PLATINA3
IWT policy platform

# D4.4 Report on barriers towards implementation of waterway and port infrastructure investments and proposed solutions

| | |
|---|---|
| Grant Agreement No. | 101006364 |
| Start date of Project | 01-01-2021 |
| Duration of the Project | 30 months |
| Deliverable Leader | Danube Commission |
| Dissemination level | Public |
| Status | V2.0 |
| Submission Date | 17-04-2023 |
| Author | Manfred Seitz, Danube Commission<br>Virginia Oganesian, Danube Commission |
| Co-author(s) | Michelangelo De Lisi, CCNR,<br>Juha Schweighofer, Viadonau<br>Severin Fraundorfer, Viadonau<br>Nik Delmeire, IWT Platform<br>Ruxandra Florescu, PDM<br>Salih Karaarslan, EICB |

*This deliverable has not yet been approved by CINEA*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006364. The opinions expressed in this document reflect only the author's view and in no way reflect the European Commission's opinions. The European Commission is not responsible for any use that may be made of the information it contains.

Funded by the Horizon H2020 Programme of the European Union under grant agreement No 101006364

# Version

| Version # | Date | Author | Organisation |
|---|---|---|---|
| V0.5 | 05-09-2022 | Virginia Oganesian | DC |
| V1.0 | 20-01-2023 | Virginia Oganesian, Juha Schweighofer, Severin Fraundorfer, Michelangelo De Lisi | DC, viadonau, CCNR |
| V1.1 | 24-02-2023 | Virginia Oganesian, Juha Schweighofer, Severin Fraundorfer | DC, viadonau |
| V1.2 | 07-03-2023 | Virginia Oganesian, Juha Schweighofer, Severin Fraundorfer, Michelangelo De Lisi, Ruxandra Florescu | DC, viadonau, CCNR, PDM |
| V2.0 | 13-03-2023 | Virginia Oganesian, Juha Schweighofer | DC, viadonau |

# Release Approval

| Name | Role | Date |
|---|---|---|
| Juha Schweighofer, viadonau | WP4 Leader | 13-03-2023 |
| Salih Karaarslan, EICB | Quality Assurance Manager | 17-04-2023 |

# Table of Content

# Executive Summary

This deliverable identifies and analyses the main existing barriers in inland waterways (IWW) and port infrastructure projects implementation, both on national and international (EU) level. The main focus is put on barriers related to funding as one of the most important obstacles to inland waterway transport (IWT) infrastructure implementation.

In line with the main objective of this task, an assessment was conducted with respect to existing barriers relating to the inland waterway infrastructure, fairway infrastructure, as well as inland port infrastructure. The deliverable takes into consideration not only constraints (administrative and technological barriers) inherent to construction processes, but also aspects of climate change, global warming and emergence of correspondent regulatory measures implemented on EU level.

However, not only barriers are described in the report, but also existing good practices and successful examples of projects implementation in combination with measures tackling these barriers. In addition, the work was amended by input collected during the PLATINA3 4th Stage event in Strasbourg, in particular, from the discussions during the dedicated panel: "How to make sure that (more) IWT projects are raised, financed and implemented?". The research is complemented by recommendations on potential elimination of the barriers on operational and regulatory level, proposing possible adaptation of the existing framework to diminish barriers for IWT infrastructure and facilitate projects' implementation to ensure modal shift towards IWT.

The report is structured across four main topics:

1. Technological and regulatory barriers, in particular in relation to the complexity of the environmental legislation – on national level (depending on the national legislation in the field of environmental protection), on EU-level and on cross-border level (when legislation differs from one state to another).
2. Barriers on funding and financing, issues related to attraction of investments to IWT infrastructure projects, also touching upon regulatory and policy aspects, especially in relation to climate proofing and climate change mitigation and adaptation measures.
3. Administrative and regulatory barriers, addressed on national level, EU level, and in case of cross-border projects – international level when several countries (EU or EU and non-EU Member States) are involved.
4. Institutional barriers related to institutional capacity constraints, lack of engineers, technical experts and infrastructure managers.

The given structure is reflected in the framework of the report, consisting of eight chapters. While the first chapter provides an overview of the overall objectives of the report, scope and accepted methodology, the second chapter is focusing on modal shift and the role IWT infrastructure plays in it. The following four chapters are dedicated to the aforementioned categorized barriers. The seventh chapter is complementing the analysis conducted in the previous chapters and summarizes the recommendations of the deliverable, focusing on four areas: environmental, regulatory (in relation to funding), institutional and administrative.

**The environmental perspective** is evaluated from the position of the sector, which always was focusing on ensuring the balance between navigability and sustainability. The search for measures to create a sustainable inland waterway infrastructure has always been an important issue, as freshwater ecosystems being considered endangered and species protection and nature conservation as a whole must be ensured not only for the sake of the environment, but also for the sake of navigation. The inland navigation sector has always been confronted with various challenges. On the one hand, integration of IWT into multimodal supply chains through the maintenance of fairways and canals, the expansion of inland waterways, and the creation and operation of additional port infrastructure (ensuring road and rail connectivity). On the other hand, the implementation of sustainable solutions to ensure preservation of water bodies and tackling climate change has to be undertaken.

Today environmental issues become more and more urgent, requiring a proper addressing of existing problems through both: structural and non-structural measures to avoid causalities, to lower the negative impact brought by

construction, as well as through integration of new findings on an accelerating climate change into adaptation strategies. It is clear that no solution fits all, and measures have to be considered in a case-by-case manner. River adaptive capacities have to be assessed on a river basin level in a comprehensive way. This can be done through exploring funding opportunities on EU-level (CEF, operational programs) to conduct studies on integrated environmental measures in the design of the projects not only for the sake of biodiversity conservation, protection of species and environmental protection, but also building adaptive capacity of river engineering measures and infrastructure management for a particular river basin.

On the other side, there is the optimization of the IWT infrastructure network in terms of port infrastructure and fairway depths (Good Navigation Status, GNS). Operations in connection with IWT significantly depend on the prediction of water levels and availability of adequate water depths. Temporary blocking of waterway sections has to be avoided and prevented, ensuring uninterrupted operations throughout the year. Otherwise, such disruptions are seriously undermining the capacity of IWT and decreasing the attractiveness and competitiveness of this type of transport.

This means that solutions have to be found regarding a further integration of transport and environmental policies, as well as a strategic vision for sustainable strategic development of IWT has to be established. The European Green Deal (EGD), the Sustainable and Smart Mobility Strategy (SSMS), as well as NAIADES III are emphasizing the important role IWT plays in sustainable transportation transition. At the same time, the implementation of IWT infrastructure projects is often facing opposition in terms of environmental aspects, meaning that the bridges between environmental legislation and IWT policy have to be built to bring more balance into decision-making and the necessary political support at both national and international level.

