



Upgrading of Inland Waterway and Sea Ports



FINAL REPORT
ACTION PLAN



**CENTRAL
EUROPE**
COOPERATING FOR SUCCESS.



EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND

Imprint

Owner and publisher: INWAPO Project

www.inwapo-project.eu

Editor: ICG Ex Ante

www.icg-exante.hu

Design: László Bagu

Photos:

INWAPO Project

ICG Ex Ante

www.freeimages.com

Copyright: INWAPO Project

All rights reserved.

Printed: December 2014

■ This document is the final outcome of the Strategic Project INWAPO - Upgrading of Inland Waterway and Sea Ports, co-financed by the European Regional Development Fund - ERDF within the CENTRAL EUROPE Programme. Through the contribution by this European Territorial Cooperation programme, Venice Port Authority and other 12 European partners, involving seven different countries, have enhanced the cooperation in the last three years to support investments for the competitiveness and efficiency of inland and sea ports, promoting inter-modal transport.

INWAPO involved three different main waterway systems: the Northern Adriatic ports (Venice, Trieste and Koper), the Danube river ports (Vienna, Budapest, Bratislava and Komarno) and the Czech and Polish inland waterways (Elbe, Vistula and Oder systems), with an extension towards the Baltic ports. The project encompassed several studies and analyses, in order to prepare port development strategies and investments contributing to the European Union goals in the field of transportation.

As a matter of fact, cooperation among project partners has led to the definition of common aims and joint actions. Moreover, the relevance and multilevel composition of the partnership has offered a strong potential impact in terms of influence on the policies in the programme area and an integrated approach to tackle the issues of sustainable connections in the Central Europe area.

This document consists of two parts complementing each other: The Final Report and the Final Action Plan of the INWAPO project. The Final Report presents the main activities and findings of the project, while the Action Plan involves a strategic assessment of the project results, providing for a support to decision makers responsible for the development of the waterway transportation system in the EU and related policy priorities. The Final Action Plan highlights opportunities for joint cooperation on common actions for investments and projects, to which the INWAPO project has contributed.

INWAPO PROJECT FINAL REPORT





Contents

Introduction	1
INWAPO at a glance	4
Executive Summary	7
INWAPO countries and the Central Europe area	8
Project results	10
Analysis on the potential waterborne transport generated by the hinterlands	10
Feasibility studies of new links to support the activation of new transport services for the improvement of ports efficiency	12
Needs assessment and investment plans	13
Pilot actions	15
INWAPO investments	17
INWAPO Transnational events	20

INWAPO at a glance



1. VENICE PORT AUTHORITY (IT) - LP

2. VIADONAU (AT)

3. PORT OF VIENNA (AT)

4. MINISTRY OF TRANSPORT OF CZECH REPUBLIC (CZ)

5. REGIONAL DEVELOPMENT AGENCY OF USTI REGION (CZ)

6. GENERAL DIRECTORATE OF WATER MANAGEMENT (HU)

7. FREEPORT OF BUDAPEST LOGISTICS (HU)

8. TRIESTE PORT AUTHORITY (IT)

9. EINE - NORTH EASTERN INDUSTRIALIZATION BODIES (IT)

10. DEVELOPMENT AGENCY OF MAZOWIA REGION (PL)

11. SLOVAK SHIPPING AND PORTS (SK)

12. PUBLIC PORTS (SK)

13. LUKA KOPER (SI)

TECHNICAL IDENTIKIT

CENRTAL EUROPE PROGRAMME CALL
FOR STRATEGIC PROJECTS

Project Concept n. 2

- Priority 2.2
- Developing Multimodal Logistics' Cooperation

THREE WATERWAY SYSTEMS



KEY PLAYERS ARE THE PORTS

NORTH ADRIATIC PORTS
(IT, SI)

VENICE (IT)
TRIESTE (IT)
KOPER (SI)

DANUBE PORTS
(AT, HU, SK)

WIEN (AT)
BUDAPEST (HU)
BRATISLAVA (SK)
KOMARNO (SK)
STUROVO (SK)

ELBE, ODER, WISLA PORTS
(PL, CZ)

MELNIK (CZ)
LOVOSICE (CZ)
USTI NAD LABEN (CZ)
DECIN (CZ)
GDANSK (PL)
POLISH PORTS (WARSAW,
PLOCK, WLOCLAWECK)

MAIN GOALS

- establishing the Ports as fully equipped with tri-modal transport hubs
- shifting additional cargo into waterways
- connecting river and sea ports with new multimodal services

GENERAL OBJECTIVE

Provide support to:

- the implementation of investments in intermodal infrastructures
- the activation of new intermodal transport services

Promoting better connections of CE ports with their hinterlands as well as with other ports, with focus on the links between inland ports and maritime ports.

Promoting better integration of different transport modes in the CE area, with specific attention on investments in intermodal solutions and ICT applications for inland and sea ports.

Ensuring the development of tri-modal transport hubs of the CE area and the balanced development of road, rail, maritime and inland waterway transport.

A GATEWAY TO THE HEART OF EUROPE

INWAPO increases the attractiveness of waterborne transport by:

- improving the efficiency of the river and sea ports
- fostering freight traffic on waterways
- strengthening the integration of ports' infrastructures in the logistics chain with connections from ports to the hinterland

INWAPO PROJECT

- 1 of the 18 CENTRAL EUROPE Programme projects dealing with accessibility and multimodal logistics
 - 1 of the 7 CENTRAL EUROPE Programme strategic projects
 - 7 countries involved
 - 13 project partners
 - Financed with a total amount of € 3,8 millions
 - 39 month
- Start date: October 2011
End date: December 2014

Executive Summary

Central Europe's inland waterways offer economical and environmentally friendly freight transport, but this potential is not sufficiently exploited. Major reason for the unsatisfactory role inland navigation plays in coping with the ever growing freight volumes in Central Europe is the lack of functional integration of the ports with their potential hinterland and also with other ports and a underdeveloped function of tri-modality. The main aim of the INWAPO project is to activate the unexploited potential of waterborne transport in Central Europe and to develop the ports' infrastructure and new waterway services.

Two approaches are proposed in the INWAPO project:

- a) to focus on the relations between inland and maritime ports on the Adriatic Sea and Baltic Sea;
- b) to concentrate on port hinterland in accordance with the potential capacity of the port and the waterway.

This has led to a strengthened cooperation, both between port locations and their hinterland and between port locations, constituting a unique opportunity to foster innovation in the public/private sphere.

INWAPO has promoted a better coordination among decision makers and stakeholders involved within the logistic multimodal field, allowing for a growth in competitiveness of the alternatives to road transportation. In this perspective, the initiative has supported better and more sustainable connections in Central Europe in order to lead port authorities, national, regional and local institutions to identify best policies promoting more environment friendly ways of transportation.

The cooperation within INWAPO, aiming to foster freight traffic on Central European waterways, has concentrated on the followings topics:

- **Analysis on the potential waterborne transport volume**, coordinated by Public Ports JSC (SK)
- **Needs assessments**, coordinated by Mazovia Development Agency (PL)
- **Feasibility of new links**, coordinated by Port of Vienna (AT)
- **Pilot Actions**, coordinated by Freeport of Budapest (HU)

Specifically, the common actions taken were:

- identification of a common approach to the definition of the hinterland and of the waterborne potential for maritime and river ports;
- identification of the weaknesses and potentials of the solutions for waterborne transportation;
- analysis on the existing waterborne and tri-modal transport services and potential;
- definition of common benchmarks for inland and sea ports, in order to assess the needs of the involved ports in terms of infrastructures and links/services to improve the tri-modality;
- analysis on investment needs, elaboration of investment plans and business needs;
- feasibility studies on new transport services;
- support to the investment preparation and testing of new services;
- environmental analyses focused on the potential impact of increased transport volumes on the river and maritime environment and elaboration of recommendations to improve the environmental impacts of the planned investments.

Moreover, the project has kept logistics operators informed of the business opportunities produced by the activation of new services, providing hands-on assessments - through large-scale events, like the June 2013 Transport Logistic Fair held in Munich. On that occasion, the transnational INWAPO event "Strengthening the integration of Port's infrastructures in the logistics chain of Central Europe Regions" gave the opportunity to present project activities and studies carried out and exchange interesting assessments and outlooks with the relevant logistics parterre.

Finally, INWAPO collected the feedback from operators on the sustainability of the proposed investment actions in services and infrastructures, through dedicated business-to-business meetings.

Synergies established between INWAPO cooperating ports can provide an outstanding forum at institutional levels, contributing to an upgrade of inland and sea ports.

INWAPO countries and the Central Europe area

The area of Central Europe covers the territory of several countries, involving a significant fragmentation of infrastructure, a high number of potential stakeholders in the field of transport and logistics, and plurality of authorities, policies and procedures. Therefore, transnational cooperation is the only dimension that can provide the framework for the effective coordination of the different national and local transport and logistics policies towards increased intermodality and environmental sustainability.

Central Europe has extensive inland waterways which in all cases underperform in terms of utilising their capacities for freight transportation. The major reason for the unsatisfactory role inland navigation plays in coping with ever growing freight volumes in Central Europe is the lack of functional integration of the ports with their potential hinterland, and also with other ports. Likewise, the functionality of tri-modal transport infrastructures is rather limited.

INWAPO project results will lead port managers, national, regional authorities and municipalities to understand the strategic function of multimodal transport infrastructure in handling traffic flows in the region.

Map 1: Ports and waterways in Central Europe



Source: <http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/en/maps.html>

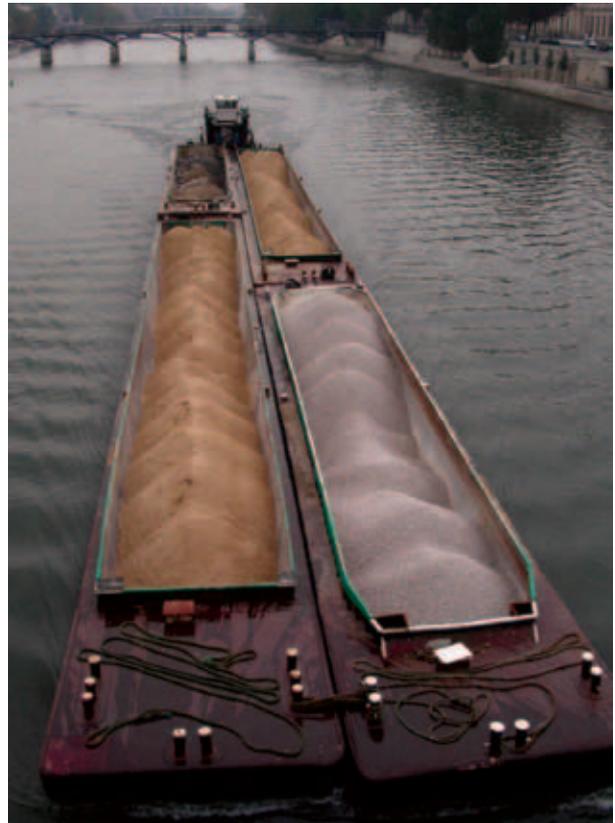
The INWAPO project focused on several challenging topics of the waterway transportation:

- 1) identifying bottlenecks and reasons for the unexploited potential of waterborne transportation in order to define and carry out actions/solutions to activate this potential and remove such bottlenecks;
- 2) promoting better connections of Central European ports with their hinterland and also with other ports, with a focus on linking inland and maritime ports;
- 3) promoting better integration of different transport modes in the Central European area, with specific attention to investments in intermodal solutions and ICT applications for inland and sea ports;
- 4) ensuring the development of tri-modal transport hubs of the Central European area and the balanced development of road, rail, maritime and inland waterway transportation;
- 5) using ICT technologies to develop advanced technological solutions for port management systems and traffic information systems of transnational transport flows enhancing efficiency and safety;
- 6) supporting the activation of new transport services and rail connection;
- 7) increasing the attractiveness of the intermodal transportation, by supporting the implementation of relevant investments improving the connections between sea and river-port infrastructures and hinterland areas.

The INWAPO project contributes directly to the overall goals of the CENTRAL EUROPE Programme by strengthening territorial cohesion, promoting internal integration and enhancing competitiveness. Concerning the Programme priorities, INWAPO aims to improve tri-modal transport hubs with the intention to shift additional cargo into the waterways, an area of high importance for the Programme area. In particular, the project is strongly consistent with Priority 2: improving accessibility of and within the Central Europe area, and promoting multimodal cooperation and sustainable development.

Moreover the INWAPO project promotes the preparation and implementation of actions to integrate waterborne transport with other modes in the Central Europe area, while involving relevant stakeholders from 7 different Central European countries, together with operative actors and stakeholders at different levels (European/national/regional and local).

By setting up actions and tools for the preparation of investments in tri-modal infrastructure and supporting of the activation of new transport services, the project strictly supports the enhancement of the competitiveness of the Central European area, according to the Programme and renewed Lisbon strategies, in particular by tackling the disparities generated by lack of accessibility.



Project results

Analysis on the potential waterborne transport generated by the hinterlands

One key output of the INWAPD project was a research to verify the assumption whether there is a significant demand for sea and river freight transport services in Central Europe. To this end, INWAPD project partners conducted market-based surveys with the direct involvement of logistics operators and clients and produced **13 studies and one environmental impact analysis to obtain an updated picture of the potential supply and demand of waterway transport services and infrastructure in Central Europe.** The findings of this research were presented to the port managers involved, and also to most of the companies representing the potential market for waterway transportation.

The following studies have been conducted in order to investigate and estimate potential waterborne transport at partner ports, analyzing the transport volume generated by the port hinterlands and the port infrastructures:

- **PORT OF VENICE:** analysis results of four different sectors relevant for the Port of Venice
 1. Iron and steel logistics: central and eastern Europe represents a considerable potential market and the enhancement of rail services and related logistics requirement will allow to fulfil this opportunity;
 2. Agri-food/feed logistics: potential interesting sector to expand the foreign hinterland is soya for use in animal feed industries;
 3. Refined oil and energy logistics: incoming products already refined and processed are modifying the nature of port traffic in this sector, leading towards new investments in “green” technologies;
 4. Chemical logistics: assessment of logistics requirements needed and enhancement of port capacities in relation to different commodities (solid, liquid and gaseous).
- **CZECH IWW SYSTEM:** analysis of the potential of the inland waterway connecting the Black Sea through the Czech Republic with the North and Baltic Seas - the Danube-Odra-Elbe canal.
- **PORT OF VIENNA:** in-depth survey about the inland waterway transport potential in the ports’ hinterland. The major goal is to assess quantitative and qualitative data about the companies in the port hinterland and their transport logistics systems.
- **FREPORT OF BUDAPEST:** analysis elaborated on questionnaires conducted with manufacturing/shipping companies having relevant freight transport flows originated from, or destined to, the hinterland area of the Freeport of Budapest.
- **PORT OF TRIESTE:** overview of the existing trade flows of agri-food products, the transport modalities, the main overseas O/D markets, the specialized terminals in the port. Assessment of the potentials generated by the hinterland with a focus on the inland waterways.
- **VISTULA RIVER:** analysis of the potential generated by the ports situated on the waterway of the Vistula River in the section between Gdansk and Warsaw (the Vistula in the section from the Vistula estuary to the 507th km - Warsaw, southern part of the city - between the sea ports in Gdańsk and Elbląg and Warsaw Siekierkowski Port).
- **PORT OF KOPER:** the extent of use of the existing infrastructures, requirements regarding the infrastructures and foreseen freight flow for different groups of goods were estimated.
- **PORTS OF BRATISLAVA AND KOMARNO:** Port infrastructure conditions of inland cargo ports were taken into account and analysed. Available data on domestic and international unaccompanied container transport and performance data of selected intermodal terminals in Slovakia were examined too.

- **USTI REGION:** analysis of freight flows in the hinterland area of four Czech Lower Elbe ports - Mělník, Lovosice, Ústí nad Labem and Děčín based on information gathered from the interviewed shipping companies, in order to estimate the potential freight volume to be shifted on waterways, primarily from road.
- **INFRASTRUCTURAL NODES IN THE NORTH-EAST OF ITALY:** analysis of traffic flows in 8 infrastructural nodes, in particular: Trento, Verona, Padua, Rovigo, Cervignano Freight Villages; Port of Venice, Port of Trieste; Intermodal node Consorzio CIPAF (Gemona del Friuli - Udine)
- **ENVIRONMENTAL ANALYSIS:** it is focused on the potential impact of increased transport volumes on the river and maritime environment. The most important findings concern climate change, air pollution, noise impacts, land use and biodiversity, and water quality. Methods to mitigate impacts of increased waterborne transport are proposed as well as the environmental impacts that can be avoided by the improvement of waterborne transport are presented.

The analysis involved 23 ports:

Country	Regions examined + NUTS code	Area covered	Population in region	Ports involved
Austria	Burgenland/AT11 Niederösterreich/AT12 Wien/AT13	23,6 th.km ²	3,63 mln	Port of Vienna
Czech Republic	Central Bohemia/CZ 02 Prague/CZ 01 Ústecký Region/CZ 042 North-East/CZ 05 South-East/CZ 06 Central Moravia/CZ 07 Moravian Silesia/CZ 08	57,9 th.km ²	8,99 mln	Port of Děčín Port of Ústí n. Labem Port of Lovosice Port of Mělník
Hungary	National level	93,0 th.km ²	9,98 mln	Freeport of Budapest
Italy ¹	Veneto Region/ITH3 Friuli Venezia Giulia Region/ITH4	26,3 th.km ²	6,07 mln	Port of Venice Port of Trieste
Poland	Mazowieckie/PL12 Kujawsko-Pomorskie/PL61 Warmińsko-Mazurskie/PL62 Pomorskie/PL 63	96,0 th.km ²	11,1 mln	Port of Gdansk Port of Elbląg Port of Malbork Port of Tczew Port of Grudziądz Port of Świecie Port of Bydgoszcz Port of Solec Kujawski Port of Toruń Port of Włocławek Port of Płock Port of Warsaw
Slovak Republic	Bratislava Region/SK010 Trnava Region/SK021 Nitra Region/SK023	12,6 th.km ²	1,85 mln	Port of Bratislava Port of Komárno
Slovenia ²	National level	20,3 th.km ²	2,05 mln	Port of Koper

¹ http://demo.istat.it/pop2012/index1_e.html

² http://www.stat.si/doc/pub/slo_stevilke_12.pdf

The result is an assessment of the **POTENTIAL DEMAND FOR SEA AND RIVER FREIGHT TRANSPORT SERVICES:**

- **ALONG DIFFERENT CENTRAL EUROPEAN INLAND WATERWAYS - DANUBE, ODER, ELBE, VISTULA**
- **FOR THE MAIN PORT INFRASTRUCTURES IN THE NORTH ADRIATIC SEA AND THE BALTIC SEA**

Feasibility studies of new links to support the activation of new transport services for the improvement of ports efficiency

INWAPD partners produced **market review analyses**, focusing on commodities with a higher potential to be shifted from road to inland waterways and railways.

Seven market review analyses were implemented at different levels, involving the:

- **AUSTRIAN MARKET**, assessing specific potential sectors for a modal shift towards inland waterways;
- **CZECH REPUBLIC AREA**, market review on key commodity groups and existing related services;
- **ODER AND VISTULA RIVERS**, overview and analysis of inland waterway transport market;
- **NORTH EAST ITALY**, potential intermodal services linking N-E Italy with the Central European area;
- **ANALYSIS OF CSEPEL FREEPORT - BUDAPEST**, market review on specific types of cargo;
- **BRATISLAVA**, a) analysis of Bratislava, Nitra and Trnava regions: overview of cargos with the highest potential for modal shift; b) market study examining possibilities for transporting wheeled vehicles and container units by IWW;
- **PORT OF KOPER**, analysis related to INWAPD countries - overview of cargo flows for the optimization of railway block trains.

These analyses were then used to investigate the **feasibility of new waterborne and intermodal links** serving the port hinterlands, in order to enhance connections between port locations, but also between partner ports and non-partner ports, on the basis of the identified transport volumes.

