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Future Research on Inland Navigation – A European Perspective

Michael Fastenbauer

Smart Rivers 2007 Conference, Louisville, Kentucky
September 18th, 2007

Background

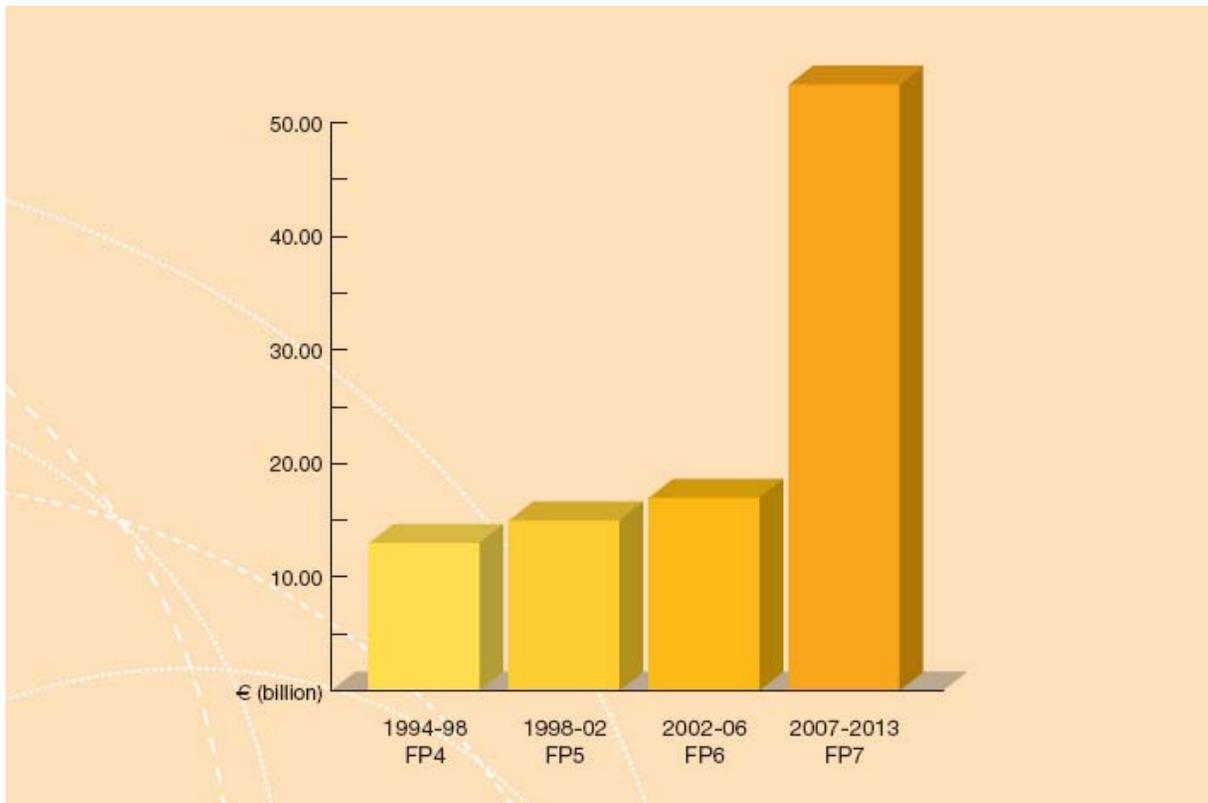
- The European Union (EU), based on its transport and environment policies, has Inland Waterway Transport (IWT) on its political agenda.
- Research is a priority for the EU for safeguarding and improving Europe's position in global competition.

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**7th Framework Programme for
Research and Technological Development
of the European Union
(FP7)**

Evolution of EU Research Framework Programme Budgets



FP7 Budget
2007-2013:

51 bn €

(w/o Euratom)

Some key properties of FP7

- FP7 is a key tool to respond to Europe's needs in terms of jobs and competitiveness, and to maintain leadership in the global knowledge economy.
- Funded activities must have a "European added value" in order to complement national research programmes.
- "Transnationality": Projects are carried out by consortia which include participants from different countries.
- "Lisbon strategy" implementation: FP7 contributes to objectives like growth, jobs, quality of life.