**From the perspective of funding,** reliable and efficient instruments are key when it comes to the development of any kind of an infrastructure project. The deliverable presents certain cases on funding issues related to the implementation of IWT infrastructure in the Danube and Rhine regions and certain peculiarities of obtaining EU-funding for the implementation of CEF-funded cross-border projects between EU and non-EU Member States too.

From the perspective of inland port projects, results of the research conducted in 2021 by the Rhine-Danube Corridor Study Team led by iC consulenten and by the DTP DIONYSUS project are given to provide an overview on the development of the port infrastructure in the Rhine-Danube Corridor. The research showed a comparison of funding dedicated to IWT port projects with the one of projects relating to other transport modes. The analysis revealed that the vast majority of inland port projects fall into the category of project costs between €1 million and €50 million, which is significantly less capital intensive than projects in the rail or road sector.

Furthermore, the fourth chapter provides an overview of the existing funding issues, also analyzing the new legislation supporting sustainable economic activities (such as theGuidelines on State aid for climate, environmental protection and energy and the Taxonomy Regulation). Another important document – the Technical Guidance on climate proofing of infrastructure in the period 2021-2027, was assessed from the perspective of a holistic methodology it brought to ensure that an IWT project subject to EU-funding is covering the aspect of climate change. Together with this, it means that another possibility to ensure funding for IWT infrastructure is given by the combination of engineering and environmental measures under one project. It is also emphasized that for many projects, budgets are often allocated to individual works for either construction or upgrade of infrastructure facilities, while a variety of current instruments for EU-funding allows the combination of the primary objectives of infrastructure projects relating to transport with other ones eligible for EU funding like climate change mitigation and adaptation, as well as energy transition. A combination of budgets for one IWT infrastructure project covering several objectives can be a solution to tackle the issue of budgetary constraints. Examples on grouping of budgets were provided on the renovation of the Ijmuiden Sea lock in the Netherlands and on the reconsideration of the system on the Meuse River.

**The institutional barriers perspective** is evaluated for various stages of IWT infrastructure projects implementation, through approvals, decision-making and permitting procedures, in certain cases, negotiations on national, international or EU-level. By being conservative in methods of handling infrastructure projects and overall functioning of the transport system, governmental institutions can be reluctant in terms of adoption of modern approaches, and restrain learning, for example, by imposing strict compliance to existing rules and procedures. Yet, the other way around, these structures can also enable learning, for instance, through stakeholders' involvement and interactive decision-making.

Institutional constraints often play a role of an important limiting factor even when overall transport policies are in favour of IWT. Therefore, the political will shall be backed up with relevant capabilities (including institutional capacity) of various governmental, public and private stakeholders to eliminate barriers in IWT infrastructure implementation as well as bringing modern state-of-art solutions to IWT on a continuous basis with concrete results. An iterative approach shall be brought in practice in combination with existing successful practices on the governance structure and institutional capacity of a country.

Good practices, such as the importance of education and training for ensuring ecologically sound river engineering were presented. There are different levels of impact and different requirements when it comes to education for all aspects of the complex river system. A shift from a subject based education to sciences integration shall be duly addressed and embedded in the educational processes as well as in regular training programs to build-up and to reinforce existing institutional capacity in the IWT sector. A double-loop learning in order to better understand modern IWT infrastructure needs to be put in practice by reconsideration of its original aims, implying interdisciplinary and an integrated approach. Both single-loop and double-loop learning are considered essential, while existing functionalities of IWT infrastructure can be optimized and potentially transformed, to refine and develop new approaches to accommodate extreme weather events (e.g., creating either robust waterworks or more flexible designs).

The most common **administrative barriers** related to infrastructure projects' implementation at different stages, such as various procedures in terms of certification, due diligence, permits, public procurements, tender biddings, contracting and planning are given in the deliverable. They often go close with the aforementioned complex hierarchy of the institutional system and international character inherent to a large number of IWT infrastructure projects. The vast majority of administrative barriers stems from institutional complexity and procedures, which are following the established hierarchy, defined on the national level of EU Member States. In many cases, for large infrastructure projects, and especially for cross-border projects (with involvement of several Member States, budgetary approvals, technical and administrative complexity of permit granting procedures, public procurements etc.), this complexity is understandable as it relates to large investments, public funding and complex decision-making. It is obvious that major infrastructure projects take a long time.

Very often due to the lack of communication, low involvement of public authorities in the early stages of setting up a project, long discussions and argumentations at later stages affect significantly the timely preparation and implementation of a project causing delays. In this regard, an open planning process (especially if substantial environmental impact is expected) and early involvement of all relevant stakeholders to participate in the scoping process and to contribute to identifying alternatives will help to reconcile or reduce conflicting interests and to lower risk of delays at later stages. The stakeholder involvement process is the responsibility of the project promoters and respective authorities in charge. Thus, a better promotion of the positive impacts of IWT due to its high energy efficiency contributing to the climate objectives can lead to a higher acceptance of the proposed infrastructures by environmental authorities and the society. The involvement of local stakeholders can be a good tool to avoid opposition and to increase awareness of the benefits of a project.

# List of abbreviations

| | |
|---|---|
| BAW | the Federal Waterways Engineering and Research Institute of Germany |
| BfG | the Federal Institute of Hydrology of Germany |
| CBA | Cost-benefit analysis |
| CCNR | Central Commission for the Navigation of the Rhine |
| CEDA | Central Dredging Association |
| CEEAG | Guidelines on State aid for climate, environmental protection and energy |
| CEF | Connecting Europe Facility |
| CF | Cohesion Fund |
| CINEA | the European Climate, Infrastructure and Environment Executive Agency |
| DANTE DTP | DTP Project: Improving Administrative Procedures and Processes for Danube IWT |
| DAPhNE DTP | DTP Project: Danube Ports Network |
| DG CLIMA | the Directorate-General for Climate Action |
| DG ENV | the Directorate-General for Environment |
| DG FISMA | the Directorate-General for Financial Stability, Financial Services and Capital Markets Union |
| DG MOVE | the Directorate-General for Mobility and Transport |
| DG NEAR | the Directorate-General for Neighbourhood and Enlargement Negotiations |
| DG REGIO | the Directorate General for Regional and Urban Policy |
| DIONYSUS DTP | DTP Project: Integrating Danube Region into Smart & Sustainable Multi-modal & Intermodal Transport Chains |
| DTP | Danube Transnational Program |
| EC | European Commission |
| EGD | European Green Deal |
| EIA | Environmental Impact Assessment |
| EIB | European Investment Bank |