Specifically, the analyses involved the following waterway systems and ports:

IMPLEMENTATION OF NEW WATERBORNE TRANSPORT SERVICES ALONG THE DANUBE RIVER: PORT OF VIENNA AND FREEPORT OF BUDAPEST (+ JOINT STUDY VIENNA-BUDAPEST)	<ul style="list-style-type: none"> ▪ Service Liner on the Danube by linking the Port of Vienna (Budapest-Bratislava-Vienna) ▪ Improvement of port services in the Freeport of Budapest: new cars to be transhipped through Ro-Ro; oversized and overweight cargo to be handled in the port
ACTIVATION OF INTERMODAL SERVICES LINKING HINTERLANDS AND PORTS: PORT OF TRIESTE AND PORT OF KOPER	<ul style="list-style-type: none"> ▪ Joint Study Trieste Port Authority and EINE: analysis of internal and external bottlenecks in the port of Trieste ▪ Luka Koper: assessment of foreseen freight flows and national economic effects of different variants of transport connections with hinterland countries
INFRASTRUCTURAL AND TECHNOLOGICAL SERVICES TO STRENGTHEN THE ATTRACTIVENESS OF IWT: SLOVAK PORTS	<ul style="list-style-type: none"> ▪ Interconnection of port fees collection system on data from RIS; ▪ Optimization and increase of usage of existing storage capacities in ports of Bratislava, Komárno and Štúrovo
FEASIBILITY ON WATERWAYS SYSTEMS POTENTIALS: POLISH PORTS	<ul style="list-style-type: none"> ▪ New water links for Vistula river system from Gdansk to Warsaw
FEASIBILITY OF THE DANUBE-ODER-ELBE CANAL INFRASTRUCTURAL PROJECT	<ul style="list-style-type: none"> ▪ Two transnational consultation meetings with involved countries

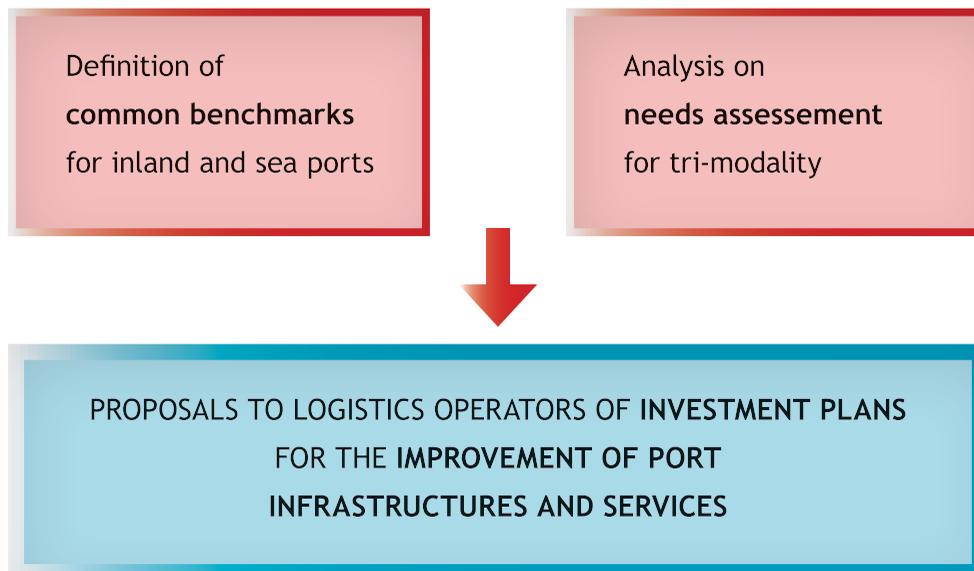
Moreover, focusing on feasibility of potentials in the waterways systems, two transnational consultation meetings have been carried out by the Ministry of Transport of the Czech Republic, involving neighboring countries - Poland and Slovakia - and EU representatives, in order to investigate the actual interest of decision makers in the Danube-Oder-Elbe canal infrastructural project.

In relation to the actions supporting new links, logistics operators were kept informed by the INWAPO project through specific **business-to-business meetings** about the business opportunities revealed by the activation of new services.

- 20th March 2014: Transnational INWAPO event for Danube waterways “Danube Business Talks”, Vienna (AT)
 - VIADONAU
 - PORT OF VIENNA
 - FREEPORT OF BUDAPEST
 - SLOVAK PORTS
- 10th-12th June 2014: “Waterway Expo 2014” fairs in Bydgoszcz (PL)
 - MAZOVIA DEVELOPMENT AGENCY
 - EINE - NORTH EASTERN INDUSTRIALIZATION BODIES
- 3rd December 2014: Ústí nad Labem (CZ)
 - Regional Development Agency of Usti Region

Needs assessment and investment plans

The project also defined **common benchmarks for inland and seaports**, serving as a basis for **needs assessment analyses identifying the development priorities to improve tri-modal accessibility**, allowing INWAPO partners to elaborate their **investment plans**.



PORT OF VENICE

In the port of Venice investment needs have been identified in port facilities improvement and rail, road and nautical accessibility, focusing on: the realization of the project of the Offshore/Onshore terminal, the upgrading of the port railway system, new ICT systems and inland waterway connections.

PORT OF VIENNA

The port of Vienna is one of the highest developed ports along the Danube and because of its location and the close cooperation with the city of Vienna the port represents the most important logistic centre in Eastern Austria. At the moment there is no need for large infrastructure investments in the port of Vienna except of the expansion of the container terminal. The change of the expected amount of goods and the relocation of traffics will afford to modernize and optimize the infrastructure in the coming years.

PORTS OF MĚLNÍK, ÚSTÍ NAD LABEM, DĚČÍN, LOVOSICE

As a result of an insufficient draught in the part of the Elbe waterway for considerable part of the calendar year, the use of the waterway is extremely low and falling. The greatest need and the challenge is the improvement of the relevant parameters of the Elbe waterway and the lengthening of the waterway up the stream to Pardubice. There is a real need to ensure the navigation of the Elbe most of the calendar year and the Czech state plans the relevant investments. Czech ports, except the Port of Mělník, need also protection against flooding in order to make their investments in their facilities secured. The individual ports plan to extend their transport infrastructure and modernization of their reloading equipment.

FREEPORTR OF BUDAPEST

The identified investment needs includes, among others: new parking lots, reconstruction of the outdoor loading and unloading facilities and tracks, implementation of the gate signalling system, new track at the river wall, new shunting tracks, new rail weighbridge, construction of the new access and internal port roads, oversize and/or overweight cargo port, protection of the river banks, dredging and geometrical reconstruction of the port basins as well as the new GIS system.

PORT OF TRIESTE

Investment needs of the port of Trieste include a number of significant investments aimed at increasing the capacity of the port and its intermodal vocation. In the immediate future some actions are possible: efficiency measures (e.g. the railway operations), modernization of facilities and technologies and analysis of organizational procedures and internal management that should be revisited to increase the productivity of the port.

PORT OF NOGARO

Analysing the actual condition of the infrastructures in Porto Nogaro and considering the nature of the most important business entities in the port's hinterland along with the nature of the main freight type transiting through the port, the two priority interventions needed are represented by: dredging operation to bring the maximum draft in channels and basins at 7.5 meters; upgrading of the rail connection and in particular upgrade of the small bridge on the sidings belonging to the National Railway company (RFI) from C3 to D4 category.

POLISH PORTS

In Poland the greatest need and challenge is to restore relevant parameters to inland waterways, along the Odra and Vistula rivers. This is to a large extent dependent on the ratification of the Agreement AGN by the Polish Government.

PORTS OF BRATISLAVA

The main objective of the development of the port is strengthening its competitive position in comparison with other river ports on the Danube. Short and medium term plan is to make from port of Bratislava an attractive port through wide portfolio of logistic, transshipment and other ICT support services.

PORT OF KOMARNO

The main goals and investment plans of the port of Komárno lay mostly in the preservation of current infrastructure, maintenance of quay edges and maintenance of rails and rail siding. There will be also necessary investments in crane infrastructure as it needs equipment maintenance and adaptation to technological development.

PORT OF KOPER

The port of Koper has defined the following middle term investments: dredging operations in port basins and accessing channel, extension of port piers and berthing facilities, additional railway tracks and connecting infrastructure inside the port, construction of storage areas in the port immediate hinterland (priority on containers).

In this way, an updated picture of common investment priorities in the Central European area was summarised and the OPPORTUNITIES OF JOINT COOPERATION ON COMMON PROJECTS AND INVESTMENTS PRIORITIES were highlighted in the following areas:

- **NAPA PORTS**
- **DANUBE WATERWAY SYSTEM**
- **CZECH WATERWAY SYSTEM**
- **POLISH WATERWAYS - INLAND AND SEA PORTS**

Moreover, environmental assessment of partner ports have been elaborated on the basis of environmental benchmarks indicators, and the findings were included in the investment plans.

Pilot actions

Within INWAPO, TANGIBLE SUPPORT WAS GIVEN TO ENHANCE THE COMPETITIVENESS OF PORTS, PREPARING SMALL AND LARGER SCALE INVESTMENTS OR PILOT SERVICE OPERATIONS, including:

- Handling equipment,
- Infrastructure adaptation for better accessibility to waterborne transport,
- Investment with direct effect on the waterborne side of port operations including ICT.

Large scale analysis for the preparation of strategic investments

PORT OF VENICE

Analyses on infrastructural solutions to open access to large freight flows:

- Cost/benefit analysis for the optimization and enhancement of the broadband infrastructure in the port of Venice;
- Analysis of the residual external rail capacity, investigating existing and potential bottlenecks in the short-middle term;
- Analysis of intermodal port performance needed to satisfy the rail freight demand deriving from new traffic flows linked to Venice Offshore/Onshore Transfer System.

ICT investments

PORT OF VIENNA

RIS services adaptation:

- Electronic arrival/departure reporting system for vessels
- Introduction of the possibility for a service to display position and estimated time of arrival for vessels heading towards the port

PORTS OF BRATISLAVA AND KOMARNO

- Upgrade of application for automation of processes for management and collection of port duties
- Implementation of new Client Interface Module to improve communication with clients from the whole Danube Region
- Study on software and hardware solutions to support the process of transshipment of cargo from ship to shore and vice versa

Study on the New Infrastructure Policy of the EU Commission

The Freeport of Budapest carried out a strategic study to evaluate and influence the new state aid policy of the EU Commission and its effects on inland port development projects.

Test of New Services

PORT OF VIENNA

Set up of neutral internet platform for shippers, forwarders, shipping companies, shipping agents and barge owners, industries and ports, providing a market place to offer cargos and barges to potential customers

POLISH PORTS

- Pilot compilation and assessment of the system for supporting navigation in the section of the Lower Vistula between Warsaw and Gdansk (waterway E-40)
- Development and testing of a pilot system for supporting navigation in the section of the Lower Vistula between Warsaw and Gdansk (waterway E-40)

GENERAL DIRECTORATE OF WATER MANAGEMENT (HU)

Test of a mobile waste and bilge water collector equipment



2. FREEPORT OF BUDAPEST: Infrastructure at two cargo ship quays for the provision of water and electricity. Cargo ships that arrive and stay in the port can connect to these devices directly in a „self-service” way, and when leaving they can pay at the operator.
INWAPD co-financing: euro 51.000



Water and electricity provision



3. PORT OF BRATISLAVA: Renovation of a crane, allowing the port to attract and handle goods that have not been previously transported on river.

This investment contributes concretely to modal shift of goods, in particular agricultural commodities, from road to river transport.

INWAPO co-financing: euro 174.000



The renewed crane

INWAPO Transnational events

30th October 2012:
Visit to the port of Duisburg

18th September 2014:
presentation
of INWAPO at the
**EU COMMITTEE OF THE
REGIONS SEMINAR**
“Interconnecting Europe’s
Region”, Iași - Romania

5th June 2014: presentation of
INWAPO at the transnational
event “**VI Baja Grain
Partnership 2014**”,
Baja - Hungary

7th November 2012:
presentation of INWAPO to the
EU Parliament (Brussels):
“**Inland Waterways - All hands
on board**”, promoted by
Mazowia Region



19th-20th March 2014:
transnational INWAPO event
for Danube waterways
“**Danube Business Talks**”,
promoted by viadonau,
Vienna



4th-7th June 2013:
participation at the
international fair
“**TRANSPORT LOGISTIC**”
MUNICH with a dedicated stand
and the organization of the
INWAPO transnational event
held on 5th June 2013

20th-22th November 2013:
presentation of INWAPO
at the event
“**Hinterland conference**”,
Magdeburg

5th March 2014:
transnational INWAPO
event at the
EU Parliament (Brussels):
“**Connecting European Regions
through Intermodal Freight
Transport - Challenges
and Opportunities**”,
by EINE - North Eastern
Industrialization bodies

INWAPO PROJECT ACTION PLAN



Contents

The European framework	23
The European transport policy: a few remarks	23
Cohesion policy and the Central Europe Programme	25
The macroeconomic context: a dual scenario	27
Analysis of the project results	29
Inland waterways	29
Danube	29
Elbe-Oder	33
Vistula	34
Sea ports	36
Northern Adriatic	36
Baltic Sea	41
Links inland - sea ports	44
North Adriatic: Connections with The Danube and the North-Italy Inland Waterway System	44
Vistula-Baltic Sea	47
Action plans: joint cooperation on common projects and investments priorities	50
The North Adriatic Ports and the NAPA Association	50
INWAPO project's support to the investment plans of the North Adriatic ports: the case of Venice, Trieste and Koper	52
Main needs and opportunities of cooperation for interventions within NAPA	54
Danube ports	55
Vienna	55
Budapest	56
The Public Ports in Slovakia	57
Conclusion	58
The Czech Waterway System	58
Polish waterways - inland and sea ports	60
INWAPO environmental assessments	63
Environmental indicators	63
Environmental assessment	63
Environmental analysis of ports' investment plans	64
EU strategies and policies for transport and territorial cohesion	65
EU Strategy for the Danube Region	65
The European Union Strategy for the Baltic Sea Region	66
European Union Strategy for the Adriatic and Ionian Region	67

The European framework

The European transport policy: a few remarks

Efficient transport infrastructure and services are critical components for economic development. When transport infrastructure responds correctly to demand, the entire economic system benefits, through network effects, improvements in industrial performance and productivity, and guaranteeing easier access to wider markets at national and international levels.

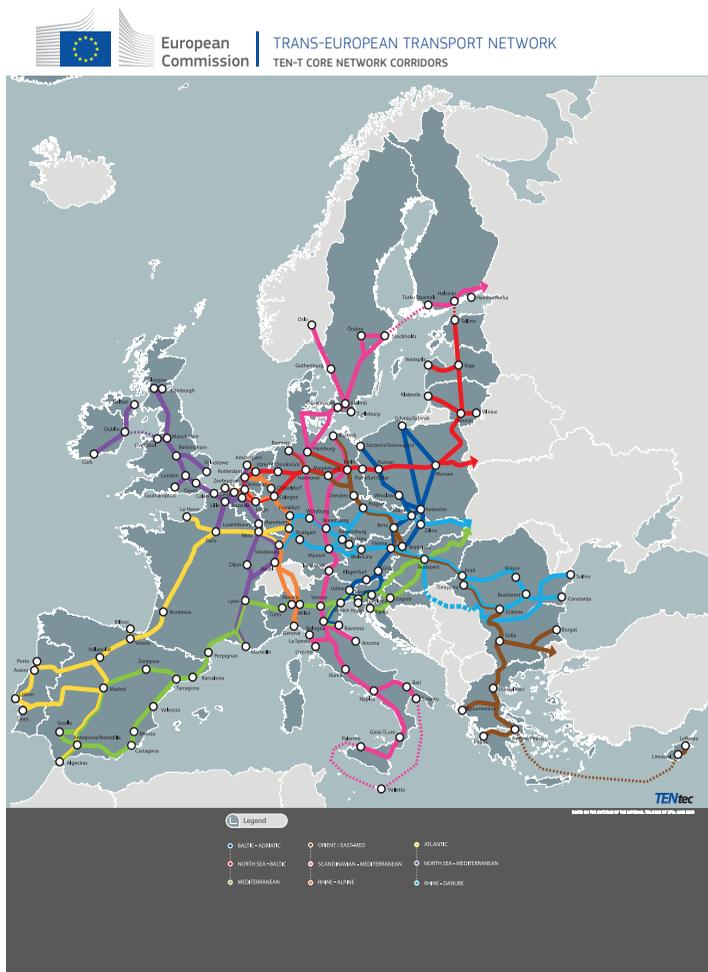
Since the enlargement of the European Union to 28 members, EU transportation policy has become more and more focused on the construction of an infrastructure network aimed at promoting cohesion, growth and competitiveness among regions and territories. During the next financing period 2014-2020, infrastructure investments will continue to be promoted along the path followed previously, with special attention to the achievement of a new core transport network. Removing bottlenecks, upgrading infrastructure, facilitating cross-border transport operations and delivering safer and less congested travel are among the main goals related to the setting up of nine major transport corridors crossing the European Union. One of the most important objectives of these corridors is to facilitate trade flows among the member countries within Europe and between EU countries and extra-EU countries and continents. The Adriatic ports, in particular, play a central role in serving the freight flows with origins and destinations in Turkey, Egypt and in the East Med region, as well as overseas traffic coming from/going to Asia and the Far East through the Suez Canal. For these reasons, in the future, North Adriatic ports should guarantee adequate sea & land-side infrastructures which are able to handle vessels from 8 to 10.000 TEU in at least one or two ports in the region.

Figure 1. Comparison between the Shanghai-Venice, Shanghai-Rotterdam and Shanghai-Hamburg maritime routes



Source: Venice Port Authority

Figure 2: TEN-T Core Network Corridors



Source: http://ec.europa.eu/transport/index_en.htm

In particular, the 7 INWAPO Central Europe countries are located in a strategic macro-region crossed by 4 European corridors. In this area, multimodality represents a key solution to tackle congestion problems and stimulate growth of merchandise trade among the CEE countries, as well as favouring the exchange of goods with other continents. The 4 core network corridors are: the Baltic - Adriatic, the Mediterranean, the Orient/ East-Med and the Rhine - Alpine corridors.

The first, running from the Baltic sea ports to the Northern Adriatic ones, crosses most INWAPO countries through highly industrialised regions in Southern Poland, Austria, Slovakia and the Czech Republic. Its route serves freight flows coming from/going to the North Adriatic ports of Venice, Trieste or Koper on one side and the Baltic port of Gdansk on the other, feeding the supply chains of the many important industrial sectors located in the area: car and aerospace industry, mechanical, electric machinery and appliances sectors, etc., operating in various CEE countries.

Similarly, the Mediterranean corridor, crossing the Northern regions of Italy Eastbound, passes through the same INWAPO Adriatic maritime ports, reaching Slovenia, Hungary and, eventually, Ukraine.

The Orient/East-Med corridor is among the most crucial for INWAPO countries, as it links the port of Hamburg to the Black and Mediterranean seas, crossing the entirety of Central and South-East Europe through the Balkans, with the Elbe River included as an inland waterway.

Lastly, the Rhine - Danube corridor has the Main and Danube River basins as the backbone and connects the central regions of Germany and France to Vienna, Bratislava and Budapest, and down to the port of Constanta in the Black Sea.

Among the 5 main problem areas tackled by the European transport policy, at least 3 are of direct interest to the INWAPO framework: 1) missing links and bottlenecks, particularly at cross-border sections, which would act as an obstacle to the free movement of goods; 2) disparity in quality and availability of infrastructure between member countries, as well as in operational rules and requirements, hindering the interoperability of transport networks, especially in the East-West connections; 3) insufficient intermodal (rail and/or inland waterway) connections among sea and inland ports, airports, large urban nodes, freight terminals and logistics platforms. In Western Europe an extended and well-established network of inland waterways, canals and sea ports connects the most industrialised regions of France, Germany and the Netherlands with the North Sea and the Mediterranean. The same cannot be claimed in Central and Eastern Europe in view of several bottlenecks, insufficient navigability and interruptions in a network potentially embodying the most important rivers in Europe, from the Elbe and Oder to the Danube.