Participating countries in FP7

- EU Member States
- Countries associated to FP7
- International Cooperation Partner Countries (e.g. Russia, Western Balkan countries)
- industrialised high-income countries
- "third countries"

Entities participating in FP7

- research groups at universities or research institutes
- companies intending to innovate
- small or medium-sized enterprises (SMEs)
- SME associations or groupings
- public or governmental administration
- early-stage researchers (postgraduate students)
- experienced researchers
- etc.



FP7 2007-2013

| | | | |
|-------------|---|------------|----------------------------------|
| COOPERATION | Health | IDEAS | European Research Council |
| | Food, agriculture and biotechnology | PEOPLE | Initial training |
| | Information and communication technologies | | Life-long training |
| | Nanosciences, nanotechnologies, materials and new production technologies | | Industry-academia |
| | Energy | CAPACITIES | International dimension |
| | Environment (including climate change) | | Specific actions |
| | Transport (including aeronautics) | | Research infrastructures |
| | Socio-economic sciences and the humanities | | Research for the benefit of SMEs |
| | Security | | Regions of Knowledge |
| | Space | | Research potential |
| | Science in society | | |
| | Coherent development of research policies | | |
| | International co-operation | | |
| | Non-nuclear actions by the Joint Research Centre | | |

FP7 - Specific Programme "Cooperation"

1. Health
2. Food, agriculture and biotechnology
3. **Information and communication technologies. The ICT sub-programme aims to integrate technologies and result in new applications for industrial as well as domestic settings.**
4. Nanosciences, nanotechnologies
5. Energy
6. Environment (including climate change) dealing with ways to predict climate change and the development of novel approaches towards earth observation.
7. **Transport (including aeronautics) developing environmentally-friendly and efficient pan-European transport systems.**
8. Socio-economic sciences and the humanities
9. **Security and Space**
covering technologies developed to ensure citizen security with applications in the civil as well as the defence areas.

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Research need for Inland Waterway Transport (IWT)

Background

- IWT has to match the improvements in efficiency and environmental performance with those of rail and road.
- IWT vessels and equipment are only a minor part of maritime industry's sales and with limited global competition.
- Ageing fleet and technology (e.g. Rhine fleet average age > 40 years) are in use.

Modes of innovation in IWT

- Sector specific research
 - Development of specific services (e.g. RIS)
 - Vessel concepts (e.g. vessel for transport of continental and maritime containers)
 - Construction of low-weight inland vessels (e.g. new structures and materials)
 - Shallow-water hydrodynamics and propulsion (e.g. specific design of stern and propulsion system, tunnel stern)
 - etc.
- Technology transfer to inland navigation from other sectors
 - deep sea navigation (e.g. propulsion systems, production methods, design tools)
 - short sea shipping (e.g. cargo handling and storage)
 - automotive industry (e.g. engines, exhaust gas pre- and after-treatment)
 - ICT industry (e.g. navigation systems, automation)
 - etc.

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Research strategy Inland Waterway Transport (IWT)

Waterborne Technology Platform

- A European Union Forum of stakeholders:
EU maritime industry, science, society, EC, Member States
- Definition and implementation of future "waterborne" R&D
- Creation of:
 - Vision 2020
 - Strategic Research Agenda (WSRA)
 - Implementation Plan (project initiatives with required funding and time frame)
- Used as input to EU research policy and funding programs (e.g. FP7)



Representatives of the Waterborne TP.
Source: Waterborne Strategic Research Agenda

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Research topics for Inland Waterway Transport (IWT)

Waterborne TP – key priorities for R&D

Safe, sustainable and efficient waterborne operations

1. Implementing goal based/ risk based frameworks for cost efficient safety
2. The „Zero-Accidents“ target
3. The „Crashworthy“ vessel
4. „Low Emission“ vessels and waterborne activities
5. Enhanced waterborne security

A competitive European maritime industry

1. Innovative vessels and structures
2. Innovative marine equipment and systems
3. Tools for accelerated innovation
4. Next generation production processes
5. Effective waterborne operations
6. Technologies for new and extended marine operations