| | |
|---|---|
| ERDF | European Regional Development Fund |
| EU | European Union |
| EUSDR | European Union Strategy for Danube Region |
| FRMMP | Fairway Rehabilitation and Maintenance Master Plan |
| GHG | Greenhouse gas |
| GES | Good Ecological Status |
| GNS | Good Navigation Status |
| IADC | International Association of Dredging Companies |
| ICPDR | International Commission for the Protection of the Danube River |
| INEA | the Innovation and Networks Executive Agency |
| IPCC | Intergovernmental Panel on Climate Change |
| ISPI | Italian institute for international political studies |
| IWT | Inland Waterway Transport |
| IWW | Inland Waterways |
| JASPERS | Joint Assistance to Support Projects in European Regions |
| JS | Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin |
| LNG | Liquified natural gas |
| METEET | Mixed Environment Transport External Expert Team |
| MFF | Multiannual Financial Framework |
| MS | Member States |
| MSCI | Morgan Stanley Capital International |
| NACE | the Statistical Classification of Economic Activities in the European Community |
| PLATINA | Platform for the Implementation of NAIADES |
| PPP | Public-private partnership |
| RDC | Rhine-Danube Corridor |
| RIS | River Information Services |

| | |
|---|---|
| SEA | Strategic environmental assessment |
| SDG | Sustainable Development Goals |
| SSMS | Sustainable and Smart Mobility Strategy |
| TEN-T | Trans-European Transport Network |
| TSC | Technical Screening Criteria |
| UNECE | United Nations Economic Commission for Europe |
| VBW | Association for European Inland Navigation and Waterways |
| WAMS | Waterway asset management systems |
| WFD | Water Framework Directive |
| WP | Work Package |
| WSA | the Wasser- und Schifffahrtsamt (Waterways and Shipping Office) |
| WSV | the German Federal Waterways and Shipping Administration |

# List of figures



# List of tables

# 1. Introduction

## 1.1. Project and task description

The Horizon 2020 PLATINA3 project[1] is a platform supporting the European Commission (EC) in the implementation of the NAIADES III Action Programme[2]. PLATINA3 is structured around four fields: market (Work Package (WP)1), fleet (WP2), jobs and skills (WP3) and infrastructure (WP4). The main objective of PLATINA3 is to provide a knowledge base for the implementation of the European Green Deal (hereinafter – EGD) in a view of further development of the EC's inland waterway transport (IWT) action programme (NAIADES III) towards 2030. The platform is aiming at bringing together key stakeholders of the sector for better involvement and uptake of outcomes from related national and European projects and initiatives. PLATINA3 will consolidate their findings, assess their impacts and gaps.

Work package 4 "Infrastructure" deals with various aspects of the infrastructure, such as:

- inland waterway and port infrastructure ready for a changing climate;
- alternative energy infrastructure along the waterway and in ports;
- smart waterway and port infrastructure and management;
- barriers to infrastructure implementation and proposed solutions.

This report presents the research conducted within Task 4.4 - Barriers to infrastructure implementation and proposed solutions of PLATINA3, which focuses on existing barriers affecting the implementation of infrastructure projects on inland waterways and in inland ports, such as administrative and regulatory ones, technological constraints, lack of funding and institutional capacity issues. The aim of this task is to identify and analyse existing barriers and to draft recommendations for waterway managers, project coordinators and project promoters as well as to propose possible adaptation of the existing regulatory framework to diminish barriers for IWT infrastructure and facilitate projects' implementation to boost modal shift towards IWT.

A number of measures has been undertaken by the EC in order to establish a sustainable framework for the deployment of the European IWT infrastructure network during previous decades, to enhance the performance of IWT by making it safer, more reliable and reducing congestion, offering lower energy consumption and better environmental performance. Yet today, IWT infrastructure managers are challenged by certain constraints, some of them are inherent not only to IWT but also to any other kind of infrastructure implementation (such as civil engineering, transport and industrial infrastructure overall), also in the light of climate change and emergence of stringent regulatory measures creating additional levels to be considered in all the stages of project implementation from planning till start of operation, including also aspects relating to regular maintenance.

Considering the vulnerable position of IWT in the transportation market and the challenges it is facing regularly, it has to be emphasized that the creation or modernizing of the physical infrastructure on inland waterways (IWW) and in ports is one of the key issues for success, demanding, however, further actions to overcome the existing main barriers relating to the implementation of proper infrastructure measures.

[1] https://platina3.eu/
[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0324

## 1.2. Objective of the deliverable and its methodology

According to the Grant Agreement, the **objective of this task** is: *to outline ways to diminish barriers towards implementation of IWT infrastructure investment on EU and national scale, from the perspective of public administrations, the IWT sector and financing institutions.*

It has to be emphasized that Task 4.4. doesn't address alternative fuels infrastructure implementation, as being investigated within the Task 4.2. Alternative energy infrastructure along the waterway and in ports, except for certain general remarks and points which have close correlation with IWT infrastructure as a whole. Digital infrastructure on IWW and in inland ports is not addressed either, as being discussed in Task 4.3 Smart waterway and port infrastructure and management.

**Refined objectives identified during PLATINA3 consultations on Taxonomy Regulation[3]:**

Task 4.4. had to come up with meaningful measures and practical recommendations based on desk research and stakeholders' consultations on possible ways to eliminate existing barriers and to facilitate infrastructure implementation processes on various stages. Considering the new legislation for public funding and private investments adopted by the EC in order to direct investments towards sustainable projects and activities to meet the EU's climate and energy targets for 2030 and the EGD objectives, the Taxonomy Regulation in particular may impose certain challenges to future IWT infrastructure investments.

In this regard, Task 4.4. provides a brief analysis of the Technical Screening Criteria (TSC) for IWT infrastructure and their possible impact on future IWT infrastructure projects implementation. Some recommendations produced within this task can be taken into consideration for a possible revision of the Technical Screening Criteria for IWT infrastructure by the technical expert group: "Platform on Sustainable Finance" or for IWT stakeholders when preparing a justification for particular projects which are not fully aligned with the current TSC.

**Link of the task objective with NAIADES III:**

*As it is emphasized in NAIADES III:*

- *Today, **the scarcity of transshipment infrastructure, and of inland multimodal terminals** in particular, is pronounced in certain parts of Europe, and **should be given the highest priority.***
- *The use of the EU's inland waterway network is currently **not optimized** due to the **lack of coherent infrastructure and fairway quality assurance.***
- ***By 2030, the European inland waterway network can and must be connected** as much as possible – both **physically** and digitally – **to other transport modes**. Yet today, interoperability between inland ports and hinterland connections remains an issue, and the number of multi-modal platforms and transshipment nodes is insufficient.*
- ***Flagship 1: Helping waterway managers to ensure a high level of service (Good Navigation Status) along EU inland waterway corridors by 31 December 2030***
- *While calling on Member States to step up fairway rehabilitation and maintenance efforts in order to uphold and improve navigation conditions, **the Commission will give more support for projects aimed at completing and upgrading the inland waterway TEN-T network** and addressing bottlenecks, with a particular focus on inland waterways that require strong coordination between Member States and adequate governance.*
- *The European Parliament invited the Commission to ensure stricter oversight of the implementation of the TEN-T by **reinforcing relevant instruments and the role of the European coordinators in the governance of the corridors, with a focus on inland waterway cross-border projects**. The Commission will therefore consider **to propose a dedicated cooperation framework for inland waterway***