Figure 3: Major rivers in Europe



Source: Google Maps website

Cohesion policy and the CENTRAL EUROPE Programme

In 2010 the European Union adopted the new political strategy “Europe 2020”, to support employment, productivity and social cohesion in Europe. This strategy should enable the European Union to achieve smart, sustainable and inclusive growth. One of the 7 flagship initiatives to be put in place at European level and in EU countries presented by the European Commission is the “Resource-efficient Europe”, aiming to support sustainable management of resources and the reduction of carbon emissions, while maintaining the competitiveness of the European economy and its energy security. Involving the transport system, the strategy aims at the modernisation and de-carbonisation of transport, to accelerate the implementation of strategic projects with high European added value and address critical bottlenecks, in particular cross-border sections and intermodal nodes (cities, ports, logistic platforms). Within this purpose, the 2011 White Paper “Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system” sets the

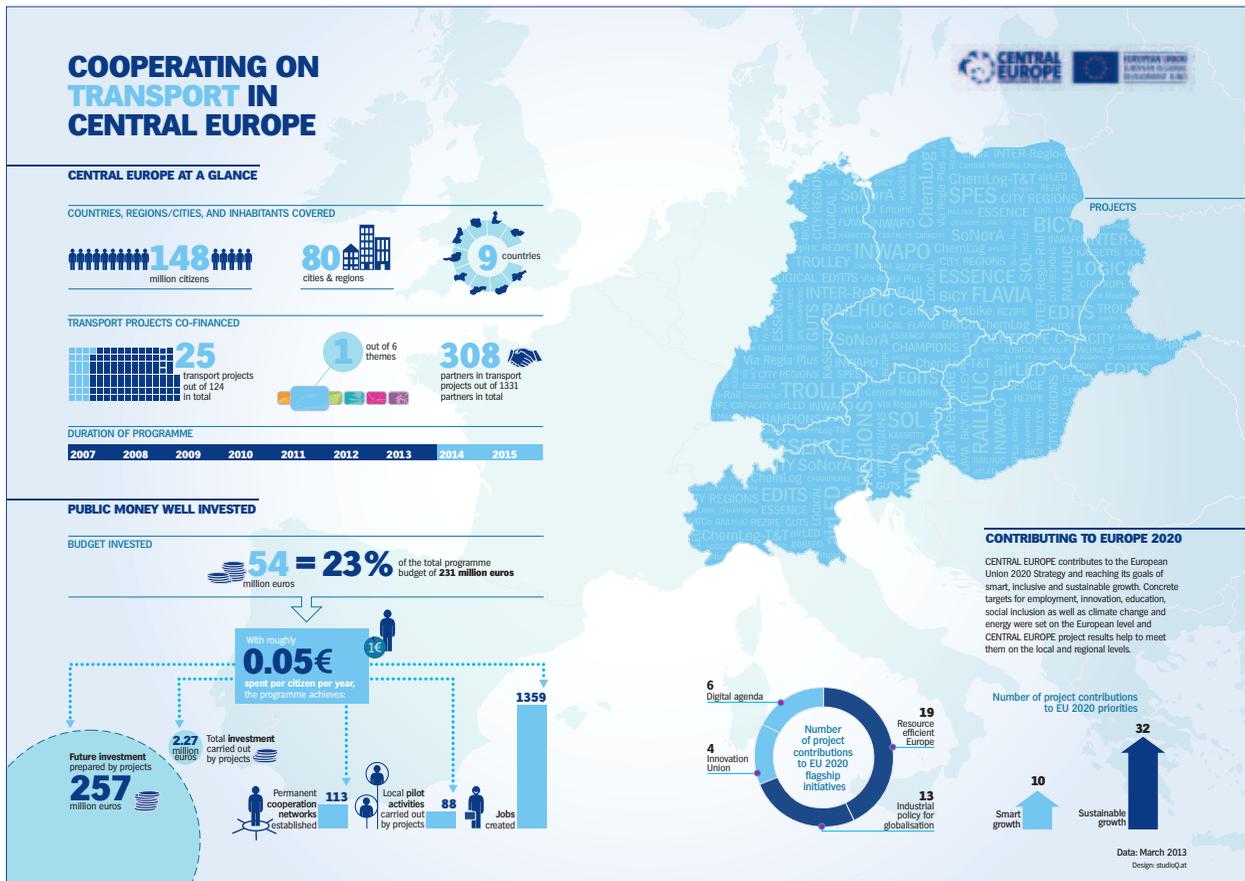
goals to reshape the European transport system by 2050, supporting mobility while reaching the 60% emission reduction target, infrastructure modernisation and introduction of new technologies for transport.

A concrete instrument to reach these objectives is the European Territorial Cooperation (ETC) objective. The ETC objective is financed by the European Regional Development Fund (ERDF) and supports cross-border, transnational and interregional cooperation programmes, mainly focusing on the achievement of the objectives of “Europe 2020”, supporting the Cohesion policy as the primary instrument for mobilising territorial potentials across Europe and covering the period 2014-2020. The European Structural and Investments Funds (ESIF) will continue to support investments in the European Union regions, including cooperation in the transport sector, with the aim of promoting sustainable transport and the removal of bottlenecks in key network infrastructure, complementing the TEN-T infrastructure policy and new Connecting Europe Facility (CEF). The transnational cooperation programme CENTRAL EUROPE is aiming “to get transport go in a greener direction”, as one of the missions is to answer regional challenges in the field of transport and mobility among Central European countries. Croatia is the latest country to join the programme, which already includes Austria, Czech Republic, Hungary, Poland, Slovakia and Slovenia, as well as parts of Germany and Italy. The CENTRAL EUROPE Programme is helping to tackle passenger and freight transport issues, enhancing cooperation for sustainable connections in the Central European regions. In particular, when it comes to freight transport, co-financed projects support the:

- passage to cleaner forms of transportation, in order to shift cargo from the road to railways and rivers;
- improvement of logistics planning for a greener freight transport chain;
- introduction and use of information and technology communication systems;
- testing of new services with pilot actions.

The results of the transnational cooperation networks established in the period 2007-2013 show the contribution of the CENTRAL EUROPE Programme to a more efficient transportation:

Figure 4: Cooperating on transport - CENTRAL EUROPE Programme 2007-2013. Data: April 2014



Source: <http://www.central2013.eu/>

The macroeconomic context: a dual scenario

In Europe, economic growth continues to be registered at a lopsided speed between Western European countries and the Newly Acceded countries. While domestic consumption and investment are lagging behind, exports remain the main engine of growth for a vast majority of countries. Difficulties have mainly arisen from strong competition among countries, due to the global reduction in pace of recovery.

According to the October 2014 IMF World Economic Outlook, the macro-economic scenario continues to be characterised by an uneven global recovery, largely due to weaker-than-expected activity in the first half of 2014 that pushed the IMF to revise downwards the forecasts for the second half of 2014 and into 2015. Emerging markets are registering GDP growth rates that are significantly lower than expected, while advanced (the European ones in particular) economies' pace of recovery is disappointing, as it remains fragile and uneven among countries. Advanced Europe, in particular, is experiencing a multi-speed recovery, with growth still low in the Euro area. The CE region is characterised by an uneven economic recovery split into two sub-regions: on the West, Italy, France, Germany, and to a lesser extent Austria are suffering from negative or very low growth, with serious risks of stagnation. In the East, in the last decade CEE GDP growth has been 6.2 times that of Italy, 3.4 times that of Germany and 2.1 times that of France.

Beyond the CEE and INWAPO borders, Russia, Ukraine, Kazakhstan, Turkey, Egypt and Morocco have seriously reduced their speed of growth, also due to geo-political and military tensions in the Mediterranean region.

As reported in the following table, GDP growth 2019 projections are substantially lower than those registered during the first decade of 2000. Moreover, the pace of recovery is becoming more country specific, with uneven projected growth rates characterising, on one side, Austria, Germany and Italy and, on the other, the Czech Republic, Hungary, Poland, Slovakia, Slovenia and Ukraine.

Among the Central and Eastern European economies, namely Hungary, Czech Republic, Slovakia and Slovenia, export is the main engine of GDP growth, with the strategic importance of long-haul transport and logistics infrastructure, as well as services, having significant implications for their future development.

Figure 5: Enlarged INWAPO countries: selected social and economic indicators

Countries/ Indicators	Population (millions)	Population Density	GDP at 2000 prices US\$ (mil.)	GDP Growth Rate (2000-10)	GDP Growth Projections 2019	Exports as % of GDP 2011
AUSTRIA	8,4	102	230.913	+1.9	+1.3	57
CZECH REP.	10.5	136	83.442	+3.8	+2.1	75
GERMANY	81.7	235	2.131.457	+1.0	+1.3	50
HUNGARY	9.9	110	57.293	+1.9	+1.8	92
ITALY	60.8	206	1.150.683	+0.3	+1.0	29
POLAND	38.2	126	261.950	+4.3	+3.6	42
SLOVAKIA	5.4	113	47.294	+5.2	+2.9	89
SLOVENIA	2.1	102	26.037	+0.3	+1.9	72
UKRAINE	45.7	79	49.985	+4.8	+4.5	53
TOTAL	262.7		4.039.054			

Source: IFM, World Economic Outlook, October 2014. World Bank, World Development Indicators, various issues

In a European economic scenario that looks weaker and weaker, with serious risks of falling into a new recession, CEE and INWAPO countries, in particular, may enjoy the advantages of being in a strategic geographical location, guaranteeing more direct access to the wealthy markets of Western Europe and, more specifically

Germany. INWAPD countries are, in fact, crossed by 2 fast-growing new trade routes across continental Europe: the new silk-road land-bridge linking Europe to Asia and China, and the multi-modal axis linking Central and East Europe to Turkey and the East Med countries. Rail is the main means of transport in the first case, with long and heavy “American-style” freight trains linking Chinese rail terminals to those in Poland and Hungary. The second instance is a mix of rail, road, short haul sea shipping, and inland waterways linking sea, inland ports and intermodal terminals. Sea ports like Venice, Trieste and Koper, and inland ports like Vienna, Budapest and Bratislava, are the potential beneficiaries of increasing freight flow crossing the region from East to West and from South-East to North-West. As foreign trade is among the fastest growing components in the economy of the area, ports and inland terminals will not only play a fundamental role for regional development, but will also act as a strong attractor for private investment in logistics and transport operators. This opportunity presents a strong case for increasing public infrastructure investments that might provide a significant boost to demand in the short term and help raise potential output in the long term. Among the domains more directly involved in this investment process, the most important fields to be developed in the entire area are inter-modality solutions, inland waterways navigability, new rail infrastructures and, in more general terms, cross-border cooperation projects between neighbouring regions.



Analysis of the project results

Inland waterways

DANUBE

In its function as a transport axis, the Danube connects key production and sales markets that have significant European importance. The waterway makes a major contribution towards strengthening the transport network within the Danube Region but also in connecting this macro-economic area via the sea ports along the North and Black Seas to the rest of the world. The ports are also functioning as important transshipment points and logistic hubs. Via their direct rail connection, they are also connected to the North-Adriatic ports.

Figure 6: Ports along the Danube in Austria, Hungary and Slovakia



Source: <http://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/en/maps.html>

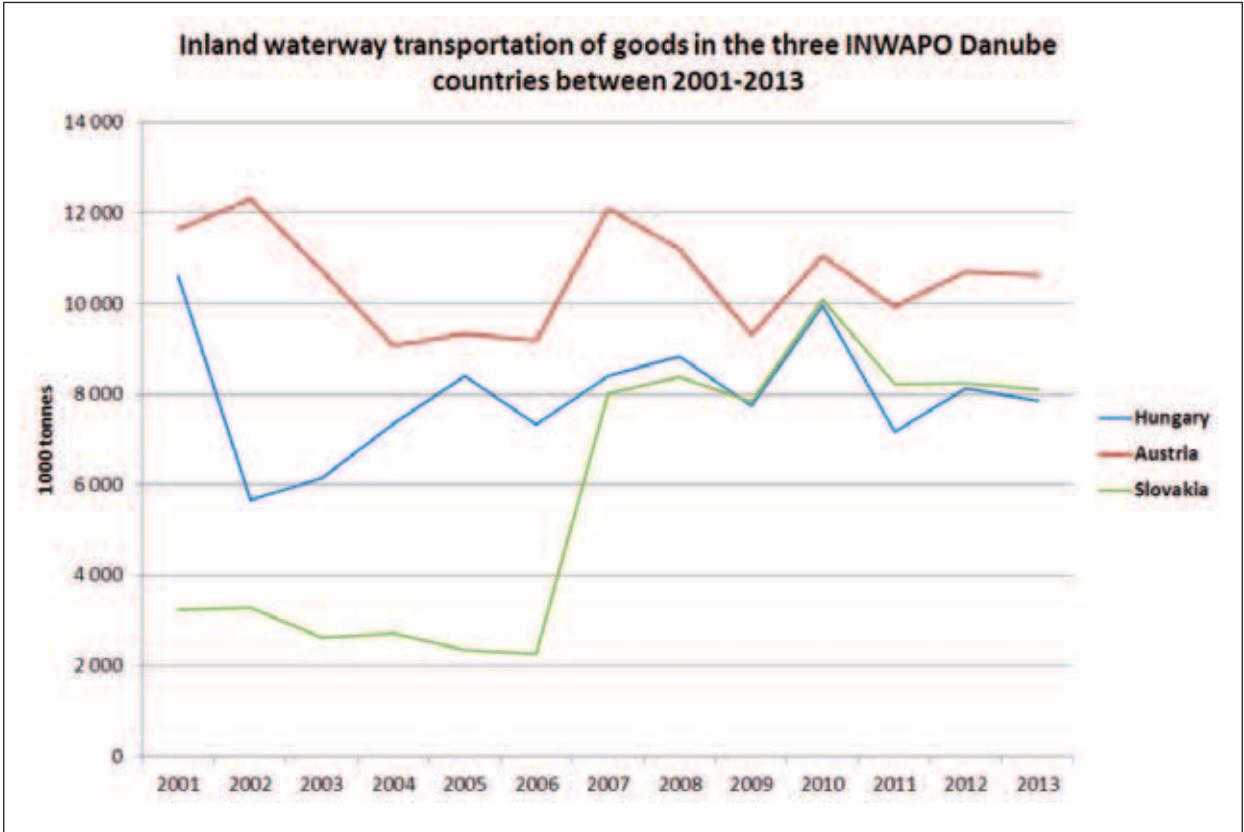
Larger cargo volumes by vessel or convoy improve the relation between freight revenues and costs and thus the overall competitiveness of inland waterway transport. This implies that there is a direct relationship between fairway conditions and the load factor of vessels, and, ultimately, the competitiveness of this mode of transport. Currently, minimum fairway conditions cannot be guaranteed on some sections of the Danube, resulting partly from poor planning, partly from the lack of adequate maintenance equipment and finally from

a lack of financial resources. In order to enable Danube navigation to make use of its key strengths, waterway maintenance and ensuring reliable fairway depths remain indispensable tasks for all Danube countries.

Presentation of the waterway transportation

The diagram of waterway freight transport in the three Danube-related INWAPO countries represents how this transport mode has changed over the past decade. As can be seen on the diagram, Slovakia had a massive increase in waterway transportation in the second part of the 2000s. This increase has been generated by the growing automotive industry, as well as by elevating demand for this mode of transport.

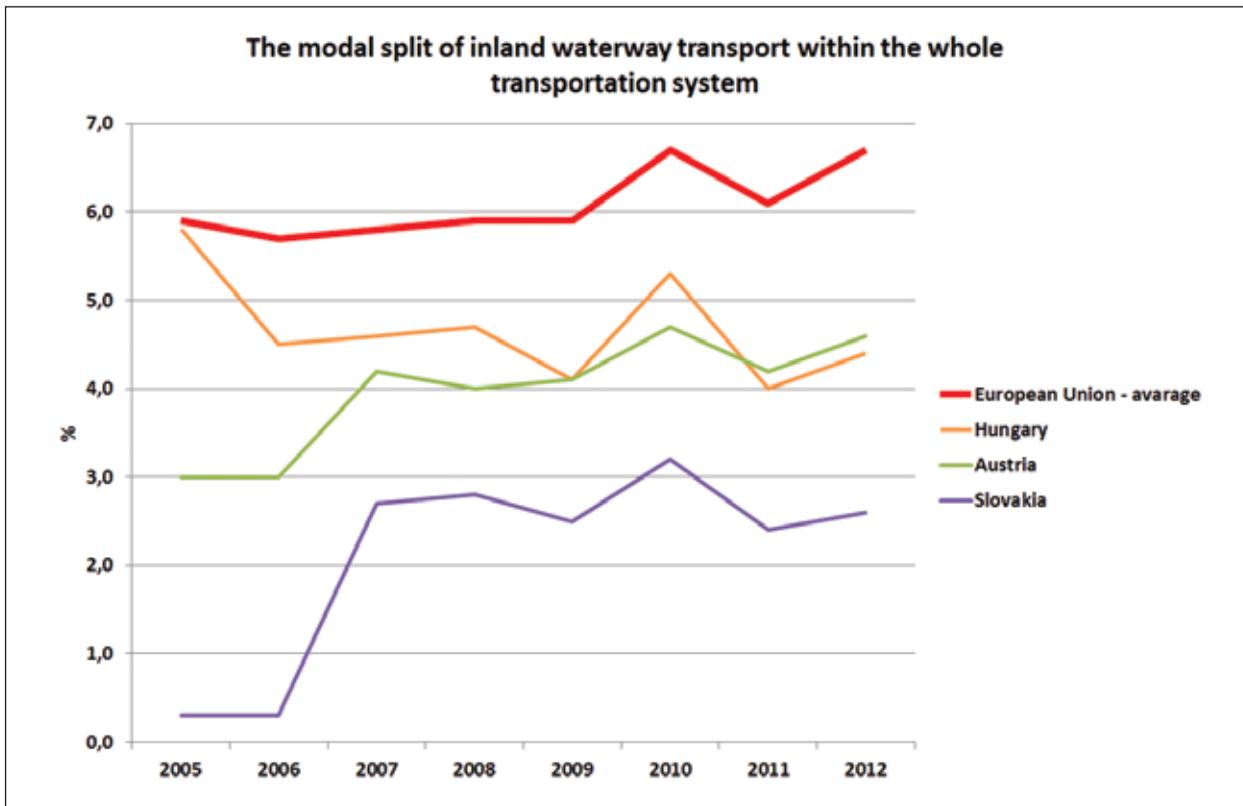
Figure 7.



Source: Eurostat

Comparing modal split of the three countries with the EU average, it can be concluded that waterway transportation is less exploited in these INWAPO Danube countries.

Figure 8.



Source: Eurostat

Budapest - Freeport of Budapest

The overall transshipment capacity of the port is currently close to 2.000.000 tonnes per year (while the capacity of the Ro-Ro ramp is 125.000 vehicles per year). The Freeport of Budapest plans to develop the infrastructure and increase the capacity of the port in the framework of the Transport Operational Programme of Hungary. The road network, rail facilities, water side and public utilities will be developed (rail upgrading, development of internal and connecting road-network, building of a small open cargo bay and parking area, new dock for heavy goods).

As a result of the INWAPO small scale investments, water and electricity direct connection points were built at the quay for vessels, providing direct connection for vessels to basic infrastructural services.

Vienna

The Port of Vienna handles around 12.000.000 tonnes per year, out of which 1.200.000 tonnes are waterborne transshipment.

The INWAPO feasibility study of the port focusing on container transport also highlights the inadequate waterway conditions of the Danube.

The port put the focus on bulk and heavy cargo and implemented the internet platform for shippers, forwarders, shipping companies, shipping agents and barge owners, industries and ports.

Based on the potential waterborne transport volume analysis, bulk and heavy cargo showed the greatest opportunity for the port location of Vienna. The Study "Ports Need Assessment" underlined the results to set the focus in that direction.