Manage & facilitate growth and changing trade patterns

1. Accelerated development of new port and infrastructure facilities
2. Interoperability between modes
3. More effective ports and infrastructure
4. Intelligent transportation technologies and integrated ICT solutions
5. Understand environmental impact of infrastructure building and dredging
6. Traffic management strategies

Priority research topics for IWT

- New vessel concepts for multimodal transport (long term effect)
- Modernisation of existing fleet (short term effect)
- Lightweight structures for increased cargo carrying capacity
- Improved fuel efficiency by improved hull forms and propulsion systems taking into account fairway conditions (e.g. shallow water)
- “Zero-emissions” and wash by inland navigation
- Efficient operations in terminals and ports and cargo handling
- Development of traffic management systems and services
- Optimisation and automation of ship operation (RIS, tempomaat)
- Consideration of climate change with respect to infrastructure and technical requirements of vessels
- Environmentally friendly coatings

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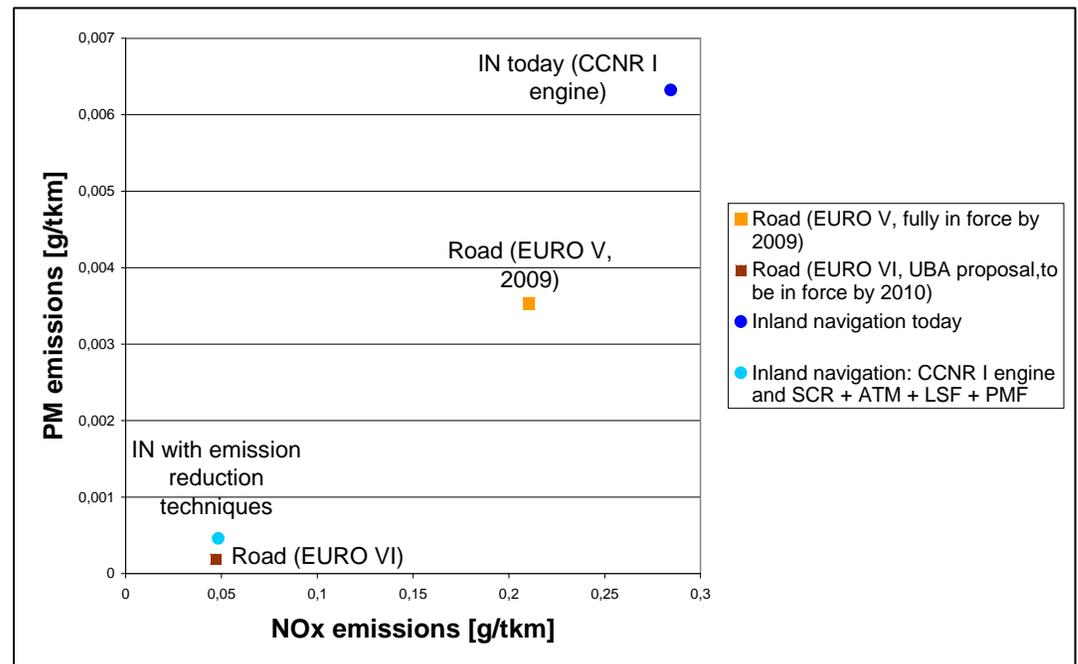
Example results of IWT research

Recent examples of innovation

- Environmental performance of engines
(CREATING results)
- Vessel concepts
(e.g. CompocaNord, Futura Carrier, CREATING vessels,
Port Feeder Barge)
- eLearning
(eWIT, INeS)
- River Information Services
from research (FPx) to infrastructure programmes (TEN-T):
..., INDRIS, COMPRIS, DoRIS, Masterplan IRIS, IRIS Europe, SIF, ...