[3] REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (europa.eu)

***transport within the revision of the TEN-T Regulation**, which will enable Member States to better coordinate cross-border actions and projects.*

- *Through **the Connecting Europe Facility (CEF),** the Commission will support **measures that help to achieve Good Navigation Status,** such as deploying cross-disciplinary digital information and operation systems for water and waterway management.*
- *The Commission will give more support for projects aimed at improving the quality of inland ports infrastructure and their multimodal connections to rail, road and sea through dedicated terminals.*

Additional requirements for infrastructure and waterway investment are imposed by environmental measures and impact assessment regulations. With respect to Task 4.4, it is important to take into account the following propositions described in NAIADES III:

- ***An integrated approach** is therefore essential when considering future **inland waterway transport infrastructure developments, taking into account transport needs but also environmental and societal concerns,** as well as the multiple functions of waterways and ports in terms of regional economic development, water supply, energy generation and biodiversity.*
- ***Flagship 4: Guaranteeing IWT investments take into account climate and environmental objectives***
- ***In 2021, the European Commission will adopt technical guidance on climate-proofing to help promoters take into account climate and environmental objectives when investing in transport infrastructure.** Furthermore, as part of this integrated approach, the Adaptation Support Tool may support the development of climate change adaptation strategies and plans for inland waterways. The European Commission also supports a better integration between the Water Framework Directive and navigation policies, by providing support for integrated planning of inland waterways and a better implementation of the environmental legislation.*
- ***The Commission will launch a study on the impacts that the port activities of selected river and sea ports can have on the environment.** The study will develop and implement specific tools, such as Environmental Management Systems, as well as port-specific action plans creating a nucleus for wide-scale roll-out of environmentally sustainable port management and operations.*

**Concluding for Task 4.4:**
Although NAIADES III doesn't point at direct barriers for infrastructure investments, it is also tackling the question of infrastructure financing by means of support for projects aimed on infrastructure development, ports' modernization, waterways' rehabilitation and other measures.

**Methodology according to the Grant Agreement:**

*"Existing barriers towards implementing IWT infrastructure investments (fairway, locks and ports and both in volume and lead time) will be investigated in regarding infrastructure needs, financing requirements and opportunities, as well as the challenge of infrastructure implementation in sensitive and valuable ecosystems.*

*By desk research and expert interviews, the regulatory and administrative/organisational framework for such investments as well as planning and financing instruments will be analysed. Solutions will be proposed based on the analysis of good practices, existing and forthcoming financing instruments as well as expert opinions. Existing findings (e.g. the Bodewig & Secchi Report, Report of Court of Auditors, projects in TEN-T, CEF Transport and Operational Programs, interviews with IWT infrastructure managers and – planners) will be taken into account. The investigations will address relevant areas such as: integration of transport modes in transport planning, alignment of needs for transport master plans and regional development plans and of infrastructure planning on different levels (EU, national, regional), interdisciplinary planning of infrastructure and environment, regulatory framework for IWT infrastructure projects, existing financing & funding instruments and new forms thereof and capacity constraints of implementing bodies".*

**Refined methodology of the deliverable:**

In line with the main objective of this task, an assessment was conducted with respect to existing barriers relating to the inland waterway infrastructure, like the fairway (including fairway maintenance issues, locks, approaching channels, navigable and connecting channels and waterside approaches to inland ports etc.), as well as inland port infrastructure, like quay walls, berths, docks, harbor areas, roadsteads, anchorage areas and all kind of physical infrastructure in ports.

Dedicated good practices, new regulations, as well as in particular the funding and financial framework were considered. The work was amended by valuable input collected during the PLATINA3 4th Stage event in Strasbourg[4], in particular, from the discussions during the dedicated panel: "How to make sure that (more) IWT projects are raised, financed and implemented?".

The main existing barriers comprise:

- Technological and regulatory barriers, in particular in relation to the complexity of the environmental legislation – on national level (depending on the national legislation in the field of environmental protection), on EU-level and on cross-border level (when legislation differs from one state to another).
- Barriers on funding and financing, issues related to the attraction of investments to IWT infrastructure projects, main challenges public and private operators face to receive funding and financing for their projects and ensuring the eligibility of expenditures. This category is also tackling regulatory and policy aspects as was explained above, especially in relation to climate proofing and climate change mitigation and adaptation measures.
- Administrative barriers, addressed on national level, EU level, and in case of cross-border projects – international level when several countries (EU or EU and non-EU Member States (MS) are involved.
- Institutional barriers related to institutional capacity constraints, lack of engineers, technical experts and infrastructure managers.

The deliverable also includes certain good practice examples from on-going and completed projects addressing the Rhine – Danube Corridor (FAIRway Danube CEF project, FAST Danube project, DTP DIONYSUS) and initiatives aiming at the removal of existing barriers (European Investment Bank (EIB) consultancy programs, Joint Assistance to Support Projects in European Regions (JASPERS), Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin (JS), Mixed Environment Transport External Expert Team (METEET).

## 1.3. Structure of the report

The deliverable is divided into 8 Chapters. **The first chapter** gives an overview of the overall objectives, scope and accepted methodology based on the task description of the Grant Agreement, the NAIADES III objectives and the Taxonomy Regulation discussions in PLATINA3, as well as the research conducted.

**The second chapter** is an introductory one, describing the current status of the infrastructure of the European IWT system, its role in the development of the European transportation sector and contribution towards the greening objectives of the current EU legislation. The main aim of this chapter is to provide an overview of the correlation between sustainable IWT infrastructure and the future of not only IWT, but also the European economic development as a whole. It emphasizes the need to reconsider certain approaches relating to funding, planning, design, management, implementation and operation of IWW infrastructure projects.

**The third chapter** takes a closer look at the main existing technological and regulatory barriers, especially in terms of existing complex and multilevel environmental legislation, lack of alignment in national, EU and

[4] https://platina3.eu/event/stage-4-strasbourg-revisited/

international legislation and design methods in environmental impact assessment. It is also tackling issues of sustainability in design and construction and the need to implement clean, energy efficient practices in construction methods, as well as environmentally friendly solutions considering climate proofing. Like all the subsequent chapters this chapter considers two views: from the perspective of IWW infrastructure and from the perspective of inland ports infrastructure.

**The fourth chapter** provides an overview of the existing funding issues, also analyzing the new legislation supporting sustainable economic activities (such as the CEEAG - Guidelines on State aid for climate, environmental protection and energy and the Taxonomy Regulation). It also contains an analysis of current funding for IWW and port projects in the scope of overall funding and financing of projects from different transport modes. Main barriers related to EU-funding of Trans-European Transport Network (TEN-T) infrastructure projects are evaluated.

**The fifth chapter** deals with institutional capacity issues addressing also new legislation for climate proof infrastructure, questions of training and education for infrastructure managers, technical assistance and supervision of projects' implementation and overall cooperation to avoid insufficient expertise.