The Port of Vienna is enlarging the container terminal, which is actually used mostly for landside transshipment, via land reclamation. The concentration of the container terminal allows taking advantage of new faces for the use of cargo handling.

Cargo handling had double-digit rate of increase in 2013, and as one result, in the port of Albern a new Terminal with a focus on high and heavy goods will be implemented in 2015.

Bratislava and Komarno

The overall transshipment capacity of the port of Bratislava is almost 8.000.000 tonnes while its storage capacity for containers is 25 000 TEU.

For the port of Komárno the overall transshipment capacity is more than 2,1 Mio tonnes per year. The port's most important cargo types are oil products (75% of the cargo transhipped in 2011) and bulk cargo (24,5%).

There is a real opportunity to develop the services of these ports given the prospering automotive industry. The attention of the stakeholders has to be drawn to IWW transport mode, which is competitive with rail transport thanks to cheaper prices. As can be seen on the diagram above, the IWW transport in the modal split of Slovakia significantly grew between 2006 and 2007, thanks to the automotive industry's production. Since then, the crisis has hindered the further expansion of the IWW transport. There is still the opportunity for further development, however. In the framework of the INWAPO small scale investments, a crane was renewed in Bratislava, which can be regarded as the first step towards the renewal of the port and port's services.

Potential waterborne transport volumes

An in-depth analysis has been prepared by the three INWAPO countries in order to assess freight volumes with a potential to be transported on waterways.

Freeport of Budapest: in the hinterland area of the Freeport, altogether 248.287 tonnes, 865 TEU, 15.326 ITU and 283 FTL of freight volume could potentially be shifted on waterways.

Port of Vienna: the theoretical transport cargo potential that could be shifted to inland waterway transport is 7,3% of the existing road transport. As not all demands find a suitable solution and not all solutions can be designed to meet the existing demands, this potential is reduced to 4,7 %. Considering 18 companies, this potential is around 120.000 tonnes. For 50 companies it is 320.000 tonnes and for 120 companies it is 730.000 tonnes per year.

Slovak ports: the aim of the INWAPO project was to draw attention to the unused transshipment potential at the Ports of Bratislava and Komárno. The existing insufficiently used infrastructure offers outstanding development opportunities (i.e. the Ro-Ro ramp in Bratislava). The proposed new construction activities within the area of the port can also improve the current situation. The most promising development is the construction of a new car terminal. The INWAPO feasibility study of the port points out that the automotive industry could be the target of the port's future development. The existing Ro-Ro ramp can be used for the transshipment of new cars from rail and truck to vessels and vice versa.

Problems, challenges and needs identified

The main challenges for the ports along the Danube are their underutilisation. The ports' capacities are far larger than what their usage statistics show. The modernisation of ports - including the modernisation of services provided for the ports' users - could lead to a better capacity usage.

Another challenge is to raise awareness of transport stakeholders towards inland waterway transportation. The good rail and road conditions and connection possibilities, and the medium distance from the European core territory prevent the development of waterway transport in many cases, even if it would be cheaper to tranship products and raw materials on waterways. That is why it is preferable to provide flexible and quick services and put more emphasis on marketing. In some cases, the only option for transportation is waterways, especially for the transport of heavy goods (bridge elements, heavy vehicles, large quantities of bulk material). These cargo types ensure the future demand for the ports' services.

The availability of adequate, cargo-specific handling and storage equipment at a certain port location is - in combination with the overall service quality provided in ports (opening hours, flexibility, etc.) - a decisive factor concerning the question whether a modal shift towards inland waterway transport can be achieved or not.

ELBE-ODER

Presentation of the water transportation

The inland waterway transportation system of the Czech Republic consists of Elbe-Vltava waterways, with a navigable length of 315.2 km. The main part of the waterway is the Elbe, having an importance in the context of international transport as it is the only waterway connecting the Czech Republic to overseas ports. Unfortunately, its main bottleneck limits water transportation and navigability in the problematic section between Ustí n. L. Střekov - and the state border with Germany.

Classification of inland waterways in the Czech Republic is based on the Decree of the Ministry of Transport dated to 14 September 1995. Middle Elbe (Chvaletice - Melník) is classified in category IV, Lower Elbe (Melník - state border with Germany) in category Va and the lower course of the river Vltava (Trebenice - Melník) in category IV. The parameters of two defining objects, the Fairway and the lock chamber specifies the classification of waterways. According to the Decree, the smallest width of the fairway for category IV and Va is 50 metres; the minimum navigation depth for the same category is 2,80 + 0,50 m (safety distance above the bottom of the waterways) and the smallest radius of fairway curvature for category IV and Va is 650 m. The Decree also contains a list of public ports and their operational status. Elbe ports in operation are: Kolín, Mělník, Lovosice, Ústí nad Labem-Vaňov, Ústí nad Labem-Krásné Březno, Děčín-Loubí and Děčín-Rozbělesy. The ports of the Vltava River in operation are: Praha - Radotín, Praha - Smíchov, Praha - Holešovice and Praha - Libeň.

The Elbe-Vltava waterway, including its ports, forms a part of a TEN-T project, with a main objective is to create a multimodal network and to improve the infrastructure of inland waterways.

Inland Waterway Transport

The cargo traffic within the Czech Republic has a low volume: an average of 385. 4 thousand tonnes per year was transported during the last three years. Inland waterway transport cargo exists only within three regions: Ústecký kraj, Středočeský kraj and Praha. Typical transported goods are: metal ores, other mineral raw materials and secondary raw materials, municipal and other waste.

International Waterway Transport

Transport streams from the Czech Republic through international traffic to Germany, Belgium, France and the Netherlands. In the last three years, the average export to these countries was about 232, 1 thousand tonnes per year. Raw materials for chemical production and chemical products, fertilizers, agricultural products, metal products, machinery and equipment, secondary raw materials and waste, and metal ores and other minerals dominated the export. There is only a small volume of international cargo transportation via waterways in the Czech Republic. The following table shows the carriage of goods on inland waterways in the territory of the Czech Republic in the years 2005 - 2012. Transport of agricultural commodities, fertilizers, animal feed, chemical raw materials for the production of heavy and oversized objects (investment units) dominated the foreign transportation on the Elbe.

Table 1: Total transport of goods (thousand tonnes)

Total transport of goods (thousand tonnes)	2005	2006	2007	2008	2009	2010	2011	2012
<i>by type of transport</i>								
inland	685	419	630	388	335	371	510	410
International - total	923	722	511	363	469	461	401	428
in which: export	553	380	259	185	336	289	206	264
import	370	342	252	178	133	172	194	164
Transport performance (mil. tkm)	62	44	36	28	33	43	42	38
<i>by type of transport</i>								
inland	29	15	17	12	12	16	21	16
International - total	34	29	19	15	21	26	22	23
in which: export	22	17	12	10	16	19	12	14
import	12	11	8	6	5	7	9	8

Source: <https://www.sydos.cz/cs/prepravaCR.htm>

Potential waterborne transport volumes

Statistics for cargo transport in the Czech Republic indicate that IWT makes up only a marginal amount of the transported cargo, about 1% of the total amount. Road transportation has a dominant role, followed by rail, which has a significant share in the transportation of bulk cargo and containers over long distances.

According to the methodology of the INWAPO project, applying the affinity index processes of the theoretical shifting of 414.9 thousand tonnes per year of potential cargo volumes to waterway transportation at the ports on the Elbe - Melnik, Lovosice, Ústí nad Labem and Decin in the Czech Republic - was identified. In reality, a smaller volume is realisable, according to the situation of the transport market, where firms are accustomed to the relatively well-established transport services of road and rail carriers. It is a challenge to convince companies to transfer part of their cargo to a new multimodal transport system, encompassing inland waterways.

Inland waterway transportation in the Czech Republic is essential for the transport of heavy and oversize cargo abroad. River ports are, in special cases, cooperating with engineering firms offering them the possibility to install large investment projects in the port before embarkation.

There is a potential to shift overseas cargo to waterways if shipment companies are able to offer production firms, as end customers, “one-stop” solutions, i.e. a comprehensive method of commercial traffic. However, as a beginning it is necessary to improve the infrastructure of waterways, ports and vessels, and to enter into negotiations with customers and logistics firms.

Problems, challenges and needs identified

The fundamental problem of inland waterway transportation in the Czech Republic is the unreliability of the Elbe waterway between the lock at Ústí n. L. Střekov and the state border with Germany. Unsatisfactory navigation conditions in this section for a considerable part of the year are barriers to the competitiveness of inland waterway transportation. The second problem of Czech IWT is in the unnavigability of the river Elbe in the section near Přelouč, which does not allow for an upstream cargo traffic to Pardubice.

Two navigation improvement projects at the Decin Lock and the Přelouč II lock can enhance the navigability in the above mentioned sections. Both projects went through several years of EIA approval processes but environmental initiatives have been actively preventing their approval up to now.

Once the navigability problems of the Elbe can be overcome, it will offer the opportunity for the IWT to regain part of the traffic now covered by road and rail services. Some inland ports, such as Mělník and Ústí nad Labem, offering intermodal transport services in rail container terminals located within the port area, would in the future more easily shift freight cargos from rail to IWT, according to the circumstances.

Better possibilities to transfer goods to the multimodal cargo transport including an IWW component can be reached if the local transport authorities will be able to implement a number of pilot projects which would demonstrate to the potential customers the costs and timing advantages produced by using the inland waterway transportation.

It will be necessary to continue the programmes of modernisation of inland waterway freight carriers, offering the owners or operators of vessels grants for the purchase of low-emission propulsion units and ancillary components, the modernisation of vessels for the purpose of increased multimodality and the realisation of measures to increase the safety of inland waterway transport.

VISTULA

Presentation of the waterway transportation

Among the analysed ports, most have been excluded from the operation or do not meet any function for freight transshipment. The Vistula river ports no longer constitute a natural hinterland for the sea ports in Gdańsk and Gdynia. Now the Vistula River navigation consists of three main components, which are the following:

1. Barge movements related to public works related to the maintenance of infrastructure against floods, including dredging and ice-breaking;
2. Inland tourism carried out on small vessels (e.g. yachts) along short distances;
3. Transport services related to the exploration of sand deposits and aggregates of the bottom of the Vistula River; the transport takes place on short distances between the place of extraction and the port of destination; the distribution of raw material mined is also carried within short distances.

Figure 9: Classes of navigable waterways in Poland

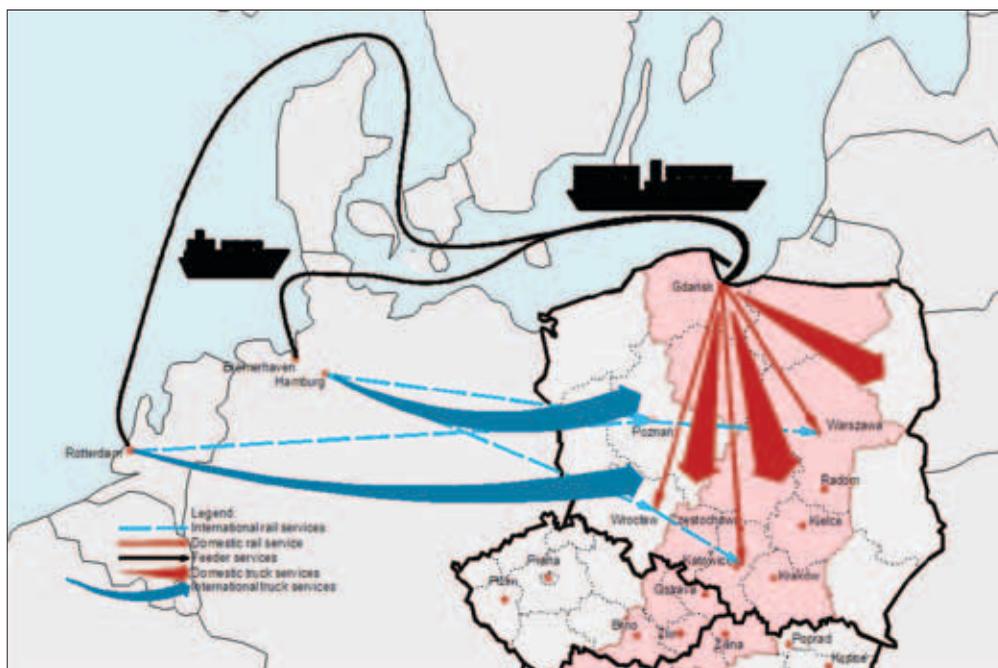


Source: INWAPO study "Needs Assessment" and "Investment plans"

Potential waterborne transport volumes

The route of the Vistula waterway overlaps with the route of the VI Transport Corridor of TEN-T Network included in 2012 by the European Commission into the Core Network of the EU transport corridors. Included in these corridors, there are the two most important Polish sea ports - in Gdańsk and in Gdynia, both located at the estuary of the Vistula River. The actual capacity and, more importantly, the future potentiality of both ports in terms of container traffic with origins and destinations the internal markets in Poland are a starting point for any further consideration concerning the development of inland waterway transport services along the Vistula River.

Figure 10: The freight distribution area from the ports of Gdynia and Gdańsk along the Vistula River



Source: INWAPD Market Review Analysis report, based on the data of the Deepwater Container Terminal in Gdańsk

Elimination of bottlenecks, even on short sections of waterways (deepening of river-bed, modernization of terminals, etc.) would encourage the creation of pilot actions addressed towards the spreading of new interest in the use of waterway services as an alternative to road transport. In perspective, the route linking the port of Warsaw to those of Gdynia and Gdańsk could cover quite large shares of the market.

Problems, challenges and needs identified

In Poland it is necessary to determine, at Governmental level, the development plan of inland waterways and ports. The most important decision concerns the classification of the waterways. “White Paper 2011” in the part concerning inland waterway transport will not be adapted to national policy. The Vistula River will not be a component of the TEN-T network and Poland has not signed the “European Agreement on Main Inland Waterways of International Importance (AGN)” yet.

Sea ports

NORTHERN ADRIATIC

Presentation of the waterway transportation

Port of Venice

Handling approximately 450.000 TEUs in 2013, Venice is one of the leading Adriatic container ports. Basically, international cargo flows consist of manufactured goods (Far East), semi-finished goods (Mediterranean), raw materials, grains, oil and oil products (all the world). Besides that, the Port of Venice is home to ferry services (Ro-Ro/Ro-Pax) linking it with destinations in Southern Europe and Northern Africa. Venice is the main port in Italy with immediate access to inland waterways connecting the north-eastern and north-western regions of the country; this system efficiently facilitates the transport of about 1.8 million tonnes of freight a year, that

otherwise would have to be transported by road. In order to further develop Venice's Ro-Ro and RO-PAX traffic in the context of Motorways of the Sea and short sea shipping, a new dedicated terminal is operational since May 2014. On the land side, the port of Venice has direct access to the national and European highway networks. The port is also linked to the rail network by a double-track, electrified route through Marghera and Mestre stations. The internal rail tracks, of about 30 km, reach the terminals, running along the quayside, and serving both the commercial and industrial commodity sectors.

Port of Trieste

In 2013 the port of Trieste handled 458.600 TEUs and a total of 56.585.000 tonnes, with a significant increase of 15% from 2012. Thanks to a maximum depth of 18 m, 12 km of docks, 70 km of rail track connecting 58 berths and 925,000 sqm of storage areas, the port of Trieste offers services for all types of traffic: containers, Ro-Ro ferries, passengers, agri-food products (cereals, fruits, coffee and refrigerated products), miscellaneous goods, project cargoes, cements, mineral oils, bulk products, iron and steel products, oil products and by-products, industrial products, and chemicals. Port services are available day and night, 365 days a year and they can be adapted to each customer's needs. As regards multimodal rail links, the port of Trieste is connected with the major Central European hubs of Munich, Vienna, Prague and Budapest by regular scheduled train services. In order to further increase traffic, the port of Trieste is currently building a new logistic platform with equipped yards and new docks connected to the Trieste motorway link road and the rail network outside of the port with a dock approximately 600 m in length and 14 m depth; the port has also planned to enlarge some terminals for containers as well as for Ro-Ro. Currently, the port is not connected to inland waterways, but potentially the Po river and its North Italian trade basin could be reached, re-adapting historical lagoon routes using sea-river barges. The connections with the Danube River could be further developed by road or train.

Port of Koper

The Port of Koper is a multi-purpose port, equipped and prepared for handling and warehousing all types of goods. The Port of Koper is connected with the hinterlands by highway and railway. The hinterland of the traffic of the port of Koper is represented by the main Central and Eastern European countries. In 2011 traffic was related to Austria (27%), Slovenia (28%), Italy (14%) Hungary (9%), Czech Republic (3%), Slovakia (5%), Germany (2%) and other markets (12%). However, currently, there is no real traffic between the port and inland waterways, potentially the Po River could be linked to Koper using sea-river barges, while connections with the Danube could be developed by road or railways. The port's inland connections are well-developed: 30 km of railways connecting all terminals and 26 km of berths, some of which are specialised to specific cargo groups, whereas others are multipurpose.

The waterborne transport potential

Port of Venice

In order to investigate the port of Venice potential waterborne transport volume, within the INWAPO project four categories of commodities have been analysed, selected among the most relevant for the Port.

The iron and steel logistics: central and eastern Europe represents a considerable potential market and the enhancement of rail services and related logistics requirement will allow fulfilling this opportunity.

Agro-food/feed logistics: the port of Venice plays a key role as a primary import gate for the milling and animal husbandry industries (feed mills) located in the northern Italian regions. To develop this sector beyond the Italian boundaries, at the moment, the most interesting sector is soya flour, to be used in the animal feed industry. This comes from the fact that balanced rail connections can be built capitalizing on:

- Inbound, the grain and cereals loads arriving from Austria with market destinations in Veneto by train, that can easily reach also the docks of the Venice port;
- Outbound, the soya flour unloaded in Venice port with destination the Austrian markets.

Refined oil and the energy logistics: incoming products in the port of Venice are already refined and processed. This is having an important impact for the port, modifying the nature and the characteristics of port traffics in this sector and leading towards the promotion of new investments in "green" technologies.

Chemical logistics: assessment of logistics requirements needed and enhancement of port capacities in relation to different commodities (solid, liquid and gaseous).

Port of Trieste

For the port of Trieste one specific waterborne transport volume was analysed within the INWAPO project, with the goal of understanding the actual situation and the potential traffic for agro-food products in view of future market developments at national level and also abroad. According to the results of the study, the market share covered by the port of Trieste in this sector can be subject to a significant further increase in the next years, given the current positive trends in the exports of many emerging producer countries in the East Med and surrounding region.

In the port there are three terminal operators specialised in the handling, storing, conservation, packaging and industrial processing of food products. In the 2007-2011 period, traffic of perishable products has increased, while that of dry products decreased slightly, as a result of the fluctuation of the market in cereals.

According to the study, by 2020 the traffic of food products is likely to increase by a few percentage points, considering the limitations of port infrastructure, but if better connections with the Eastern European countries would be developed and if existing technologies would be further implemented, the market could grow significantly more in the future.

Table 2: Total data of agri-food products by cargo modality

TOTAL AGRI-FOOD PRODUCTS	TOTAL - tonnes			
	Total	Containerized	Break-Bulk	In bulk
2007	679.121	245.568	262.451	171.102
2008	583.269	298.235	209.261	75.773
2009	702.770	388.824	199.442	114.504
2010	649.290	391.623	170.446	76.798
2011	816.983	574.552	165.633	76.798
Average % yearly incr./ decr.	4,45%	10,91%	-4,78%	-7,07%
Forecast	Total	Containerized	Break-Bulk	In bulk
2015	776.656	529.284	165.789	81.584
2020	1.031.353	837.497	132.890	60.966
% yearly incr./decr.	2,62%	4,28%	-2,42%	-2,53%

Source: Trieste Port Authority's data - processed by A.I.O.M

Port of Koper

Incidentally, all the INWAPO countries are defined as the hinterland of the Port of Koper: Austria, Slovenia, Italy, Hungary, Czech Republic, Slovakia, Germany (and also, to a lesser extent, other markets).