Environmental performance of IWT (results from CREATING project)

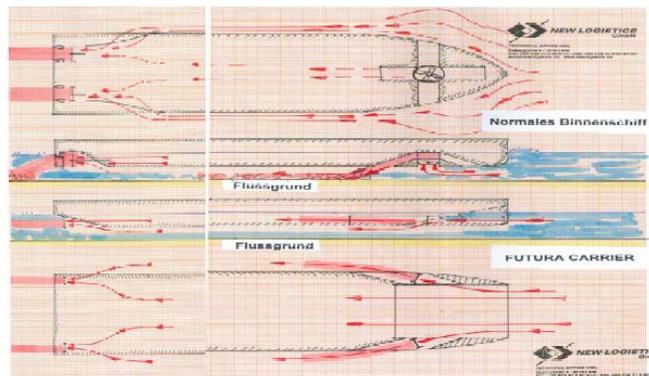
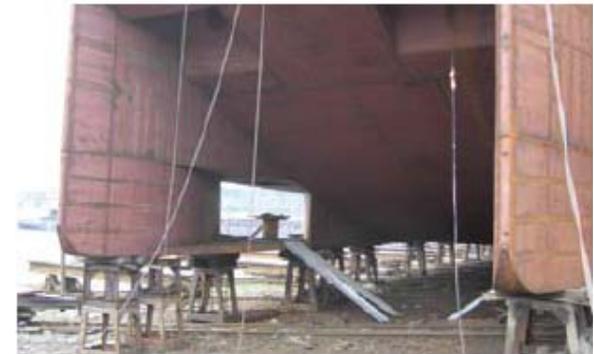
- change to low sulfur fuel (LSF) is the most urgent measure
- complementary emission reduction techniques are available and in combination allow for comparable emission performance as the next forthcoming road standard (EURO VI):
 - Selective Catalytic Reduction
 - Particulate Matter Filter
 - Advising Tempomaat



Comparison of PM and NO_x emissions of road transport and inland navigation.
Vessel: Danube motor cargo vessel pushing a barge.
Source: CREATING. WP6.

Futura carrier

- Developed by New Logistics
- Different vessels based on same design (container, iron ore, tanker)
- Innovative hull form and propulsion system with air-bubble lubrication leads to reduced power demand and fuel consumption (reduced wave making by bow form and reduced frictional resistance by air bubbles)
- Selective catalytic reduction and particle filter => reduced NOX and particulate matter emissions
- Vessels built: TMS Till Deymann (2007), RMS Kiel (2007)



Source: <http://www.innovatie.binnenvaart.nl>

Binnenschifffahrt – ZfB – Nr. 4 – April 2007

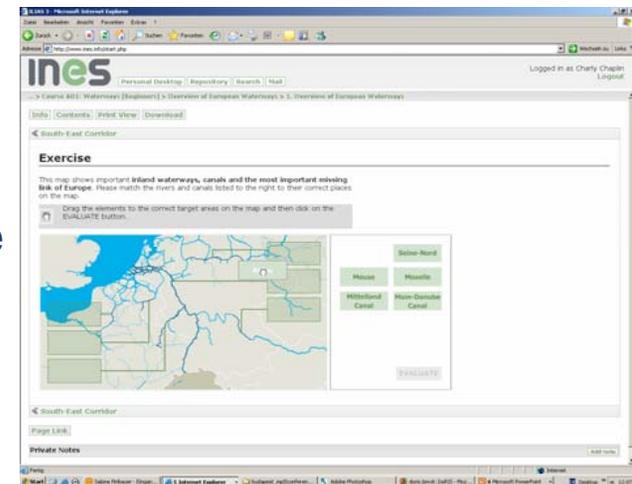
Inland Navigation eLearning System

= eLearning Platform for the Danube

- **Target groups**
 - Logistics schools
 - Universities and Fachhochschulen
 - Practitioners
 - Private individuals

- **7 learning topics prepared for 3 learning levels**
 - Content is clearly structured
 - Usage of multimedia material, interactive elements, pictures and graphs

- **Access** free of charge for all interested at www.ines.info



Learning topics in INeS



- **Waterways**
 - Overview of European Waterways
 - Waterway Classification
 - Infrastructural Bottlenecks
 - Locks and Bridges
- **Inland Vessels**
- **Ports & Terminals**
- **River Information Services**
- **Market & Organisation**
- **Intermodal IWT**
- **Policy and Law**

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- C - Ports&Terminals [Remove from desktop](#)
- D - River Information Services [Remove from desktop](#)
- E - Market & Organisation [Remove from desktop](#)
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Learning Goals

This chapter contains an **overview of European waterways**. You will learn about the following things:

- The length of European inland waterways and their different sections.
- The four waterway systems that are of key importance for European inland navigation: the Rhine waterway, the North-South Corridor, the East West Corridor, and the South-East Corridor.