**The sixth chapter** addresses the most common administrative barriers related to infrastructure projects' implementation at different stages, such as various procedures in terms of certification, due diligence, permits, public procurements, tender biddings, contracting and planning. Another scope of barriers in this chapter is related to issues which arise from various stages of the project elaboration, including design, alignment with strategic planning, preparation of feasibility studies, cost-benefit analysis etc.

**The seventh chapter** contains recommendations related to possible solutions to overcome the identified barriers, lessons learnt from successful IWT projects` implementation and overall conclusions drawn.

**The eighth chapter** provides a list of selected bibliography studied for the elaboration of this deliverable.

# 2. Status quo of IWT infrastructure and its role in modal shift

The total length of the navigable inland waterway network, running through 25 MS of which 13 MS[5] are interconnected by inland waterways, amounts to 41,000 km[6]. The TEN-T network takes a share of around 15,000 km. The remaining 26,000 km are defined as a secondary network for regional transport.

A well-functioning transport infrastructure is one of the key objectives to be fulfilled in order to achieve a modal shift towards IWT in accordance with the EGD[7] and Sustainable and Smart Mobility Strategy (SSMS)[8] targets, as well as it is an essential element in maintaining the EU transport competitiveness and sustainability.

The EGD states:

- *…"to shift a substantial part of the freight transported by road (currently accounting for 75% of inland freight) to inland navigation and rail"…*
- *… "measures to increase the capacity of inland waterways from 2021".*

The Sustainable and Smart Mobility Strategy states:

- *… "inland waterway transport and short-sea shipping to increase by 25% by 2030 and by 50% by 2050".*

In this way, IWT has also a close relation to the Sustainable Development Goals (SDGs) in the 2030 Agenda [9] that relate to sustainable transport. This means that developing the IWT infrastructure can be attributed to construction of efficient and sustainable navigation, coastal protection, flood risk management etc. As defined by Bruntdland et al., 1987:

- *"Sustainability is achieved in the development of infrastructure by efficiently investing the resources needed to support the desired social, environmental and economic services generated by infrastructure for the benefit of current and future generations".*

The diagram displayed in the Figure 1, elaborated by Cavalcante de Barros et al., 2022[10] shows the role IWT infrastructure plays in regional development, protection of water ecosystems, adaptation to climate-change hazards, creation of sustainable transport systems, sustainable links between urban and rural areas and other socio-environmental issues.

Cavalcante de Barros et al., 2022 describe a sustainable IWT as the where freight increase meets lower environmental and economic costs in waterway development works and operations, while being resilient to climate change. It shall cover technological improvements in hydraulic design to reduce ecosystem impacts and enhance safety.

[5] See footnote 2
[6] https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/site/en/abouttent.htm
[7] The European Green Deal | European Commission (europa.eu)
[8] Sustainable and Smart Mobility Strategy – putting European transport on track for the (europa.eu)
[9] https://unece.org/unece-and-sdgs-2
[10] Cavalcante de Barros, Bulhões de Carvalho and Pinho Brasil Junior. "Inland waterway transport and the 2030 agenda: Taxonomy of sustainability issues"

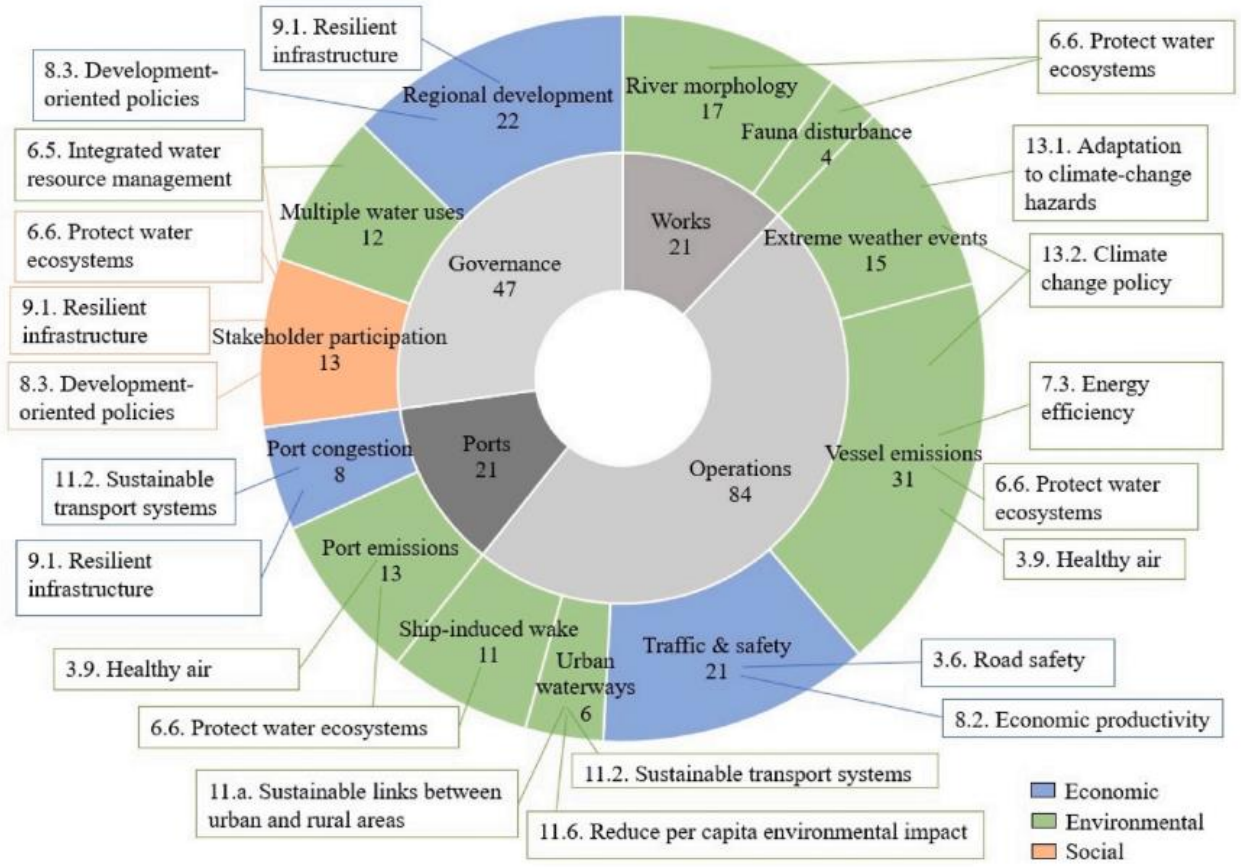


***Figure 1:*** *IWT activities and their link to socioenvironmental issues and SDG Targets.* ***Source:*** *Cavalcante de Barros et al., 2022.*