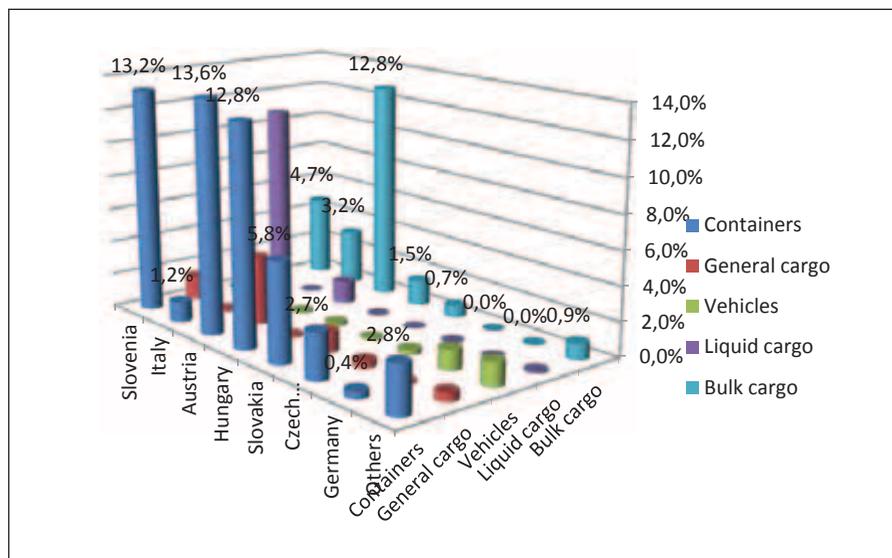
The result of the market review analysis conducted by the Port of Koper provides an overview of the goods flow between Slovenia and INWAPO countries for 14 groups of goods (EU NST 2007 classification), focusing then on 3 groups of goods: wood and wooden products, basic metal and metal products, containers. The data for import and export have been analysed with reference to 2008-2011. The analysis identified quite numerous goods categories adaptable to modal shift in the exchange between Slovenia and the INWAPO countries: food products, beverages and tobacco; coke and refined petroleum products; wood and products of wood and cork (excl. furniture); pulp, paper, paper products; chemicals, chemical products, and man-made fibres; rubber and plastic products; basic metals; and fabricated metal products, except machinery and equipment. However, given the current conditions of port infrastructures, unfortunately only a limited share could be shifted from road to rail.

During the last decade, the throughput in the Port of Koper - despite oscillations caused by the global economic crisis - was steadily growing. In particular, the throughput of containers has registered the highest growth trend: an annual rate of more than 17% per year, +19%, if calculated in TEUs. In the future, on the basis of a realistic scenario, the Port of Koper should increase its throughput by approximately 4% by year, doubling it by 2030.

On the basis of cargo modal breakdown, approximately 62% of the total throughput should be transported by railway to the final market destination countries. More precisely, the railway transport of freight should increase from 10.1 million tonnes to 20 million tonnes in 2030, assuming that both the infrastructure within the port

(enlargement of the existing facility/capacity of Piers I and III and of other terminals' capacity) and the transport infrastructure crossing Slovenia will keep up with the increase of demand for rail cargo.

Figure 11: Total data of agri-food products by cargo modality Geographical and goods structure of the throughput in the Port of Koper (realistic scenario), 2030 (%)



Source: Port of Koper

The investigation of potential waterborne transport for the North Adriatic area can be completed with the results of another study carried out within the INWAPO project, which is the analysis on intermodal rail services with origin/destinations in North East Italy, implemented by EINE - North Eastern Industrialisation bodies.

Primary infrastructural nodes in the North Eastern part of Italy have been analysed (period 2008-2011) and all the main terminals, both inland (Verona, Padua and Cervignano) and maritime (Venice and Trieste) showed increased traffic, particularly relevant in the case of ITUs.

The two main analysed inland terminals were the Verona and Padua freight villages:

- Verona freight village is among the most important freight villages in Italy, with more than 110 couples of combined transport trains in 2012. The freight village covers an area of 2,5 million square meters, with a planned expansion to 4.2 million square meters. The main typology of ITU handled in Verona Terminal is swap bodies, serving as an inland-inland terminal. Verona shows a rather constant traffic of about 300.000 ITU (corresponding to 550.000 TEUs) but main forecasts from the operators show increasing traffic, especially to Germany and North-Eastern Europe. New markets that will be exploited are Poland and, secondly, the Slovak Republic.
- Functionally, the area of Interporto Padua covers a total of more than 2 million square meters, 1 million being owned by Interporto Padova Spa, and includes rail and container terminals, numerous logistics operators, hauliers and couriers all working together in synergy to make Padua one of the most important logistics centres in Italy. Every year, the terminal handles around 300,000 TEU. These figures place Interporto Padova at the top of Italian and among the largest among European operators. More than 5,000 trains connect the freight village to the main Italian and north European ports every year. Padua shows a traffic increase of around 15-20% from 2011, mainly due to export traffic and its relationships with the ports of La Spezia, Genoa and Leghorn in Italy, but also with Rotterdam and Koper.

Problems, challenges and needs identified

In recent years, despite the crisis, the North Adriatic ports of Venice, Trieste and Koper have registered a positive performance in container traffic, as well as in bulk and general cargo. Although they are competing among each other, the three ports have different catchment areas. Venice's reference market is mainly regional, as the large majority of it refers to Veneto and the North and North-East regions of Italy. Koper and Trieste's maritime traffic is not only regional (Friuli-Venezia Giulia and North-East of Italy) or national (Slovenia),

but mostly international. Austria, Hungary and Germany are the main countries of origins/destinations of significant quantities of raw materials, bulk and manufacturing products travelling largely by train via containers, trailers and swap bodies.

In the future, the main challenge for the three North Adriatic ports comes from the opportunity to further enlarge their catchment area, increasing both the quantity of goods transported and the number of markets served. Venice, on the West side, and Trieste, Koper and Rijeka, on the East, have the chance to develop inland multi-modal (road and rail) corridors that will enlarge their catchment area to Austria and, in Southern Germany, the federal states of Bavaria and, maybe to a lesser extent, Baden-Wurttemberg. The three ports on the East side have already activated rail connections in Slovak Republic, Czech Republic, Hungary, Southern Poland and the East Landers of Germany. Venice also has significant opportunities to develop tri-modal transport services on sea-inland waterways along the Po River, linking the port of Venice with the inland ports of Mantua and Cremona, up to Milan, serving one of the richest areas in Northern Italy.

In order to reach this goal, the major problems to be tackled for the three ports are mainly concerned with the implementation of infrastructure investments needed in port capacity and, even more importantly, in rail infrastructure and services. Once all the investment programmes are completed, the three ports will be able to offer a serious alternative to services currently available from the largest European ports of the Northern Range, becoming one of the most attractive in the Mediterranean area. The major threats on this side come from difficulties in finding the significant amount of resources that need to be mobilised for investment from both public and private sources.

BALTIC SEA

Presentation of the waterway transportation

Port of Gdańsk

The port of Gdansk is the most important sea port in Poland and one of the most important on the Baltic Sea. It is located on both sides of the Martwa Vistula River, on the south shore of the Bay and with an 11.5 km extension along the river.

Figure 12: Ports Localization: Gdynia, Gdańsk, Elbląg



Source: maps.google.pl, own study

Port of Gdynia

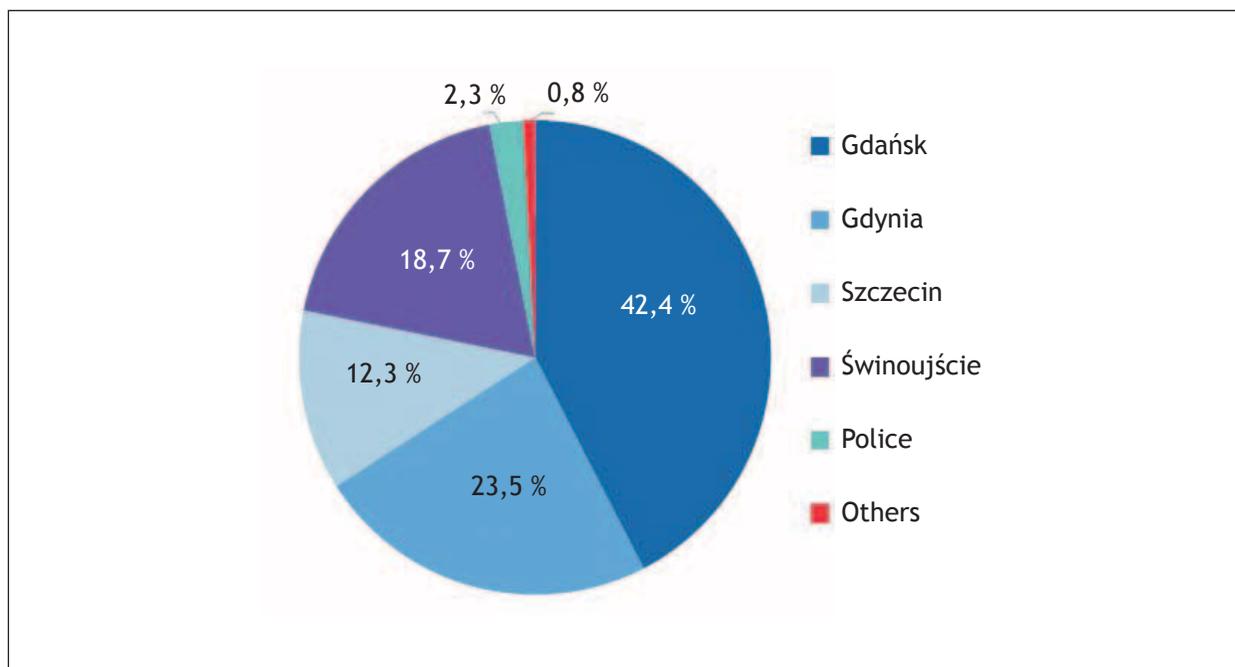
The Port of Gdynia is a universal modern port specialising in handling general cargo, mainly unitised cargo transported in containers and in a Ro-Ro system, based on the well-developed network of multimodal connections including hinterland, regular Short Sea Shipping Lines and ferry connections (ferry terminal). The Port of Gdynia is an important link in the Corridor VI of the Trans-European Transport Network (TEN-T).

Port of Elbląg

Port of Elbląg is located on Elbląg River, 6 km away from the Vistula Lagoon and is administrated by Port Elbląg Sp. z o.o. The port handles cargo and passenger navigation, mainly in the area of the Vistula Lagoon. The transshipments increased in the 1990s to over 600,000 tonnes (1997). Then the carriage decreased, firstly in connection with unclear relations with the Russian Federation and then, after 2005, due to the connection of Poland to the Schengen Area and establishment of the external border management of the European Union. The port turnover dropped to the level of 3,500 tonnes per year.

The chart below presents the cargo turnover in Polish seaports in 2013.

Figure 13: Cargo turnover of Polish sea ports



Source: portalstatystyczny.pl

The table below contains transshipment statistics data in **Port of Gdańsk** from recent years:

Table 3: Cargo handling 2010-2014 [tonnes]

	2010	2011	2012	2013	2014 I-IX
Grain	781 152	816 123	1 017 609	1 479 443	1 193 970
General cargo*	6 132 028	7 300 488	8 888 019	10 513 937	8 298 988
Other bulk**	2 686 735	5 011 746	4 327 721	2 650 378	2 705 150
Coal	3 180 939	1 789 259	1 923 785	4 589 254	2 781 866
Liquid fuels	14 401 243	10 387 872	10 741 002	11 026 283	8 599 372
TOTAL	27 182 097	25 305 488	26 898 136	30 259 295	23 579 346
Containers	4 947 223	6 100 512	7 629 909	9 745 259	7 694 276
Containers [TEU]	511 876	685 643	928 905	1 177 623	932 111
Passenger	164 331	154 651	150 099	136 378	115 261

* general cargo + timber

** aggregate, sulphur, ore...

Source: www.portgdansk.pl

Along the 33 quays and terminals, all types of cargo are handled in the port of Gdansk - from general cargo to bulk, liquid cargo and heavy and oversized cargo.

The table below contains transshipment statistics data in **Port of Gdynia** from recent years.

Table 4: Transshipment in Port of Gdynia 2009-2013

	2009	2010	2011	2012	2013
Coal&coke	1899	1684	1400	2050	2640
Ore	0	4	0	0	0
Otherbulk	1892	2264	2726	1794	1631
Grain	1915	1664	1587	1782	2178
Timber	16	44	45	50	95
General cargo	6757	8160	9562	9920	11053
Oil products	778	916	591	213	62
TEUs	378340	485255	616441	676349	729607

Source: www.port.gdynia.pl

Transshipment data from **Port of Elbląg** from the period 2009-2013 can be found in table below.

Table 5: Transshipment in Port of Elbląg 2009-2013

	2009	2010	2011	2012	2013
Coal	0,0	23,9	34,5	38,3	55,8
Sand	0,0	0,0	0,0	0	0
Steel structures	4,0	13,9	2,0	0	2,2
LCL load	0,0	17,8	77,0	122,2	226,5
Grain	0,0	9,2	0,0	8	1
TOTAL	4,0	64,8	113,5	168,5	285,5

Source: www.port.elblag.pl

Potential waterborne transport volumes

Focusing on the Port of Gdansk analysis, the main advantage of the port is the opportunity to develop deep-sea transshipment bases. Investment development plans aiming at achieving the status of a container hub of the transshipment capacity up to 5 million TEU per year are foreseen. In fact, one of the strategic objectives is the development of the Port of Gdansk as a Baltic hub container and in the position of distributor of fuel and dry bulk cargoes, taking advantage over the location of the port on the southern edge in the Baltic Sea and the course of the Trans-European Transport Corridor VI, connecting the Scandinavian countries with Southern Europe. The table below presents the overall transshipment capacity information on the Port of Gdańsk.

Table 6: Overall transshipment capacity of the Port of Gdańsk

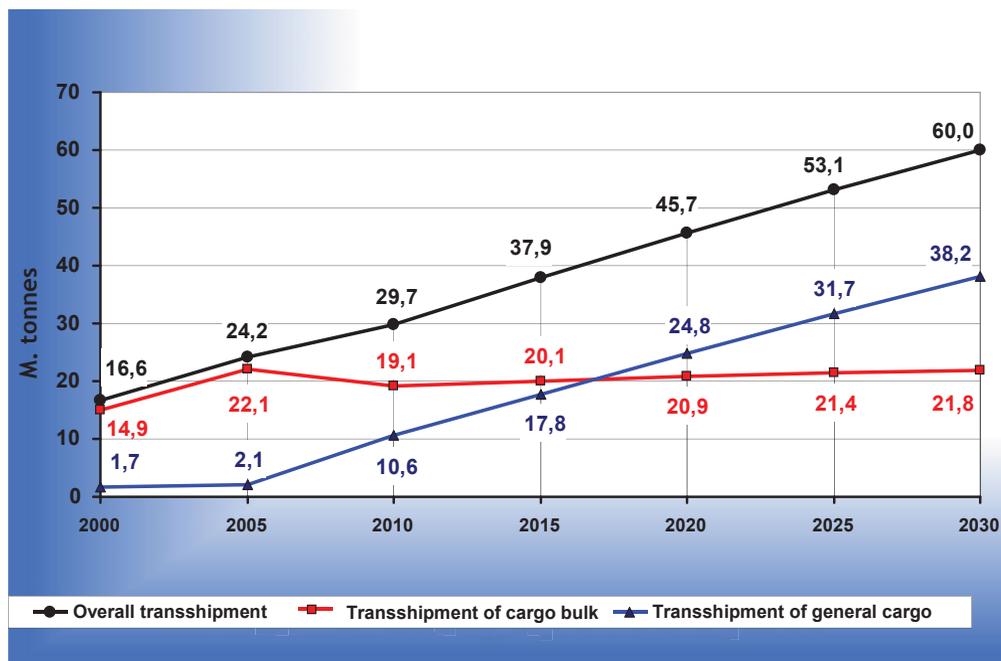
	TEU/Tonnes per year	Current utilisation in %
TEU Capacity/year - for both container terminals	1.350.000 TEU	63,5%
Tonnes Capacity/year -for whole port	63,5 M. tonnes	38,4%

Source: INWAPO Summary report on the potential waterborne transport volume

Problems, challenges and needs identified

One of the goals of the Port of Gdańsk is to achieve the status of a container hub with a transshipment capacity up to 5 million TEU per year. The main advantage of the port of Gdansk is the possibility to develop deep-sea transshipment bases. One of the strategic objectives is the development of the Port of Gdansk as a Baltic hub container and to achieve the position of distributor for fuel and dry bulk cargoes, taking advantage of the location of the port on the southern edge of the Baltic Sea and the course of the Trans-European Transport Corridor VI, connecting the Scandinavian countries with Southern Europe.

Figure 14: Forecasts transshipment of the port of Gdańsk 2030



Source: Forecast and Strategy Department, Port of Gdańsk, www.baltic-adriatic.eu

Links inland - sea ports

NORTH ADRIATIC: CONNECTIONS WITH THE DANUBE AND THE NORTH-ITALY INLAND WATERWAY SYSTEM

Links and potential links

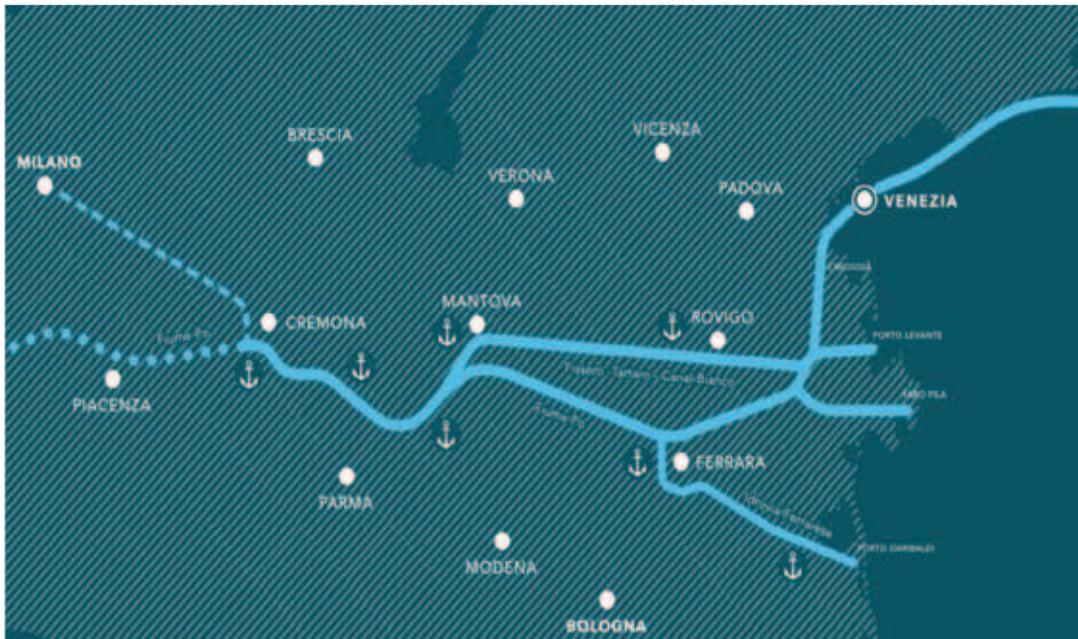
Inland connections

Port of Venice

The Port of Venice, is heavily investing to develop its multimodal services. Last year, the port expanded its commercial port's rail yard. Its main development projects (a new Ro-Ro terminal and a new offshore-onshore terminal) will add to its rail infrastructure as well. From Venice, the rail traffic can flow along three main lines: Northern Italy (through the Po Valley); Western Austria and Germany (through the Brenner Pass); and Central and Eastern Austria (through the Tarvisio node).