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[← European Inland Waterways](#)

[The Rhine Waterway →](#)

Important Inland Waterways

Many European countries have **autonomous inland waterway systems**: Italy, Spain, Portugal, Finland, Great Britain, Ukraine and Russia.

Apart from these national systems there are **four waterway systems** that are of **key importance** for European inland navigation. These are shown on the map below and will be explained in detail on the remaining pages of this chapter.

 Explore the map to find out where these important European waterway systems are located!



[← European Inland Waterways](#)

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← [South-East Corridor](#)

Exercise

This map shows important **inland waterways, canals and the most important missing link of Europe**. Please match the rivers and canals listed to the right to their correct places on the map.



Drag the elements to the correct target areas on the map and then click on the EVALUATE button.

The map displays the European continent with a network of blue lines representing waterways. Several rectangular boxes are overlaid on the map, indicating target areas for the waterways listed on the right. The list includes:

- Seine-Nord
- Meuse
- Moselle
- Mittelland Canal
- Rhine
- Main-Danube Canal

An **EVALUATE** button is located at the bottom right of the list.

← [South-East Corridor](#)

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Glossary Waterways

Term Search Clear

Terms

| Term | Definitions |
|---|---|
| Bridge Clearance | Distance between water level and the bridge. It includes a safety clearance of approximately 30 cm between the highest fixed point of the vessel or its cargo and a bridge. |
| Conférence Européenne des Ministres des Transports (CEMT) | The European Conference of Ministers of Transport (ECMT) is an intergovernmental organisation established by a Protocol signed in ... |
| Deadweight | The total weight in tons (2240 lb.) that a ship carries on a specified draft including fuel, water in tanks, cargo, stores, passengers, baggage, crew and their effects, but excludi... |
| European Agreement on Main Inland Waterways of International Importance (AGN) | 2000, ECE (TRANS/120) The European Agreement on Main Inland Waterways of International Importance (AGN) is an int... |
| Freight transport logistics | Freight transport logistics could be defined as the science or management of the movement of freight and is essentially the process that ensures that the right resources are positi... |
| Groyne | A groyne is a protective structure of stone or concrete which extends from shore into the water to prevent a beach from washing ... |
| High Water Level (HWL) | The High Water Level (HWL) is one of the three water levels defined for different navigable conditions on the Danube. It occurs during just 1% of the duration of the navigable seas... |
| International classification system for waterways | The international classification system for waterways specifies seven classes which are distinguished by Roman numerals (I, II, III, IV, V, IV, VII). Class 0 is fictive and charact... |
| ISPA | Instrument for Structural Policies for Pre-Accession. See: Instrument for Str... |
| LNRL | Low Navigation and Regulation Level.See: Low Navigation and Regulation Level (LNRL) |

(Item 1 - 10 of 17)

[1] [2] next

Testing Waterways Beginners

[Suspend the test](#) 

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Question 1 - Overview of European Waterways (4 Points)

Which canal creates a continuous waterway from the North Sea to the Black Sea?

- Mittelland canal
- Main-Danube Canal
- Dortmund-Ems canal
- Wese-Datteln canal

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INeS key properties

- **offering consolidated information about Intermodal Inland Waterway Transport**
- **providing training material in the field of IWT (e-Learning platform online and supported)**
- **serving as a basis for**
 - **adaptation and extension to national needs**
 - **using synergies in further development (e.g. for audio-visual material and animations)**

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Summary

Summary

In the European Union

- need for IWT research has been recognized,
- research topics are identified systematically,
- a EU co-financing programme is in place,
- examples for successful activities can be shown and
- the future strategy is defined.

Concluding question: Are there cases for cooperation?

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