It can be stated that IWT, being already considered as a sustainable and efficient transport mode, still has potential for improvement in terms of sustainability. This includes various aspects in IWT development, inter alia related to energy transition, reduction of environmental impact, optimization of logistic chains, and, in particular, climate change mitigation and adaptation when implementing IWT infrastructure projects. Besides the aforementioned, IWT is considered as a sustainable transport mode, which is playing an important role on the way to EU climate neutrality. In this regard, considering targets of EGD and SSMS for modal shift, smooth implementation of IWT infrastructure projects becomes crucial to ensure sufficient capacities for larger shares of goods transportation by 2030 and 2050. Yet the number of barriers associated with different stages of projects` implementation, address environmental performance, socio-economic impact, lack of funding and financing, shortcomings in terms of political will and decision making, managerial and functional backlogs, as well as lack of coherence of national and international regulatory framework. In the light of climate change, an additional challenging impact is brought to IWT (see deliverable D.4.1. of PLATINA3[11]). Another aspect, with respect to infrastructure, is associated with clean construction technologies and the need to implement innovations in construction (in particular green innovations, new technologies and sustainable operational practices, “clean” equipment, e.g., equipment which is powered by green energy) to maximize productivity, energy efficiency and to minimize negative environmental impact.

Another matter to be taken into account is that with 75% of inland waterways allocated across the borders of different EU (and non-EU) MS, a need for coordination, standardization and alignment of policies and

[11] https://platina3.eu/download/climate-change-adaptation-strategies/ (PLATINA 3 (2022). D 4.1: Climate change adaptation strategies - information package for European inland waterway and port infrastructure managers)

regulations is becoming increasingly important as experience of waterway managers, project promoters and other IWT stakeholders involved in infrastructure implementation processes proved.

Completing and maintaining the single European transport system is a cornerstone of European mobility and transport policy and focuses on main objectives, such as: making the EU transport system sustainable, climate proof and resilient.

A further point to be addressed with regards to development of sustainable IWT infrastructure is funding and financing. This aspect varies significantly from country to country. Yet, in the general scope, a number of bottlenecks on European inland waterways (IWW) annually results in restrictions in navigability and closure of navigation, which in its turn leads to significant economic losses (e.g., the low-water period of 2018 in Central Europe).

In the Danube region, while the port infrastructure is in considerably good condition (yet requiring modernization/upgrade in certain ports), fairway conditions during a large number of the days per year are often far from satisfactory. Unlike in the Rhine area, there is no extensive complementary network of navigable rivers and canals. Navigation on the Danube network is also somewhat more limited than on its counterpart in the north due to its sharp river bends and broad sections that tend to create fords and sand bars in the riverbed[12]. Blockages caused by insufficient depths during low water as well as blockages due to ice annually generate significant losses for IWT users and affect the reliability and predictability of Danube transportation.

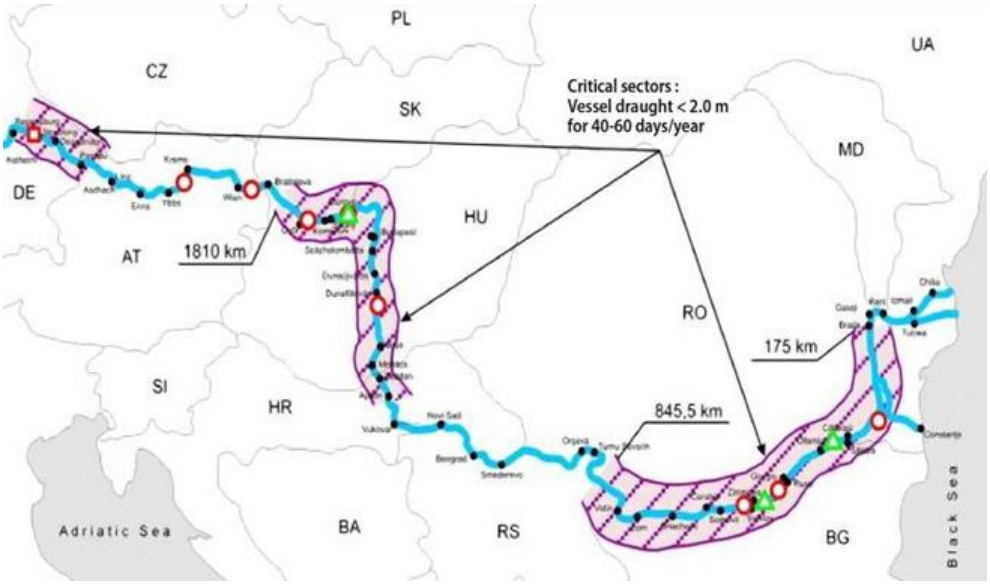


***Figure 2:*** *Critical sectors for cargo carrying capacity on the Danube.* ***Source:*** *UNECE.*

A major strategic bottleneck, which limits the cargo carrying capacity of larger vessels navigating between the Rhine and the Danube by restricted water depth and low bridge clearances, is the Straubing–Vilshofen stretch of the Danube, close to the confluence with the Main–Danube canal. On this stretch, the river averages 2 m in depth for 40 to 60 days a year[13] (Figure 2). Another bottleneck at rkm 565- 563 (Belene island) occurs with a certain regularity in the conditions of summer-autumn shallow water and causes a blockage of several hundred vessels annually. Other sections of the Danube River also experience low-water every year: Deggendorf to Vilshofen (Germany), rkm 1880 – 1863 and rkm 1810 – 1785 (Slovakia), Nyergesújfalu channel

[12] www.danubecommission.org/dc/de/die-donauschifffahrt/540-2/

[13] https://unece.org/DAM/trans/main/sc3/publications/IWW_WhitePaper_ECE_TRANS_279.pdf / UNECE White paper, 2020

(Hungary), Apatin, Futog (Serbia) and many others. An updated comprehensive list of relevant bottlenecks along the Danube has been consolidated in PLATINA3[14]. Some of these issues can be solved by dredging and proper waterway maintenance, which is not always done regularly. Greater impacts can be achieved by implementation of dedicated river-engineering measures demanding an integrated approach involving all relevant stakeholders as well as the availability of sufficient personnel and financial resources.

The maritime connectivity of the Danube River is challenged by the war situation in the Ukraine and increased navigation on the Sulina Channel, one of the three Danube arms in its Delta, which requires technical and navigational upgrade to allow 24/7 passages of vessels in both directions. The main alternative to the Sulina Channel is the Danube-Black Sea Canal, linking the port of Constanta with the Danube port of Cernavoda, and which is still underused. Another alternative, represented by the Ukrainian canal in the Kilia arm of the Danube River, is challenged by the procedure of the alignment of the project main characteristics with the requirements of Espoo Convention, which has been ongoing already for 15 years.