Venice is also the only major port in Italy with an inland waterway connection: the main section is the Fissero-Tartaro channel, 135 kilometers long. The channel is currently navigable between Venice and Mantua and, with class V barges, from Mantua to Cremona, with a possible extension, in the future, to the metropolitan area of Milan. The Po river and its canals system include a total of 735 Km of inland waterways, from Cremona down to the two Adriatic-deltas of Porto Levante to the North and Porto Garibaldi to the South.

Figure 15: Po river system



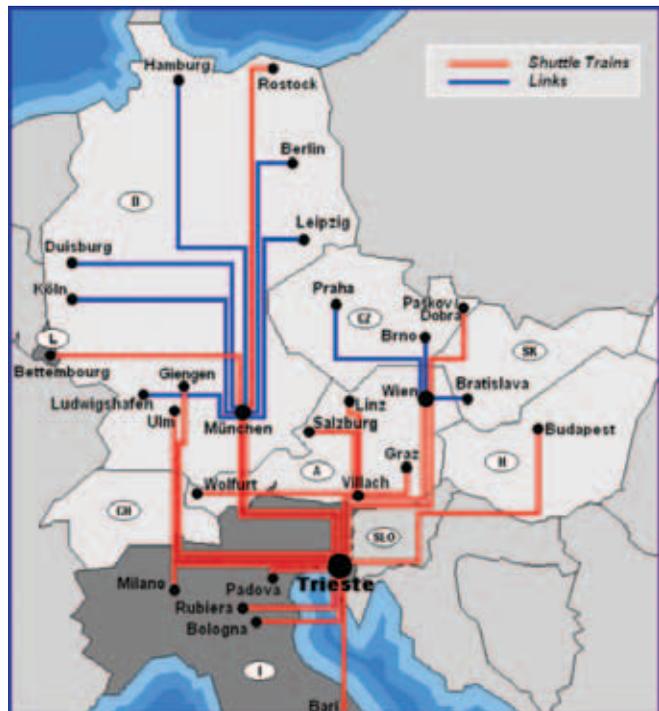
Source: Venice Port Authority

Port of Trieste

The port of Trieste has a long tradition of good rail connections and it is served by a rail transport facility connected with the national and international network (in the port area there are 70 km of tracks). More than 160 trains per month link the Trieste port area to the Italian North-East industrial districts and Southern Germany, Austria, Hungary, Slovakia and the Czech Republic.

The port facilities are already suited for hosting more than 650.000 TEUs / year and 37 trains per day; these figures may further grow if all investments in new infrastructures and technology of the rolling stocks in the Trieste Campo Marzio rail-station were to be finalised on time, allowing nearly 60 trains per day with a capacity of nearly 1.2 million TEUs per year via rail.

Figure 16: Trieste multi-modal rail connections



Source: Alpe Adria S.p.A.

Port of Koper

In the case of Koper, it must be first underlined that, when considering the total annual throughput of the port, its ranking is at least European, as its catchment area is for more than 70% outside national borders, with only 30% serving the domestic market. With a modal share of 60% for the railway side for inland transportation, Koper is able to fully exploit its existing railway infrastructure. In the container business, the following block train connections are available: Ljubljana and Maribor (Slovenia), Villach and Graz (Austria), Budapest, Szolnok, Budaörs - Törökbálint (Hungary), München (Germany), Vratimov and Ostrava (Czech Republic), Bratislava and Dunajska Streda (Slovakia), Belgrade (Serbia), Zagreb (Croatia), Arad (Romania), Sofia (Bulgaria) and Dobrowa Gornicza (Poland). Regular trains are also operating in other cargo segments (raw materials, agriculture and energy products, bulks, wood and timber, etc.). The capacity is currently fully exploited, with an offer of 56 trains per day, representing the physical limit of the infrastructure. Further increases in capacity will be available in the near future, upon the completion of current investment plans. Among the projects underway, one of the most important is the track section Koper - Divača, operating right now on one track for a distance of 27 km. The project has been included in the former PP6 and now in the Baltic-Adriatic and Mediterranean corridor.

The connections of the North Adriatic ports to the Po internal navigation route

An additional string of the North Adriatic multi-port system is represented by the maritime access to the Po-Veneto/Ferrara inland waterway; only recently it has finally become an infrastructure of prior European interest, as it has been included - the only internal navigation route on the South of the Alps - in the core TEN-T network. The 135 kilometre long itinerary is currently navigable through the Venice lagoon and the canals linking Venice to Mantua, as well as following the navigation route linking the ports of Ravenna and of Mantua, partly on the Po River and partly in canals. Navigating at the three mile distance from the coast, river-sea barges can reach the ports of Trieste and Koper, guaranteeing a long distance intermodal system that covers the entire North Adriatic macro-region. In the future, once Po navigability is guaranteed between Mantua and Cremona for class V barges and the new canal linking Cremona to the Milan waterway network is completed, the entire inland waterway system Po-Veneto/Ferrara would be able to offer transport services serving a very large macro-region in Northern Italy, along the East-West multi-modal axis of the TEN-T corridors.

The waterway system described above lies within one of the most dynamic economic macro-regions in Italy: the industrial districts, the production agglomerates and the single large company plants located in the Italian regions crossed by the waterway all have in common a strong export attitude, which should be supported by an adequate supply of infrastructure and services that can guarantee a growing competitive environment for the high industrialised regions of Northern Italy.

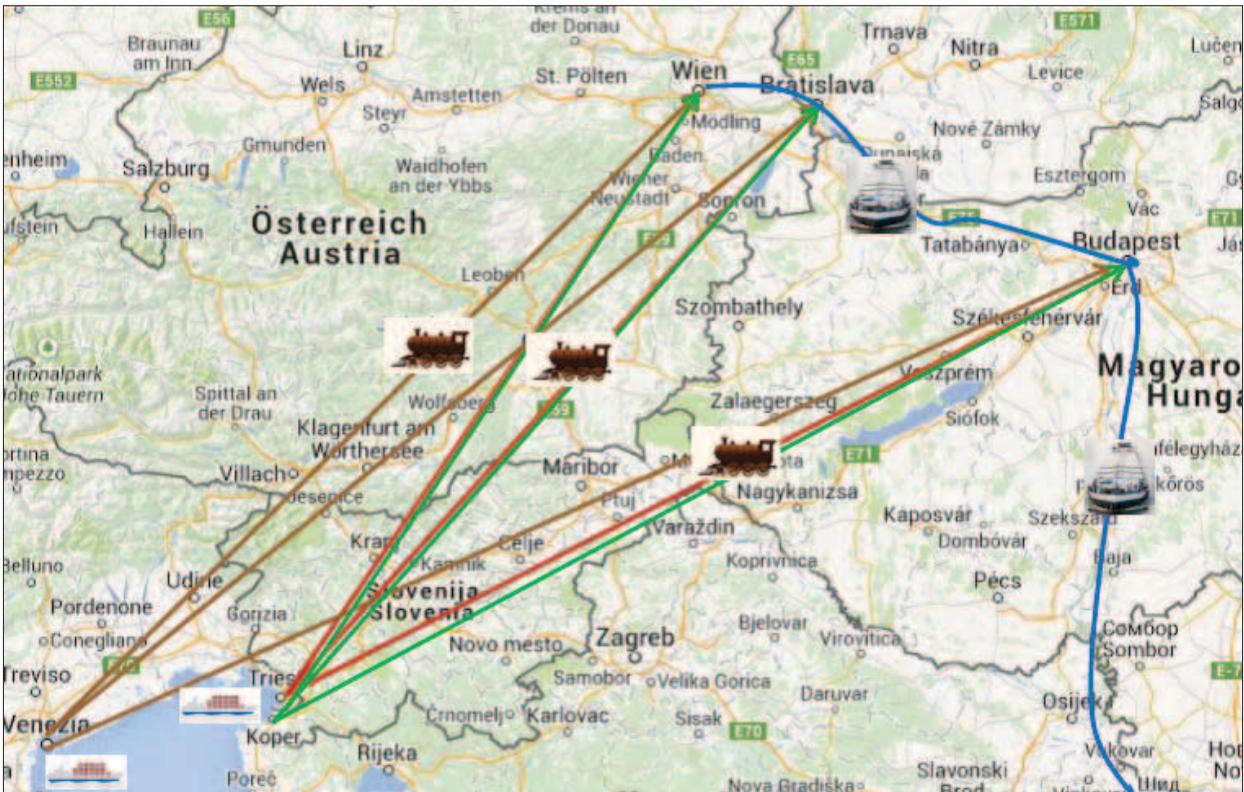
Problems, challenges and needs identified

As far as the Mediterranean ports are concerned, geographical barriers, such as the Alps in the case of Italy - as well as the lack of natural conditions, water regimes, etc. - have prevented them from developing economically viable inland waterway services. The INWAPO sea ports are no exception, in this respect, and the links to their internal markets in Italy and in Slovenia, as well as on the other side of the Alps, are made by either road or rail.

Could transport links between the three North Adriatic ports and those along the Danube be set up, right now? As schematically reported in Figure 17, the sea ports of Venice, Trieste and Koper and the inland ports of Bratislava, Budapest and Vienna can be linked by rail. Actually, rail services are readily available from Trieste and Koper to Vienna and Budapest and could be further developed also between the three sea ports and Bratislava. The port of Venice is investing in rail infrastructures inside and outside the port area, for the same purpose. Currently, not all the terminals carrying on the international rail traffic in the three capitals in CEE are concentrated in the inland ports, but further development of tri-modality will reinforce the development of intermodal services between the North Adriatic ports and the Danubian inland waterway ports in the future.

Like at many locations in Switzerland, Germany and France, the presence of ports offering intermodal services by rail, water and road, and in some cases pipelines, makes the links between sea ports and inland ones much more economically affordable. In the case of Switzerland, for instance, containers with origin in China arrive at one of the Northern range ports, reach the inland port of Basel by barge, and are loaded on trains within the port terminal, to reach their final destination at a large number of locations. In the future, perhaps the same might apply to the case of a container, coming either from the Far East through the Suez canal or the East Med, loaded on a train in one of the North Adriatic ports with a destination of Vienna, Bratislava or

Figure 17: Simplified outline of tri-modality services applied to INWAO countries



Source: Google Maps

Budapest inland tri-modal platforms, and from there be re-loaded onto a barge for its final destination in Austria, Slovak Republic, Hungary or any other country in the CEE region. Similarly, a container on the same inter-continental route could reach the port of Constanta in Romania, could be loaded on a barge in its port, could navigate until one of the three mentioned capitals and could be re-loaded on a train to reach its destination in Italy or in any other country in the CEE region. Of course, time-to-market and transportation and logistics costs, among other factors, would make the difference for the forwarder when choosing between one solution and the other.

VISTULA-BALTIC SEA

Links and potential links

Inland waterways freight transport is gradually being marginalised in comparison to the entire Polish transport market. The share of inland waterways in total freight transport in Poland reached nearly 0,1% in 2012!

The Vistula River does not meet the requirements of the AGN Agreement, which requires minimum IV class of navigable water. Due to infrastructure constraints, inland navigation on the Lower Vistula River is practically not functioning (0.5 million tonnes on the average distance 3 km were transported in 2012).

Table 7: Structure of freight in Poland according to the share in total volumes (in million tonnes)

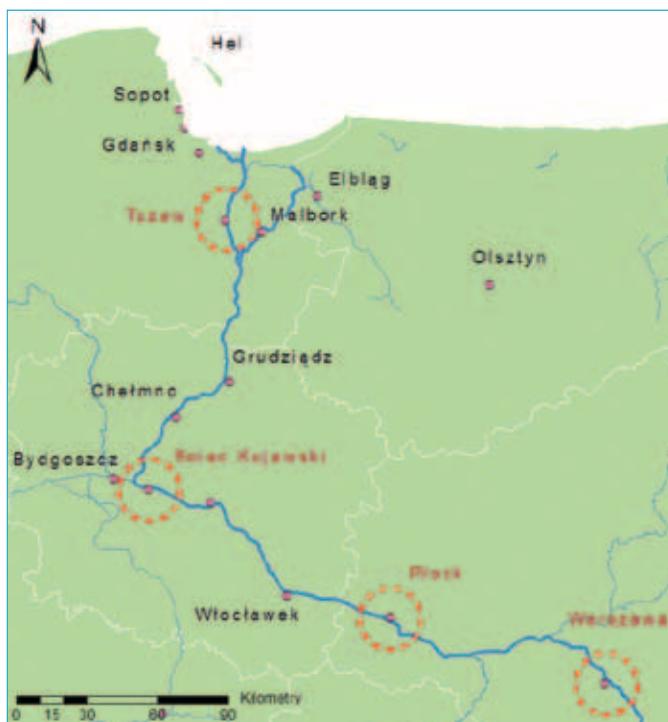
	Inland shipping share in total inland freight [%]				Waterways	
	2006	2008	2010	2012	km	km/1000 km ²
EU28	5,7	5,9	6,7	6,7		
Netherlands	32,1	34,7	35,9	38,7	6237	150,2
Belgium	14,7	15,6	17,6	24,3	2043	66,9
Romania	10	10,8	27,2	22,5	1779	7,5
Bulgaria	3,9	12,6	21,2	16,4	470	4,2
Germany	12,8	12,3	12,9	12,3	7675	21,5
Croatia	0,9	5,5	7,6	6,6	1017	18
Austria	3	4	4,7	4,6	351	4,2
Hungary	4,5	4,7	5,3	4,4	1864	20
France	3,4	3,5	4,3	4,2	4996	9,1
Slovakia	0,3	2,8	3,2	2,6	172	3,5
Czech Rep.	0,1	0	0,1	0,1	676	8,6
UK	0,1	0,1	0,1	0,1	1050	4,3
Poland	0,2	0,1	0,1	0	3659	11,7

Source: EUROSTAT statistical data

The Lower Vistula River inland ports, which have the greatest potential to become tri-modal centres/hubs for the Port of Gdańsk and Gdynia include:

- Warszawa (Port Żerański) - 521,5 km (of the Vistula River);
- Płock (Port Radziwie) - 633,0 km;
- Bydgoszcz (Solec Kujawski) - 761,0 km;
- Tczew - 909,0 km.

Figure 18:
Selected ports of the Lower Vistula



Source: INWAP0 report "Needs Assessment", own study

Currently, infrastructure of these ports (handling equipment, quays, docks and inner port infrastructure) is heavily depreciated and requires strong modernisation and upgrading interventions introducing up-to-date transport technologies.

Problems, challenges and needs identified

The following table presents the determinant multi-criteria investment objectives of Vistula Ports.

Table 8: Investment objectives of Vistula Ports

Investment area	Location	Investment objective	Remarks
Port facilities	Tczew	Reviving of the river ports for the selected locations: <ul style="list-style-type: none"> ▪ Tczew: container terminal, universal quay (bulk + Ro-Ro); ▪ Solec: container terminal, universal terminal; ▪ Płock: universal basin, shipyard basin; ▪ Warsaw: container terminal, terminal, bulk terminal, general cargo terminal. 	2030 (realization deadline)
	Solec Kujawski		
	Płock		
	Warszawa		
Intermodal network	Tczew	Railway connection with 'railway dry port' (new), road connection (modernisation)	2030
	Solec	Road and rail connections (new constructions), logistics centre (new)	2030
	Płock	Road and rail connection (modernisation)	2030
	Warszawa	Road and rail connection (modernisation) + logistics centre (new)	2050

Source: INWAPO report "Needs Assessments"



Action plans: joint cooperation on common projects and investments priorities

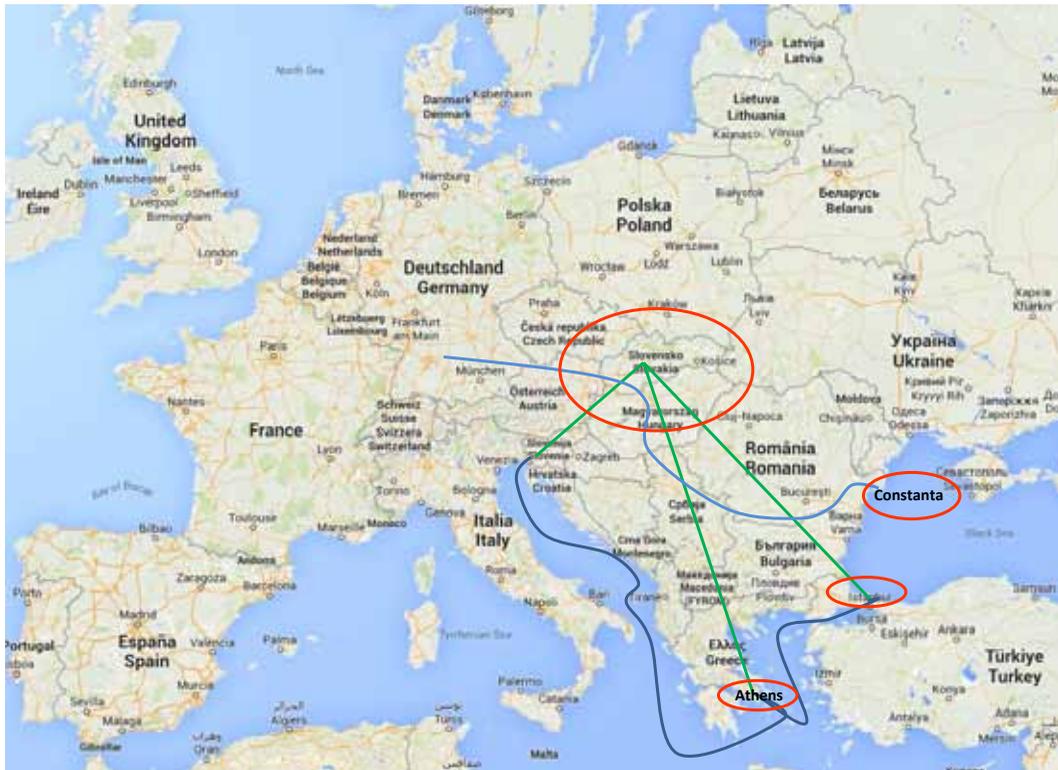
The North Adriatic Ports and the NAPA Association

The three INWAPO ports of Venice, Trieste and Koper are all founder members of the North Adriatic Port Association (NAPA), in March 2010.¹ NAPA represents a unique, successful example of cooperation among ports in various sectors not only in the Adriatic area, but also in the entire Mediterranean region, as it has been founded to tackle common problems and challenges that ports are currently facing and at the same time to grab new opportunities for development offered by the constant expansion of international trade. Acting as a multiport-gateway fostering the development of the Core Network Corridors Baltic-Adriatic, Mediterranean and Scandinavian-Mediterranean, NAPA also aims at promoting its member ports' services among global forwarders and logistics operators, as well as maritime companies, with the three ports participating together at international fairs around the world. As the importance of a port depends crucially upon the size of its hinterland, NAPA is very keen on sustaining the infrastructure development of the Baltic-Adriatic and Mediterranean Corridors in particular, within the framework of the TEN-T European Network.

The constant growth of cargo trade flows between Asia and continental Europe during the last years has continued, despite the crisis, and will likely do so in the next future, as it has been predicted by prestigious research centres. Similarly, trade between the European countries and the East Med, Turkey and the Near East keeps on rising, although the political climate is currently not so favourable. Geographically, the North Adriatic ports are among the most favourite gates of entrance into the Central and Eastern European markets. That makes the Adriatic Sea more and more strategic for the traffic crossing the Suez Canal. The exploitation of this full potential of the North Adriatic port gateway and logistic system built around the five EU TEN-T Core Network ports of Venice and Trieste, Koper and Rijeka lies in the progressive enlargement of North Adriatic port capacities, both on the east side and the west side, in order to accommodate a container traffic of at least 6 million TEUs on top of Ro-Ro traffic and more traditional ones by 2030. As reported in the following chart, the Central and Eastern European markets can be reached through a number of alternative corridors combining different mix of maritime and land routes, using short sea shipping services, rail as well as inland waterways. The four routes described below as an example compete among each other in terms of costs and tariffs, service reliability and timing to market. The amazing results registered by the port of Piraeus in the last few years is only one example of how hard competition is among the port systems in the region.

