ports	FP7	http://www.cargoxpress.eu	2009-2012
EUROVIP	Virtual Integrated Partnering (VIP) for SME service, technology and information providers in the European maritime sector	FP7	http://euro-vip.eu	2011-2014
EXCITING	EXaCt geometry sImulaTIoN for optimized desiGn of vehicles and vessels	FP7	http://www.exciting-project.eu	2008-2012
EXTREME SEAS	Design for ship safety in extreme seas	FP7	http://www.dnv.com	2009-2012
FAROS	Human Factors in Risk-Based Ship Design Methodology	FP7	http://faros-project.eu	2012-2015
FIREPROOF	Probabilistic framework for onboard fire-safety	FP7	http://www.fireproof-project.eu	2009-2012

FLAGSHIP	European Framework for Safe, Efficient and Environmentally Friendly Ship Operations	FP6	http://www.flagship.be	2007-2011
FLOODSTAND	Integrated flooding control and standard for stability and crises management	FP7	http://floodstand.aalto.fi	2009-2012
FOOL-X-SPEL	Environmentally Friendly Antifouling Technology to Optimise the Energy Efficiency of Ships	FP7	n/a	2011-2014
GHG-TransPoRD	Reducing greenhouse-gas emissions of transport beyond 2020: linking R&D, transport policies and reduction targets	FP7	http://www.ghg-transpord.eu/ghg-transpord/index.php	2009-2011
GOALDS	GOAL Based Damage Stability	FP7	http://goalds.org	2009-2012
GRIP	Green Retrofitting through Improved Propulsion	FP7	http://www.marin.nl/web/show	2011-2014
HELIOS	The Development of a New Ship Engine Generation	FP7	http://www.mandieselturbo.com/0001277/products/marine-engines-and-systems/low-speed/helios.html	2010-2013
HERCULES-B	Higher-efficiency Engine with Ultra-Low Emissions for Ships	FP7	http://www.hercules-b.com/1/article/english/1/2/index.htm	2008-2011
HERCULES-C	Higher Efficiency, Reduced Emissions, Increased Reliability and Lifetime, Engines for Ships	FP7	www.hercules-c.com	2012-2014

HILDA	High Integrity Low Distortion Assembly	FP7	n/a	2012-2015
HORIZON	Research into Effects on Cognitive Performance of Maritime Watch-Keepers under Different Watch Patterns, Workloads & Conditions, with Reality Usage of Ships Bridge, Engine & Cargo Control Simulators	FP7	http://www.warsashacademy.co.uk/mobile/about/our-schools/maritime-research-centre/horizon-project/horizon-project.aspx	2009-2012
HOVERSPILL	Multi-environment air cushion oil spill fast response & post emergency remediation system	FP7	http://hoverspill.eu	2009-2013
HYMAR	High efficiency hybrid drive trains for small and medium sized marine craft	FP7	http://hymar.org	2009-2012
ICEWIN	Innovative Icebreaking Concepts for Winter Navigation	FP7	http://www.vtt.fi/sites/icewin	2009-2012
INOMANS2HIP	INOvative Energy MANagement System for Cargo SHIP	FP7	n/a	2011-2014
INTEGRITY	Intermodal global door-to-door container supply chain visibility	FP7	http://www.integrity-supplychain.eu	2008-2011
KITVES	Airfoil-based Solution for Vessel On-board Energy Production Destined to Traction and Auxiliary Services	FP7	http://www.kitves.com	2008-2012
KNOWME	The European Academic and Industry Network for Innovative Maritime Training, Education and R&D	FP7	http://www.know-me.org	2011-2014