Another important obstacle to be taken into account when speaking about port infrastructure is the availability of road and rail connections, as very often in the case of using IWT, the last mile needs to be covered by road (or rail and road). To increase the modal shift, such infrastructure should be considered together with port development plans and IWT infrastructure development strategies to eliminate missing links. In the Danube region, there are gaps, such as road and rail connections between ports. From the corridor perspective, analysis of selected core & comprehensive network sections and nodes conducted within Danube Transnational Program (DTP) Project: Integrating Danube Region into Smart & Sustainable Multi-modal & Intermodal Transport Chains (DIONYSUS)[15] showed a need for upgrade of around 25 % of sections. It was concluded that almost 90 % of these "to be upgraded" sections belong to the railway TEN-T network. Most of them are located on the route Budapest – Arad – Timisoara – Drobeta Turnu Severin, as well as in other parts of Romania and Bulgaria. The type of all these sections is defined as conventional railway. Another issue, which is also affecting logistic chains in the Lower Danube region is the different gauge between the railway tracks of EU and non-EU countries due to the difference of the former USSR standards compared with the European standards.

An outlook on the overall IWW infrastructure in Germany was provided by Marcel Lohbek (Association for the European Inland Navigation and Waterways) during the PLATINA3 4th Stage event. While the situation relating to the inland ports infrastructure in Germany is considered rather positive, the majority of IWW structures has reached or exceeded its operational and economic life of 70-90 years. 85 % of locks in Germany are older than 40 years, 45 % are older than 80 years. Out of 350 locks in total in Germany, 50 are in an unsatisfactory condition, and 88 % of the locks require capital renovation. The thorough analysis of the condition of the locks showed that 50 locks will have to be replaced in the upcoming years to prevent infrastructure failure. It was emphasized that schedules relating to construction and renovation infrastructure targets could not be met during the previous years. Currently, it is necessary to speed up 3-5 times to replace all the infrastructure, which is in an unsatisfactory condition.

All the aforementioned results in significant capacity constraints and prevents the use of the full potential of IWT. The inland waterways and port infrastructure is facing numerous limitations and challenges in its implementation. Reasons for this backlog vary significantly: from lack of funding to extremely complex procedures on different stages of project design and implementation. As mentioned above, some of the barriers are not only inherent to IWT, but to any infrastructure project. Yet, the specificity of IWT is defining a number of issues, which in certain cases create significant obstacles to the sector`s development.

The main barriers existing on the different stages of infrastructure project implementation are listed and

[14] See footnote 11

[15] https://www.interreg-danube.eu/approved-projects/dionysus/section/project-deliverables

analyzed in the following chapters, amended by recommendations as well as existing good practices and examples for their removal. A separate analysis is conducted for the IWW and the inland port infrastructure covering different cases on the European IWT network.

# 3. Technological and regulatory barriers in relation to complexity of environmental legislation

## 3.1. Perspective of IWW infrastructure

The search for measures to create sustainable inland waterway infrastructure has always been an important issue, as freshwater ecosystems in the vicinity of inland waterways are highly endangered and species' protection and nature conservation as a whole must be ensured not only for the sake of the environment, but also for the sake of navigation.

The inland navigation sector is confronted with various challenges. On the one hand, one of the core tasks is to integrate inland navigation as a competitive mode of transport in multimodal supply chains through the maintenance of fairways and canals, the expansion of locks, berths and docks, and the creation and operation of additional infrastructure (road and rail connections to the ports). On the other hand, efforts are also being made to counteract the effects of climate change and extreme natural processes through the construction of hydrotechnical structures, dikes, dams, bank protection facilities, and so on.

Canalization of free-flowing rivers was often considered as a key issue, especially in the strategic planning and assessment phase. Dredging was considered for a long-time as a threat to the aquatic environment, due to disposal of the dredged material and also due to reactivation of pollutants in the waters during the dredging process itself. Considering the vulnerable state of the natural environment as well as the stringent regulations in the field of environmental protection, the design and implementation of IWT projects have always been linked to massive environmental impact assessment (EIA) research, analysis and elaboration of mitigation and compensatory measures.

Two main legal acts: the Habitats Directive[16] (adopted in 1992) and the Water Framework Directive (WFD)[17] (adopted in 2000) provided a comprehensive framework of environmental protection legislation in the field of inland waterways. The main provisions of the WFD include achieving good ecological status by 2027 in all rivers, lakes, transitional and coastal waters, ensuring non-deterioration and implementing river restoration measures. The Habitats Directive aims to maintain and restore habitats to a favorable condition and improve the ecological coherence of the Natura 2000 network[18].

The adoption of the EU Green Deal leads to the implementation of two broader actions in the field of environmental protection: the Biodiversity Strategy to 2030 (2020), which aims to strengthen measures to restore biodiversity, and the EU Action Plan "Towards Zero Pollution - Action Plan for Air, Water and Soil" (2021). As described by the "Fitness Check Evaluation of the Water Framework Directive and the Floods Directive"[19] there are large gaps in the implementation of EU environmental legislation at the national level, and the speed of implementation is considerably low. This leads to a number of obstacles in the preparation and adaptation of documents for environmental impact assessments, as well as to lengthy official procedures. This effect is amplified in the case of transboundary projects, even between MS.

As an example, the group of measures carried out in the CEF studies for the common sections in Romania, Bulgaria, Hungary, Slovakia, Croatia and Serbia can be referred to. The aim was to ensure a long-term good navigational status together with a good ecological status along three sections of the Danube and Sava rivers. The studies and consultations to obtain EIA decisions and all related EIA procedures progressed very slowly for several years in all countries because national legislation was not in line with the applicable EU legislation.

[16] Council Directive 92/43/EEC (europa.eu)
[17] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32000L0060&from=EN
[18] https://natura2000.eea.europa.eu/#
[19] FITNESS CHECK of the Water framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive (europa.eu)

Therefore, the Fitness Check emphasizes the need to accelerate the implementation of the WFD legislation and to allocate more resources to the measures to be achieved in order to reach the WFD objectives by 2027. Another important point is the need to better integrate sectoral policies with the WFD, including transport policies, as integration at strategic planning level is crucial. Other important legislation to be mentioned in this context is the EIA Directive (85/337/EEC)[20] on the assessment of the effects of certain public and private projects on the environment, adopted in 1985, and the Convention on Environmental Impact Assessment in a Transboundary Context - Espoo Convention[21], which entered into force in 1997. The Espoo Convention sets out the obligations of the signatory parties (EU MS and 44 countries) that have agreed to comply with the provisions of the Espoo Convention: they must subject their economic activities to an environmental impact assessment at an early planning stage and inform each other of any major projects that are likely to have negative environmental impacts across borders. With respect to inland waterways and inland ports, according to Annex 1 "List of Activities" of the Espoo Convention, activities that may cause significant adverse transboundary impacts are related to the construction of:

- Trading ports and also inland waterways and ports for inland-waterway traffic which permit the passage of vessels of over 1,350 tonnes;
- Large dams and reservoirs.