¹ Rijeka, Croatia's leading port joined the NAPA in November 2010. Ravenna Port Authority left the NAPA on 21 January 2013.

Figure 19: Alternative corridors from the East Med and the CEE countries



Source: own editing

The North Adriatic “geographic advantage” in terms of general, direct (fuel lesser costs) and indirect (environmental externalities, due to 5 navigation days shorter route compared to the Northern Range Ports from Asia) transport costs can be translated into a real economic advantage only if a relevant growth in the scale of activity will occur and will:

- a) put the North Adriatic gateway in a condition to successfully compete on central and eastern European markets;
- b) spread its economy-of-scale benefits on all the components of the logistic chain - maritime, port, foreland.

In terms of container market the growth in the scale of activity has to be about 3 times the present handled volume, i.e. from 2 to at least 6 million TEUs, to be reached progressively within 2030.

This is an achievable target if the North Adriatic ports will exploit their full geographic potential covering a 300-degree market, from Rome to Sarajevo, via Milan, Lyon, Basel, Monaco, Vienna, Budapest, Ljubljana, Zagreb and Belgrade.

In relation to their Central European region reference markets, the “geographic competitive edge” of the NAPA ports paves the way for the Northern-Adriatic Ports System to compete in a more efficient and effective way with other port systems in Europe, as well as with those in the Mediterranean, provided that:

- The railway and highway networks are constantly upgraded, in order to guarantee more efficient “land-side” services linking the three ports to their reference inland markets.
- All the transport and logistics operations taking place from the terminals inside the port to the inland terminals located at the final destination are performed according to the highest standards available.

Despite the fact NAPA are multipurpose ports, the major efforts addressed towards their future expansion are dedicated to the container segment, as the process of freight containerisation is still going on not only in the case of inter-continental, long-haul trade, but also in the Mediterranean trade context. For this reason, NAPA ports have planned important investments in the container business and there are further perspectives for its future expansion.

The presence of two of the most efficient European freight villages and intermodal terminals in North-East Italy, in Verona and Padua, plays a key role in guaranteeing a competitive edge for the NAPA ports in offering efficient transport and logistics services to operators serving not only the “new” markets of Eastern Europe but also the Central European “old” markets of Central and Northern Italy, Southern Germany and Austria, that today are mostly served by the Northern Range Ports.

In order to achieve the above mentioned market tasks, NAPA ports agreed to coordinate among each other the port development and investment plans currently pursued by each port. According to the projects undertaken by the three port authorities, the NAPA ports should be able to handle an ever increasing amount of traffic flow, from the current 1.8 million to more than 2 million TEUs per year within the next few years. Further on, port capacity, with special reference to containers, should keep on increasing, reaching 6,5 million TEUs in 2030 (2030 data projections have been issued by the MDS Transmodal Ltd. study “NAPA: market study on the potential cargo capacity of the North Adriatic Ports System in the container sector”, published in 2012). The expansion of the capacity will cover not only container traffic, but also bulk sectors, as well as Ro-Ro and passengers (mostly tourists and cruisers).

Table 9: NAPA historical and current traffic and 2030 capacity projections (TEUs)

NAPA Ports	2002	2010	2013	2030 capacity projections	
Venice	262.000	393.913	446.591	1,900.000	+325,5%
Trieste	185.000	277.058	458.000	1,300.000	+183,8%
Koper	115.000	476.731	600.441	2,000.000	+233,1
Rijeka	16.681	137.048	169.943	1,300.000	+664,9
Total	578.681	1.284.750	1.674.975	6,500.000	+288,1

Source: Ports’ web sites and “NAPA: Market study on the potential cargo capacity of the North Adriatic ports system in the container sector” by MDS Transmodal Limited (2012), TEN-T Programme (Action 2010-EU-21106-S)

In perspective, the full utilisation of the maximum capacity reached by the four ports, once all the investment projects have been successfully achieved would imply a traffic increase of +288% between 2013 and 2030, with Rijeka registering the highest rate of growth. Although, in absolute terms, the numbers may appear quite impressive, they are not so far away from those registered, on average, in the last decade. For the ports’ new capacity to be fully exploited by 2030, it is paramount that all the infrastructures planned within the framework of the TEN-T core rail network corridors are fully completed by that date.

INWAPO project’s support to the investment plans of the North Adriatic ports: the case of Venice, Trieste and Koper²

Port of Venice

The Venice Offshore-Onshore Transfer System (VOOTS) is the main investment plan of the port of Venice. Limited nautical accessibility and need to preserve the fragile environment of Venetian Lagoon (extensive dredging is banned) have pushed Venice Port Authority (VPA) to turn this problem into an opportunity, by developing this system.

² Another port analysed in terms of needs assessment and investment plans is port of Nogaro (Udine, Friuli-Venezia Giulia). Priority interventions needed in Porto Nogaro are aimed at improving efficiency by decreasing the unitary cost of transport, which is a crucial element for traffics involving goods with low added value as those currently affecting the port (metal scrap, raw materials for metallurgical and glass industry, semi-finished metal products etc.). The two priority interventions needed are the following: 1) dredging operation to bring the maximum draft in channels and basins at 7.5 meters; 2) upgrade of the small rail bridge belonging to the National Railway company (RFI) from C3 to D4 category.

In the international shipping market, increasing fleet size evolution and Alliances have pushed the shipping industry to exploit economies of scale, mainly to react to the increasing cost of bunker.

VOOTS has full nautical accessibility (8 miles off the coast, with a natural sea bed of at least -20 mt); wide onshore availability of handling and storage capacity (2000 ha former Industry-site of Marghera); efficient links to the rail/road and Inland waterways of the Core and Comprehensive European Transport Networks.

Tendered with PPP scheme and worth 2.1 Bln Euros, VOOTS is mainly composed by:

- a) a 4.2 km breakwater and 1 km Offshore container terminal
- b) Onshore Terminal Marghera and other onshore logistic terminals and inland ports (Chioggia, Porto Levante and Mantova);
- c) Tailor-made high-tech Lash-Vessel shuttle service. The “mama vessel/barge” system, patented by VPA, can load up to 2 barges with 384 TEU with a limited draft of only 5.5.

This is not a traditional transshipment port (no double-handling) and 15% of investment is dedicated to ICT / automation of container pre-sorting. The system works with special Mama vessel (both sea and inland waterway suitable) that can carry up to 768 TEU each with a draft of only 5.5 mt.

The geographic advantage of the port of Venice (5-day shorter route from Asia to Europe via Suez) can be exploited by VOOTS, being a gateway at the basis of the European Baltic-Adriatic and Mediterranean Core Network Corridors, valorising the Northern-Italy multimodal infrastructure assets, berthing ULCV with the best service performances and rebalancing the freight flows to/from Far-East and the South-East Med countries with the most industrialized and landlocked Central and Eastern European growing markets. 3Mln TEUs are expected to be handled offshore at full operation.³

In parallel with the accomplishment of the hard infrastructure needs related to the long term freight port development, the Venice port authority is fully pledged with the implementation of the broadband infrastructure. Its development is a fundamental pre-requisite for the optimization of all the port procedures, as it will significantly ameliorate the quality of the services offered by the transport and logistics companies operating along the “North Adriatic corridor”, with important positive spill-over effects along the supply chains of many industries located in the macro-region. The spread of ICT is one of the major goals of NAPA, as it looks at the implementation of a common IT platform aimed at integrating, via the Internet, the members’ port community systems.

The objective to enhance the port’s intermodal offer is pursued with investment plans in the upgrading and efficiency improvements of port-railway infrastructure, allowing the enhancement of the port of Venice connections to the Central Europe hinterland.

Port of Trieste

The Port of Trieste, for its territorial and maritime characteristics, has the potential to become one of the gates of Europe with respect to international traffic of long and very long haul interesting trade flows between Central and Eastern Europe and the Balkans, and the Far and Near East and the Mediterranean. In this direction are orientated the official planning documents and investment plans (produced both by the port and by the regional government). Trieste is placed at the intersection of three multimodal corridors (Mediterranean, Baltic-Adriatic Corridor, and Adriatic Motorway of the Sea).

The development plan of the port of Trieste includes a number of significant investments aimed at increasing the handling capacity of the port as well as its intermodal network links. In the short and medium time horizon, the primary actions are addressed towards: the introduction of efficiency measures, with special reference to on-docks, off-docks and port-area railway operations; renewing of infrastructure facilities and applied technologies; and up-dating of organisational procedures and internal management aimed at increasing the overall productivity of the port. Analysing intermodal services linking the hinterlands and the port, main bottlenecks in link infrastructure and their management, which prevent or hinder the development of intermodal traffic to - from the Port of Trieste, have been defined and located. A list of actions to be carried out has been identified, splitting the bottlenecks into 4 clusters of actions according to their level of likelihood to be solved and impact for traffic development.

Large parts of the investment programmes are already underway. As some of the investment needed to enhance the port capacity and increase its attractiveness will not depend on the investment plan of the port

³ www.offshore.port.venice.it

itself, but on those of other public entities and administrations (the Friuli Venezia-Giulia Region, the National Government and the EU Commission), the Trieste port authority keeps on striving to make sure that all development plans are carried on in parallel, on time and on budget.

Port of Koper

Within the framework of the port of Koper's development plan, the most important investments underway in the port are addressed towards the up-grading of the port infrastructure both at the quay level and with regard to the road and rail connections. Among the latter, inter-modality, in particular, is considered as a main priority in order to further enlarge the catchment area of the port. Better rail infrastructure is a first prerequisite to guarantee longer and heavier trains all along the lines from Koper to the major inland destinations in Central and Eastern Europe.

As mentioned in the case of Trieste, for infrastructure investments concerning road and rail links, the major responsibilities depend not only on the port authority but also on the government of the Republic of Slovenia. Completing all the necessary procedures at planning level and financing the investments until their full accomplishment must be fulfilled in parallel by all local and national authorities. Once the entire connecting infrastructure is built, the port of Koper's existing terminals will be in a condition to fully exploit their potential capacity. The key problems in railway connections have been occurring, above all, because of delays in the construction of the new modern railway line Divača - Koper, which represents a significant business risk for the port, where almost 60% of the goods are transported by railway: considering the type of cargo and transport distances, a great part of goods flows from and to the port of Koper are depending on rail transport (dry bulk cargo, timber, heavy cargo, liquid cargo, containers, etc.).

Main needs and opportunities of cooperation for interventions within NAPA⁴

Summarising what has been reported in the previous paragraphs, the public benefits of more direct calls in the North Adriatic by deep sea container ships would be: 1) lower costs for shipping lines and for the economy as a whole; 2) more efficient use of the European port and rail infrastructure; 3) reduced polluting emissions caused by shipping activities and hinterland road transport.

The full implementation of the investment projects now underway in the four NAPA ports implies the gradual introduction of ships of around 8,000 TEUs making direct calls in the North Adriatic arc from now to 2020, with vessels progressively increasing to about 11,000 TEUs and more as we approach 2030. In order to allow an efficient distribution of containers, swap bodies and trailers to their final inland destinations, ports must be endowed with an adequate rail infrastructure inside as well as outside the port territory. According to the European Commission's fourth railway package, this should mean operating trains of at least 750 metres long. The combination of more port capacities with deeper water and improved hinterland connections (mainly railway) may stimulate synergies to provide an offer that will be attractive to deep sea shipping lines. Building only on the port capacities, without a focus on rail freight connections, will not be sufficient for the North Adriatic to meet its potential.

Therefore, in the medium and long term the main needs to be addressed in the NAPA ports' investment plans will be related to the development of adequate:

- Port maritime capacity:
 - To receive deep sea container vessels of a size and number comparable to those of the North European seaports and related capacity to ensure suitable port and logistics space;
 - To receive larger vessels for other cargo: dry and liquid bulk, general cargo, etc, in order to fully exploit the industrial economies of scales along their supply chains;
 - To increase berthing capacities in order to receive larger vessels at the ports' quays;
 - To guarantee safe navigability even for very large vessels inside the ports' areas, accessing channels and basins.

⁴ "Main needs and opportunities of cooperation for interventions within NAPA" contains data elaborated both within INWAPO project and the "NAPA: Market study on the potential cargo capacity of the North Adriatic ports system in the container sector" by MDS Transmodal Limited (2012) under the ITS Adriatic Multiport Gateway project co-financed by TEN-T Programme (Action 2010-EU-21106-S)

- Port-hinterland connections, mainly railway and inland waterways; in particular:
 - Capacity to route container trains the whole way through the European freight rail TEN-T corridors;
 - Capacity to support more trains running from NAPA ports to their hinterland final destinations (eliminating existing bottlenecks and improving service efficiency);
 - Capacity to develop suitable internal railway within the ports in accordance with terminals needs, supporting their orientation towards railway modal split and intermodality.
- Port-inland waterways connections:
 - Capacity to send sea-river barges along the Po waterway directly from the ports of Venice, Trieste and Koper to the inland ports of Mantua and Cremona.

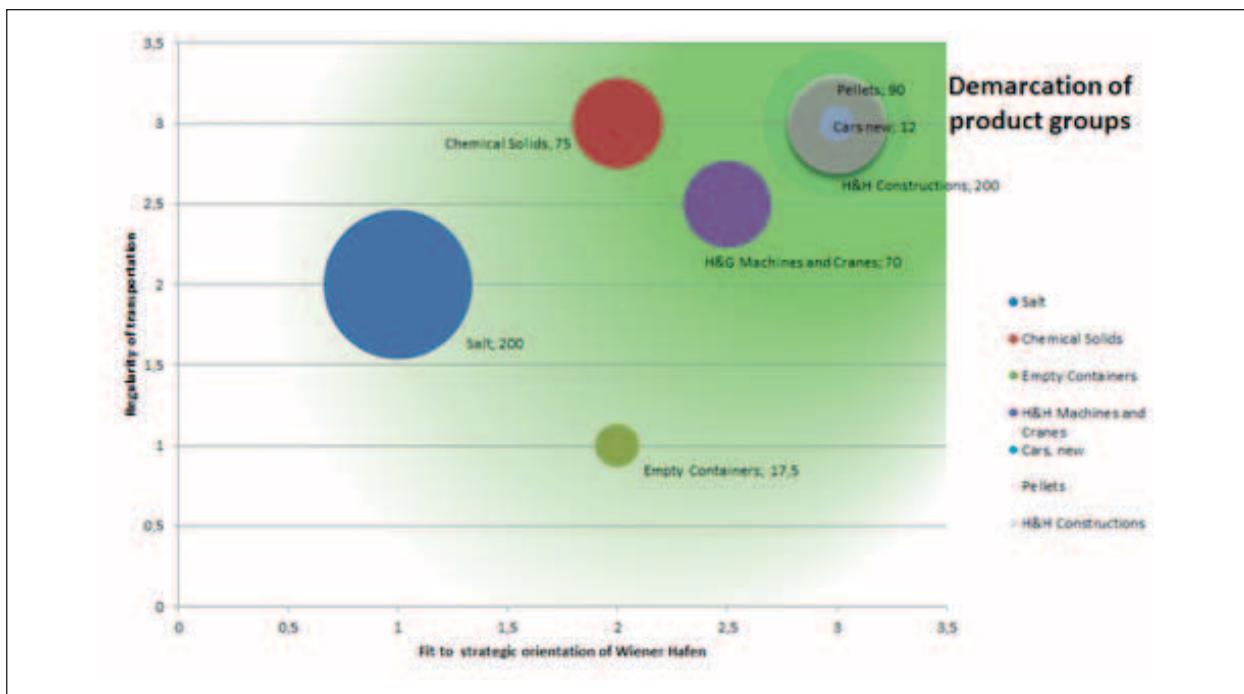
Danube ports

For the establishment of a joint cooperation strategy, it is crucial to identify future potential increases in the transportation of different goods. Ports along the Danube have many common activities, but may differ in many respects. In view of their future growth, the INWAPO project has promoted the investigation of new links between the inland ports and their potential markets of destination. In the course of the project, the following product groups and potential volume increases were identified for the following ports:

Vienna

The final demarcation of product groups, in alignment with the Port of Vienna is presented in the below diagram.

Figure 20: Demarcation of product groups, Port of Vienna



Source: INWAPO - Joint Feasibility Study, Port of Vienna

The demarcation of the different product groups shows a theoretical available cargo volume of approximately 664.500 tonnes - interesting and strategically fitting to the port of Vienna:

Salt:	200.000 tonnes
High & Heavy - Construction:	200.000 tonnes
Pellets:	90.000 tonnes
Chemical - Solids:	75.000 tonnes
High & Heavy - Machines:	70.000 tonnes
Empty Containers:	17.500 tonnes
Cars - New:	12.000 tonnes

- Salt: one of the customers in the Port of Vienna trades this product, but the decision on the transport mode is up to the supplier, as the products are purchased on a “free delivered” basis.
- “High & Heavy”: currently only a very minor and sporadic product group in the Port of Vienna. Dedicated transshipment areas are missing as well as high and heavy cranes with capacities exceeding 100 tonnes.
- Pellets: for the handling of pellets in the Port of Vienna, dedicated silos are missing. Covered storage areas in warehouses are not an option due to dust and explosion risk.

Budapest

Various goods and cargo types have been evaluated according to the regularity of transportation demand (vertical) and the importance of cargo handling and storage (horizontal) from the port’s point of view.

Table 10: Analysis of different transport goods in the Freeport of Budapest

Probabilities	Cargo handling high/ Storage high	Cargo handling high/ Storage low	Cargo handling low/ Storage high
Constant transportation demand	6	5	4
	<ul style="list-style-type: none"> ▪ Retail goods ▪ Ro-Ro - vehicles 	<ul style="list-style-type: none"> ▪ Green logistics (urban waste, sewage sludge) 	<ul style="list-style-type: none"> ▪ Coal and lignite import
Seasonal/ Fluctuating transportation demand	5	4	3
	<ul style="list-style-type: none"> ▪ Container ▪ Agricultural products in bulk 	<ul style="list-style-type: none"> ▪ Machinery and equipment ▪ Transport equipment 	<ul style="list-style-type: none"> ▪ Metal waste
Irregular/ Sporadic transportation demand	4	3	2
	<ul style="list-style-type: none"> ▪ Oversized/ overweight cargo 		

Source: INWAPD - Joint Feasibility Study, Freeport of Budapest

Based on in-depth analysis of the above cargo flows and after consultations with freight forwarders as well as the port’s representatives, the cargo handling of Ro-Ro vehicles and high and heavy goods were the focus of the study.

Joint cooperation opportunities - Budapest and Vienna

Following in-depth assessment of the cargo streams at the two ports and discussions between experts and the ports’ representatives, no specific cargo streams have been identified which could serve for a common service between the ports. This statement goes with regards to cargo types and liner services as well. Nevertheless,

there are possibilities for co-operation between the ports and, with it, to create volumes for each other. The greatest opportunities identified are within:

- Automotive sector;
- High and Heavy volumes; and
- Exchange of empty containers.

Based on the study carried out by the Port of Vienna, it became obvious that most transporting equipment is actually empty in the direction from Budapest to Vienna (this comes from the fact that major export destination areas for agricultural products of Hungary are south of Budapest). Idle capacities between Vienna and Budapest provide a great opportunity for further planning and for the identified joint cooperation possibilities (automotive sector; high and heavy volumes; and the exchange of empty containers). An integrated and structured transport concept for the Danube ports could also be developed.

Bratislava

The Port of Bratislava and the Freeport of Budapest can set up cooperation in the near future in the field of Ro-Ro transport (Bratislava is planning to build a new Ro-Ro ramp). In the Freeport of Budapest there is a Ro-Ro ramp already operating, it is worth considering the establishment of a common Ro-Ro business strategy.

As a part of the INWAP0 feasibility study, further cooperation opportunities have been identified with companies in the hinterland area. The most important identified potential automotive industry partners from the hinterland are Volkswagen Bratislava and PSA Peugeot Citroen factories. Slovakia has the highest number of produced cars per capita in the world. If the port manages to establish long term cooperation with the car factories, the expansion of development opportunities will be realised. In order to attract the car producing and logistics companies, it is crucial to build a car terminal as well. The port plans to apply for EU co-financing, as well, in order to ensure the financial sustainability of the construction works.