LEAF	Low Emission AntiFouling coatings based on the novel discovered post settlement penetration triggered antifouling	FP7	n/a	2012-2015
MARTEC II	ERA-NET MARitime TEChnologies II	FP7	http://www.martec-era.net	2012-2015
MINOAS	Marine INspection rObotic Assistant System	FP7	http://www.minoasproject.eu	2009-2012
MOSAIC	Materials Onboard: Steel Advancements and Integrated Composites	FP7	http://www.mosaicships.com	2012-2015
MUNIN	Maritime Unmanned Navigation through Intelligence in Networks	FP7	http://www.unmanned-ship.org/munin	2012-2015
NAVTRONIC	Navigational system for efficient maritime transport	FP7	http://www.navtronic-project.eu	2009-2012
POSE²IDON	Power Optimised Ship for Environment with Electric Innovative Designs on Board	FP7	http://www.poseidon-ip.eu	2009-2012
REFRESH	Green Retrofitting of Existing Ships	FP7	http://www.refreshproject.eu	2012-2015
RISPECT	Risk-based Expert System for Through Life Ship Structural Inspection and Maintenance and New-build Ship Structural Design	FP7	http://www.rispect.eu	2008-2012
SAFEGUARD	Ship evacuation data and scenarios	FP7	http://www.safeguardproject.info	2009-2012
SECTRONIC	Security system for maritime infrastructures, ports and coastal zones	FP7	http://www.sectronic.eu	2011-2014

SAFEWIN	Safety of winter navigation in dynamic ice	FP7	http://safewin.org	2009-2013
SHIPDISMANTL	Cost-Effective and Environmentally Sound Dismantling of Obsolete Vessels	FP6	http://cordis.europa.eu/projects/index.cfm?fuseaction=app.details&REF=74798	2005-2009
SILENV	Ships oriented Innovative soLutions to rEduce Noise & Vibrations	FP7	http://www.silenv.eu	2009-2012
SKEMA	Sustainable Knowledge Platform for the European Maritime and Logistics Industry	FP7	http://www.skematransport.eu	2008-2011
SONIC	Suppression Of underwater Noise Induced by Cavitation	FP7	n/a	2012-2015
STREAMLINE	Strategic Research For Innovative Marine Propulsion Concepts	FP7	http://streamline-project.eu	2010-2014
SUSY	Surfacing system for ship recovery	FP7	http://www.su-sy.eu	2009-2012
TARGETS	Targeted Advanced Research for Global Efficiency of Transportation Shipping	FP7	http://www.targets-project.eu	2010-2013
TEFLES	Technologies and Scenarios For Low Emissions Shipping	FP7	http://tefles.eu/?page_id=4	2011-2014
TRIPOD	TRIple Energy Saving by Use of CRP, CLT and PODded Propulsion	FP7	http://www.vtt.fi	2010-2013
TULS	Tools for Ultra Large Container Ships	FP7	http://www.fsb.unizg.hr/tulcs	2009-2012

VISIONS-OLYMPICS	The next generation products and procedures for vessels and floating structures	FP7	http://www.visions-olympics.eu	2009-2012
YLUSSES	The Future Propulsion as ONE System	FP6	http://www.ca-ulysses.eu/data/main.htm	2006-2013

Sub-Theme: Inland waterways				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
BB GREEN	Battery powered Boats, providing Greening, Resistance reduction, Electric, Efficient and Novelty	FP7	http://www.seseu.com	2011-2014
ECCONET	Prospects of inland navigation within an enlarged Europe	FP7	http://ecconet.eu	2010-2012
EWITA	European Web Platforms and Training Concepts for Intermodal Inland Waterway Transport	Marco Polo	http://www.ewita.info	2008-2010
IRIS-EUROPE	Implementation of River Information Services in Europe	TEN-T	http://www.iris-europe.net	2006-2011
MOVE-IT!	Modernisation of Vessels for Inland waterway freight Transport	FP7	http://www.marin.nl/web/show	2011-2014
NELI	Cooperation-Network for logistics and nautical education focusing on Inland Waterway Transport in the Danube corridor	SEE	http://www.neliproject.eu/neli	2009-2012
NEWADA	Network of Danube Waterway Administrations	SEE	http://www.newada.eu/newada	2009-2012
PLATINA	Platform for the implementation of NAIADES	FP7	http://www.naiades.info/platina/page.php?id=1	2008-2012

RISING	River Information Services for Transport & Logistics	FP7	http://www.rising.eu/web/guest/home	2009-2012
SuperGreen	Supporting EU's Freight Transport Logistics Action Plan on Green Corridors Issues	FP7	http://www.supergreenproject.eu	2010-2013
WANDA	Waste Management for Inland Navigation on the Danube	ERDF	http://www.wandaproject.eu	2009-2012
	Analysis of the Impact of Current Economic and Financial Crisis on the EU Inland Waterways Transport Sector	DG-MOVE	http://www.panteia.nl	2011
	Medium and long term perspectives IWT EU	DG-MOVE	http://www.panteia.nl	2011

Sub-Theme: Short Sea Shipping				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
MIELE	MIELE	TEN-T	www.miele-action.org	2010-2013
	The Baltic Sea Hub and Spokes Project	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2010-eu-21107-p.htm	2010-2013
MONALISA	LNG infrastructure of filling stations and deployment in ships	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2010-eu-21112-s.htm	2010-2013
	On Shore Power Supply – an integrated North Sea network	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21004-s.htm	2012-2014
	LNG in Baltic Sea Ports	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21005-s.htm	2012-2014
	ITS Adriatic multi-port gateway	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21007-s.htm	2010-2013

	Green Bridge on Nordic Corridor	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21010-m.htm	2011-2014
	MONALISA	TEN-T	http://www.sjofartsverket.se/en/MonaLisa	2010-2013
ADRIAMOS	Adriatic Motorways of the Sea	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21001-m.htm	2011-2014
ADRIATIC GATEWAY	The improvement of northern Adriatic ports and the building of a strategic corridor for multimodal transport	TEN-T	http://www.adriaticgateway.it/2	2011-2012
EU-CARGOXPRESS	Greening of surface transport through an innovative and competitive CARGO-VESSEL Concept connecting marine and fluvial intermodal ports	FP7	http://www.cargoxpress.eu	2009-2012
MOS 24	ICT based Co-modality Promotion Center for integrating PP24 into Mediterranean MoS	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2010-eu-21101-s.htm	2011-2013
PROPS	Promotional platform for short sea shipping and intermodality	FP7	http://www.props-sss.eu	2008-2011
TELLIBOX	Intelligent megaswapboxes for advanced intermodal freight transport	FP7	https://www.zlw-ima.rwth-aachen.de/webtellibox/home	2008-2011

IBUK	IBUK – intermodal corridor	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21009-m.htm	2011-2014
COSTA	COSTA	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21007-s.htm	2012-2014
CREATE3S	Production to improve total efficiency of new generation Short Sea Shipping	FP6	www.samskip.com	2006-2011
MoS4MoS	Monitoring and Operation Services for Motorways of the Sea	TEN-T	www.mos4mos.eu	2011-2012
TERCONMED	Container Terminal as a key element in the Mediterranean Short Sea Shipping	Programme	http://www.terconmed.eu	2009-2012
TrainMoS	TrainMoS	TEN-T	http://tentea.ec.europa.eu/en/ten-t_projects/ten-t_projects_by_country/multi_country/2011-eu-21004-s.htm	2011-2013

Sub-Theme: Ports and port operations				
Acronym	**Title**	**Funding Programme**	**Project Website**	**Duration**
GREEN EFFORTS	Green and Effective Operations at Terminals and in Ports	FP7	http://www.green-efforts.eu	2012-2014
EFFORTS	Effective Operation in Ports	FP6	http://www.efforts-project.org	2006-2009
APICE	Common Mediterranean strategy and local practical Actions for the mitigation of Port, Industries and Cities Emissions	Programme	www.apice-project.eu	2010-2012
CLIMEPORT	Mediterranean Ports' Contribution to Climate Change Mitigation	Programme	http://www.climeport.com	2009-2012
APC	The Adriatic Port Community	Adriatic CBC Programme	http://www.apcwindow.eu/en	2011-2013
PORTA	PORTs as a gateway for Access inner regions	Programme	www.porta-project.eu	2010-2013
CAPOEIRA	Co-ordination Action of Ports for Integration of Efficient Innovations and Development of Adequate Research, Development and Innovation Activities	FP7	http://www.intecsa-inarsa.es	2006-2008
TERCONMED	Container Terminals as a key element in the Mediterranean Short Sea shipping	Programme MED	http://www.terconmed.eu	2009-2012

MEDNET	Mediterranean Network for Custom Procedures and Simplification of Clearance in Ports	Programme	n/a	2012-2015
	Ports and their connections within the TEN-T	DG-MOVE	http://www.panteia.nl	2010
THROUGHLIFE	The next generation products and procedures for vessels and floating structures	FP7	http://www.throughlife.eu/Throughlife/index.xhtml	2011-2014