The results of the feasibility study are not binding for further activities of Public Ports JSC in relation to the development of the area of the Port. Once the proposals are accepted by the shareholders, the mid and long term investment plans of the Public Ports in Slovakia have to be included in other strategic development documents, i.e. the next update of the currently valid “Concept for development of public ports Bratislava, Komárno, Štúrovo”.

Figure 21: Car transport



Source: www.logistik-journal.de, <http://www.tachoblog.com/tachoblog-barges-ford/>, <http://www.schiffbilder.de>, <http://danube-inland-navigation-vessels.blogspot.com>

Conclusion

As a concluding remark, it can be claimed that the success of the development of ports in Austria, Hungary and Slovakia in some cases depends upon their cooperation. The capacity-building of the ports must be planned together in order to avoid parallel and surplus development projects. Cooperation is always more rewarding. The close location of ports to each other gives the opportunity for joint projects and complementary planning. Since the accession to the Schengen area, the ports' hinterland's edge has been extended and connected. Without trade-barriers, it has become easier to organise transportation. Waterway transportation will be organised by economical rationality in longer term, meaning that in some cases the closest port will be chosen by manufacturers and traders in order to transport their product to a far distant point. That's why joint projects will come to the foreground.

The Czech Waterway System

Having examined freight flows in the hinterland areas of 4 Czech Lower Elbe ports - Mělník, Lovosice, Ústí nad Labem and Děčín, and based on the information gathered from the interviewed shipping companies, the following conclusions were made in order to estimate the potential freight volume shifted on waterways.

Most of the transported goods are destined to and originate from all over Europe (primarily Germany, the Netherlands, and Slovakia). Destinations and origins outside of Europe are in the Far East (Japan, China, Thailand). The Far East is primarily the origin and not the destination of the transported goods. The overseas cargo flow origins and destinations have the chance to partly change from other modes of transportation (road or rail) to inland waterway transportation (to the maritime ports).

- Based on the data provided by the questionnaire, the most important transshipment place for cargo flows in the hinterland area of the lower Elbe ports is Hamburg.
- In the hinterland area of the lower Elbe ports, a significant part of the transported goods were bulk cargo, which is typically suitable for IWW transport.
- Only a marginal, 1% of the identified cargo flow is transported in a multimodal way, which confirms the previously identified attitude of freight forwarders towards IWW transport (IWW transport generally requires multimodal transportation modes).
- Road transport is still dominant in the modal split of transport modes, rail transport appeared a rarely applied transportation mode, but in large volumes.
- According to the affinity index approach and as a result of the common methodology to calculate the potential transport volume to be shifted onto IWW, altogether 414 924 tonnes of cargo could potentially be shifted onto waterways in the hinterland area of the lower Elbe ports.



Figure 22:
Ports on Lower Elbe in the Czech Republic

Source: own editing

The Elbe-Vltava waterway in the Czech Republic, with total length of 315.2 km, has the parameters, at the section of Middle Elbe (Chvaletice - Melník), corresponding to category IV, at the section of Lower Elbe (Mělník - state border with Germany) to category Va. The lower course of the Vltava River is category IV (Třebenice - Mělník).

There are problems concerning the waterways, which need to be solved in the near future and which are also opportunities for investment:

- The unreliability of the waterway in the Elbe between the lock Ústí n. L. Střekov and the state border with Germany (preventing economic water transportation for long period of the year);
- Unsatisfactory length of the Elbe waterway - there is a need to extend the waterway to the town of Pardubice;
- The need to make a resolution on preparing the project of water connection Danube - Odra - Elbe.

The solutions could be:

- Construction of new lock near Děčín that would help the navigability in the section between Ústí n. L. Střekov and the state border with Germany. The project has been going through several years of EIA approval processes, whereby environmental initiatives actively prevent their approval;
- Construction of new lock, Přelouč II, that would help the navigability in the section Chvaletice - Pardubice. The project has also been going through several years of EIA approval processes, whereby environmental initiatives actively prevent their approval.
- A scheme of water connection construction at three rivers in the Central Europe area, the canal Danube - Odra - Elbe (D-O-L). The Czech government has decided to start preparation of the feasibility study after getting approval from interested countries in Central Europe. Negotiations on the issue of D-O-L are currently underway.

Figure 23: Visualization of the Děčín project



Source: Regional Development Agency of Usti Region

Figure 24: Visualization of the Přelouč II project



Source: Regional Development Agency of Usti Region

Polish waterways - inland and sea ports

Inland ports along the Vistula River between Warsaw and Gdańsk are used only locally. Ports with high potential for transport, however, require renovation and reconstruction. In particular, the entrance canals and port basins require deepening. There are mostly mobile cargo handling facilities which are not permanent equipment of the port.

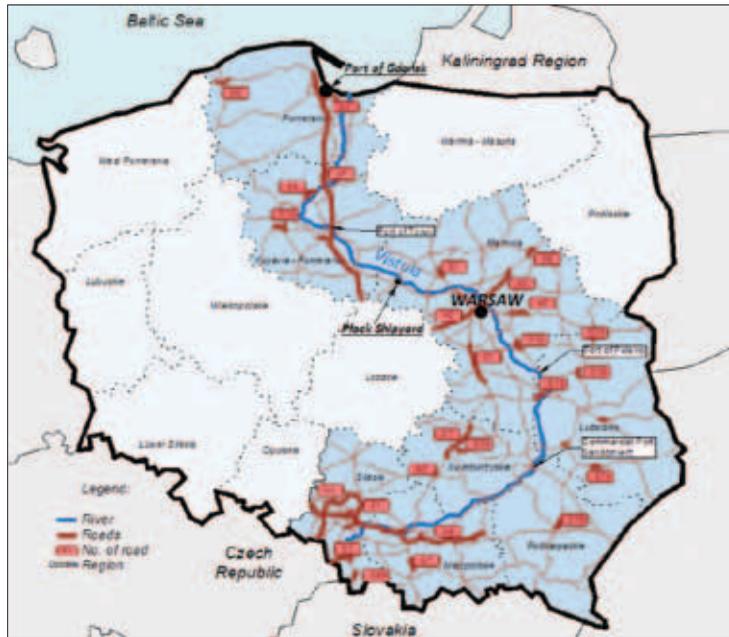
Among all the surveyed ports only Gdańsk and Elbląg can be used to operate inland waterway transport without renovation.

The geographical region, which is the potential hinterland of these ports (river and sea), covers about 10 million people. Nearly half of them live in the region of Warsaw which is also the fastest growing region in Poland.

Most of the ports provide access to road and railways. In many ports, directly on quays, there are railway sidings. Storage areas are paved and combined with asphalt roads. At the moment, there are no specific investment plans for port access infrastructure in the perspective of 2020. Existing investment plans do not include the ports as major transportation hubs.

The maps on the road and railways infrastructure illustrate the existing rail and road network in relation to the Vistula river route. The major elements of inland infrastructure, in use and operating with tri-modal potential, are also marked. It also visualises the accessibility of that infrastructure to the most important rail lines and roads.

Figure 25: The state of road infrastructure along the Vistula River



Source: own editing based on the updated map of the national road and motorways network, <http://www.gddkia.gov.pl/pl/1077/mapa-stanu-budowy-dróg>, 19.12.2012

Figure 26: The state of rail infrastructure along the Vistula River



Source: own editing based on the updated map of the rail network, <http://www.pkp.pl/cop/mapa>, 19.12.2012

Proposed changes in the parameters of the Warsaw - Gdańsk waterway are analysed in three concepts of modernisation. The most interesting and well-known one is the concept of canalisation of the Vistula River from Warsaw to Gdansk by Lower Vistula Cascade - it is a method of building stages of falls on the river. It is actually the most expensive method and the one that interferes most with the natural environment but at the same time bringing the best transport effects as well as an extra bonus in the form of electricity from power plants located at each stage of the fall. The method would enable the attainment of the minimum IV class waterway and would absolutely protect the degradation of the bottom below the stage of the fall at Włocławek (the only existing stage of fall on the Vistula).

Figure 27: Localization of the stage of fall of the Lower Vistula Cascade



Source: INWAP0 "Investment plan" - Analysis of investment conditions of the Lower Vistula

Table 11: Lower Vistula Cascade cost calculation [Mio PLN]

Stage of fall	Wyszogród	Płock	Nieszawa (planned)	Solec Kujawski	Chełmno	Opalenie	Tczew	TOTAL
Activity								
Documentation	98,92	103,65	93,16	102,09	101,83	121,98	114,00	735,64 zł
Terrain obtainment	281,27	301,67	156,67	201,12	212,05	292,20	205,49	1 650,46 zł
Hydrotechnical infrastructure	973,19	1 111,46	859,66	1 064,49	1 025,69	1 312,50	1 171,79	7 518,78 zł
Water dam	1 005,10	961,38	1 003,87	977,60	1 011,08	1 126,90	1 108,40	7 194,33 zł
Others	158,27	165,67	148,72	163,37	162,93	195,14	182,43	1 176,53 zł
TOTAL	2 516,75 zł / 599,23 mln €	2 643,83 zł / 629,48 mln €	2 262,08 zł / 538,59 mln €	2 508,66 zł / 597,30 mln €	2 513,58 zł / 598,47 mln €	3 048,72 zł / 725,89 mln €	2 782,10 zł / 662,40 mln €	18 275,73 zł / 4,35 bln €

Source: INWAP0 reports "Needs assessment" and "Investment Plan"

INWAPO environmental assessments

Environmental indicators

Waterborne transport can have positive and negative environmental effects as well; therefore it is important to continuously monitor the environmental impact of the developments and to extend port developments to environmental activities. In order to provide a tool for monitoring and planning, environmental indicators were formed and the indicator values were evaluated. These indicators can be used to determine the favourable direction of the environmental developments and to follow up the environmental impact of other developments.

Eleven environmental indicators were identified, namely:

- Total energy consumption (E_t)
- Fossil energy consumption (E_f)
- Total water consumption (Q_{water});
- Ship waste water management (Q_{bilge})
- Storm water treatment rate (R_{storm})
- Amount of non-recycled waste (Q_{nrw})
- Transshipment rate (R_{ts})
- Shore power rate (R_{sp})
- Shore power usage (R_{spu})
- Accidental pollution incidents (N_{acc}) and Existence of EMS (EMS)

Environmental assessment

The environmental indicators of the Port of Venice, the Port of Vienna, the Freeport of Budapest, the Port of Trieste, the Port of Gdansk, the Port of Bratislava, the Port of Komárno and of the Luka Koper were evaluated.:

The main findings of the assessment were the following:

- In the case of several indicators, the results showed that the indicator is less suitable to compare the environmental impact of each port, but is capable of monitoring the improvement of the port's environmental performance. This is due to the fact that the indicator values are significantly influenced by the complexity of the activities carried out at the ports;
- No cases were found in the INWAPO study where a port had not fulfilled the required environmental standards. Therefore, the purpose of the recommendations were not to meet the legal environmental requirements, but to make the operation "greener" and to reduce the environmental load of the ports;
- The ports with the best environmental indicator values have already established environmental management systems (EMS), and the ports facing the most environmental difficulties have no such system. This shows that the introduction of an environmental management system should be the first step of an environmentally conscious port operation;
- The negative environmental impact of the ports could be reduced, as a first step, by improving energy efficiency and promoting renewable and electric energy sources. Great progress can be made by switching from diesel to electric drawn transport and by the electrification of internal and external railway lines.

Progressive establishment of a shore power system can significantly improve the environmental status of the local environment, while the organisation of bilge water collection and treatment is a great step towards reducing water contamination resulting from waterborne transport.

Environmental analysis of ports' investment plans

The environmental assessment aimed at giving recommendations to improve the environmental impact of the ports' investments.

First, ports' planned investments were classified into six investment types:

- Development of waterways
- Development of quay and berths
- Development and reconstruction of internal storage capacity
- Establishment and development of internal road network
- Establishment and development of external road network
- Development of rail links

The second step was to determine the impact of the planned investments on the environmental indicators. Three categories were created:

- Positive impact
- Negative impact
- The impact depends on the method of realisation of the investment

Finally, the main environmental considerations by investment categories were collected. For each investment type, we collectively determined the factors to be considered during the detailed design of the investment in order to ensure that its environmental impact is as positive as possible. The most important considerations are the following:

- Local conditions must always be considered during the development of the waterways to prevent conflicts with nature conservation objectives;
- Quay and berths development should include "green" elements like shore power usage, storm water, bilge water and sewage collection and treatment, waste collection and electric power for infrastructure;
- Electric drive should be promoted wherever possible;
- The development of road network should not result in the marginalisation of parallel rail links.

EU strategies and policies for transport and territorial cohesion

EU Strategy for the Danube Region

The main elements of the EU Strategy for Danube Region are economic development, transport, energy supply, environmental protection and security. From the EU member states, eight are located in the Danube Region: Germany, Austria, Hungary, Czech Republic, Slovakia, Slovenia, Bulgaria and Romania. Traffic, transport and environment are important topics in the strategy in the aspect of river navigation. One of the main aims of the strategy is to 20% increase the volume of the inland freight on the River Danube. The aging freight vessels transport 80-90% less bulk, than the vessels on River Rhine.

The priority area „To improve mobility and intermodality of inland waterways” of the Strategy is definitely harmonising with the goals of the INWAPO project. Several INWAPO studies also underlined the necessity of the joint cooperation on the whole section of the Danube in order to exploit the opportunities of freight transport. Inland waterborne transport is advantageous for the shipping of car, high&heavy as well as dangerous goods.

Eight INWAPO project partners are involved in the Danube Region Strategy: Port of Vienna, viadonau, Ministry of Transport of Czech Republic, Regional Development Agency of Usti Region, General Directorate of Water Management (Hungary), Freeport of Budapest Logistics, Slovak Shipping and Ports (Slovakia), Public Ports (Slovakia).

Figure 28: EUSDR countries



Source: <http://www.danube-region.eu/communication/communication-tools>

The European Union Strategy for the Baltic Sea Region

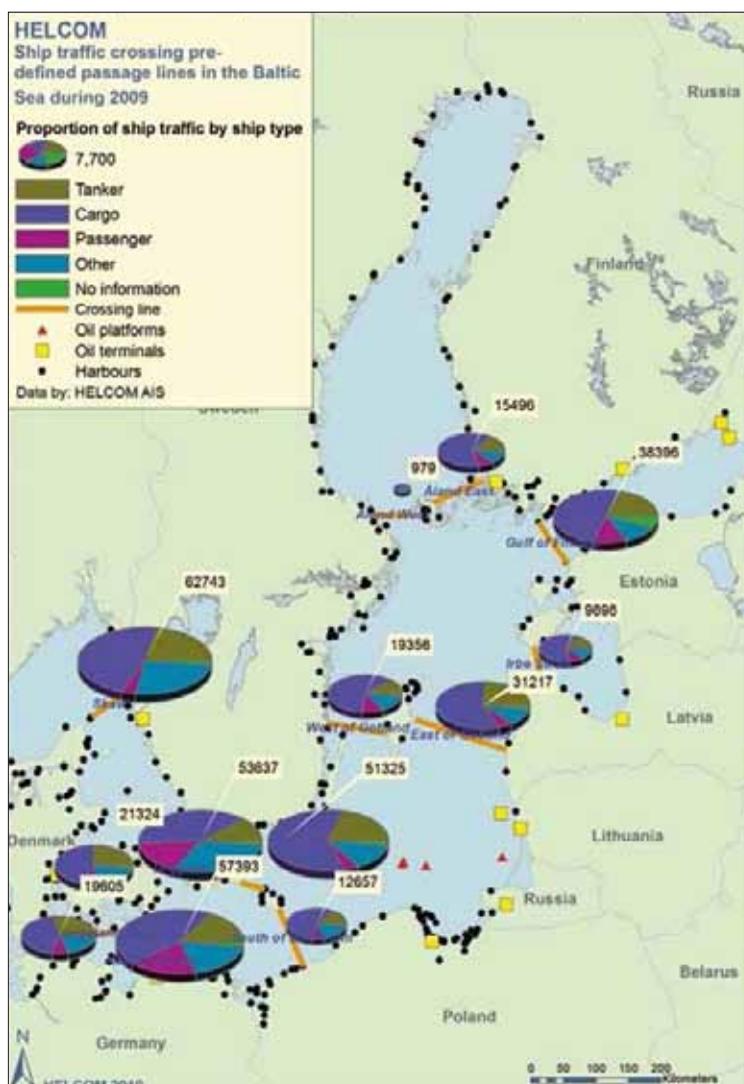
Sea transport levels in the Baltic Sea are among the highest of any of the world's marine area. Both the number and sizes of ships have been growing in recent years, especially oil tankers, and this trend is expected to continue. There are around 2000 ships at sea in the Baltic at any given time, accounting for 15% of the world's cargo transportation. Forecasts indicate that the amount of cargo shipped in the Baltic will double by 2015, due to economic growth, especially in the eastern part of the region. The amount of oil transported via terminals of over three million tonnes increased from 125 million tonnes in 1997 to 210 million tonnes in 2005.

Figure 29: EUSBSR countries



Source: <http://www.balticsea-region-strategy.eu/communication/visual-identity#.Uwx67-OSyNO>

Figure 30: Ship traffic crossing in the Baltic Sea



goods in Central and Eastern Europe, coming from Asia, while improving the eco balance, and restoring the competitive position of the North Adriatic ports as natural gateways to Central and Eastern Europe.

Road, railway and air traffic are less developed than in the rest of the EU, impacting on the attractiveness of the area. The railways are losing market shares to the profit of other modes of transport. The needs for investments in the region are huge. The South-East Europe Transport Observatory multi annual plan 2013 defines 22 mature priority projects, and 20 more projects requiring preparatory activities.

The EU is playing a key role in connecting the Macro-Region, promoting competitiveness through targeted infrastructure investment at European level, including the Adriatic-Ionian region (e.g. building missing cross-border links and removing bottlenecks).

Within the Framework of the EUSAIR Pillar 2 (Connecting the Region) actions will focus on three strategic topics: maritime transports, intermodal hinterland and energy networks. In particular it is stated that: "In maritime transports priority should be given to clustering ports activities/services throughout the region should be supported following the example of the NAPA (North Adriatic Port Association) cooperation agreement".

In the intermodal hinterland, investments on the comprehensive network (railway, inland waterways) should be prioritized, like multimodal Baltic-Adriatic, Mediterranean and Scandinavian-Mediterranean corridors.

Four INWAPO project partners are involved in the EUSAIR Strategy: Venice Port Authority, Trieste Port Authority and EINE for Italy and Luka Koper for Slovenia, and three of them are NAPA partners. INWAPO activities and in particular joint cooperation to identify common projects and investments priorities are expected to have positive impacts in the Macro-Region area in terms of economic growth and competitiveness, supporting further enhancement of connections with the central European markets. The aim is also to increase the competitiveness of hinterland economies, improving land-sea connectivity and intermodal transportation.







Venice Port Authority
www.port.venice.it

viadonau
www.via-donau.org



Port of Vienna
www.hafenwien.com



Ministry of Transport
of Czech Republic
www.mdcr.cz



Regional Development
Agency of Usti Region
www.rra.cz



General Directorate
of Water Management
www.vkki.hu



Freeport of Budapest
Logistics Ltd
www.bszi.hu



Trieste Port Authority
www.porto.trieste.it



North Eastern
Industrialization Bodies
www.eine.it



Mazovia Development
Agency
www.armsa.pl



Slovak Shipping
and Ports JSC
www.spap.sk



Public Ports JSC
www.vpas.sk



Luka Koper
www.luka-kp.si

This project is implemented through the
CENTRAL EUROPE Programme co-financed by the ERDF

A projekt a Central Europe Programban az Európai Unió
és Magyarország társfinanszírozásával valósul meg.