Both of the aforementioned legal acts require transboundary consultations (EIA subject) on projects, which potentially can have an impact outside the territory of the country of project`s location. While the Directive (85/337/EEC) can only be applied to EU MS, Espoo Convention is also applied to non-EU countries. The transboundary impacts of projects depend on their location and how construction projects are implemented and operated after completion. However, as stated in the Espoo Convention, the likelihood of transboundary impacts must be investigated in any EIA for such projects. If transboundary impacts are identified, they must be calculated and analysed. Projects do not necessarily have to be located on state borders. Even a project which is implemented at a considerable distance from the nearest state border may adversely affect the territory of another state through the transfer of pollutants to watercourses or through atmospheric circulation patterns, tides, river flows, and species migrations. The complexity of EIA procedures, obtaining permits and approvals from environmental authorities is always characterized by long procedural durations. The main relevant issues that arise at each stage of the EIA include:

- high level of bureaucracy and lack of integration among the several governmental agencies (e.g., Ministries of transport, waterway administrations and Ministries of environmental protection) mean that the approval of environmental permits for new projects or for modernization/technical upgrades takes several years, which in certain cases can delay not only the development of the inland navigation sector but also the economic development of the entire region;
- lengthy public consultations, which in certain cases can lead to public protests and project abandonment;
- different speed of elaboration of studies, conduction of surveys and permits issuing in different countries;
- lack of collaboration on decision-making regarding EIA documentation structure;
- increased complexity of all the aforementioned procedures when more than 2 countries are involved or when EU and non-EU MS are involved.

At the same time, different interdisciplinary and transdisciplinary approaches and difference in tools, scientific methods and techniques generating data for EIA in accordance with national environmental legislation often result in long lasting discussions between involved counteracting authorities (and in case of transboundary impact – between different countries) arguments for reliability of the documentation and whether it reflects a real impact on the environment or not. Some of the typical issues in preparation of EIA documentation can be defined as follows:

[20] Council Directive on the assessment of the effects of certain public and private projects on the environment (europa.eu)

[21] UNECE, Convention on environmental impact assessment in a transboundary context, 1991, Espoo Convention

- algorithms in data processing and in-situ measurements for quantitative determinations on the hydro-morphological changes may vary depending on the national standards, different predictive models of water flow and sedimentation processes, as well as types of software used for EIA calculations and modelling;
- difference in qualitative and quantitative characteristics of biological and zoological monitoring data;
- different threshold values and indicators in qualitative and quantitative analysis of samples collected;
- number and composition of environmental monitoring campaigns;
- differences in application of mathematical and hydrodynamic models when evaluating environmental impact, as well as different methods of sample collection (fillet type, mesh size etc.) and the modality in which samples were preserved and analysed, etc.

Discussions and disputes on an EIA can last for several years and even decades which affects the overall duration of the project`s design and implementation as well as bringing additional costs.

At the same time, a high level of standardization and the elimination of legislative fragmentation in the field of an EIA, as well as bringing national legislation of EU MS in compliance with the EU legislation in force may help in many cases to tackle these issues.

One of the examples of the projects in the field of river engineering, which provides a knowledge-base for project implementation on the Danube is the **FAST Danube project**[22], co-financed by the EU. It was presented during PLATINA3 3rd and 4th Stage events.

This project tackles questions of cooperation between Romania and Bulgaria in order to develop the best solution for navigational improvement of the joint section of the Lower Danube waterway. The complexity of the transboundary project to improve inland navigation infrastructure on this stretch of the Danube, known for its complex dynamics of river morphology, requires an integrated solution that must not only be selected and implemented to achieve good navigation status, but also ensure a balance between environmental services. Twelve critical bottlenecks were identified where the water level during low water periods affected the traffic on the Danube significantly. The main stages of the project covered a feasibility study, an EIA, state procurement procedures, design and project management. One of the challenges in project implementation was to conduct two different survey campaigns within a short time frame: hydrographic, hydrodynamic and geotechnical surveys. Another challenge was to obtain the permits for access to restricted areas, like nuclear power plant, to conduct these surveys aiming at obtaining data to be reflected in the hydrodynamic mathematical models for sedimentation. One of the objectives of this project was also to test implemented solutions by means of the new software[23], which allows modelling an impact of the traffic on the sedimentation processes. To deliver environmental impact assessment, it was important to identify and to harmonize the procedures between the two countries and the criteria to be applied during the development of the EIA documentation. Lots of barriers and problems were identified in this stage, which caused a significant delay. During the project implementation stage also, other issues occurred. For instance, a delay in procurement procedures due to unharmonized national legislation with the EU legislation, which was applied to this project. This caused a 1,5-year delay for the project`s implementation. Due to this delay field surveys had to be conducted in a shorter time frame. Another important barrier was related to decision-making regarding the EIA documentation. Determining the number of reports to be prepared, taking into account country-specific legislation, and setting a timetable for the preparation and submission of the documentation were also necessary to overcome the barriers. Eventually it was decided to develop 2 EIA studies to identify the impact on biodiversity and to allocate mitigation measures. Two different procedures: for Romanian and for Bulgarian parts were established. Currently, there is still a process ongoing on elaboration of the best solution as well as the best strategy for the future to implement similar projects on this section. Due to the good cooperation between the involved partners a broad experience within this project was accumulated and the FAST Danube project can be a good practice example in this regard.

[22] http://www.fastdanube.eu/

[23] https://www.marin.nl/en/facilities-and-tools/software/shipma

Administrative and regulatory barriers were clearly shown through this project as through an example. It showed the way how an equilibrium can be found between complex environmental legislation and infrastructure project implementation. It also provided certain lessons learnt for involved state authorities and national agencies, which can be reflected while planning future projects.

Another example of a major project that is making only slow progress is the Seine-Scheldt link (France-Belgium), which is part of the TEN-T core network. This project aims to make 1100 km of the inland waterway navigable for large inland vessels by 2030. However, according to the European Court of Auditors' assessment carried out in 2020[24], the link is unlikely to be fully operational by 2030. A major component of this project is the Canal Seine Nord Europe - a new 107 km link in France. This part is scheduled for completion by 2030. However, other parts of the project are not realistic. The construction, for example, was delayed for several reasons. One of which is the local opposition for the implementation of the project. There is also no agreement between main stakeholders on environmental impact. Another issue is a dramatic cost increase (for around 200% in comparison with 1993) and significant 18-years delay in construction works eventually didn't provide a solution to close the missing link to connect the port of Zeebrugge for transportation of containers.

In this regard, it can be stated that complexity of environmental legislation imposes serious barriers for IWT projects implementation and an integrated approach shall be used to achieve both: Good Ecological Status (GES) and Good Navigation Status (GNS).

A good example of sustainable infrastructure operation is **The Sigma Plan**, an integrated flood protection plan in Flanders (Belgium)[25], which takes its beginning from 1977 as a solution developed to react to a storm surge flood in 1976. The project contains a number of measures to ensure necessary protection by combining traditional infrastructure measures like dike reinforcement with innovative solutions, such as river widening through implementation of controlled flood areas. The Sigma Plan is based on integral river management solutions that affect a number of Flemish rivers: the Scheldt, the Drume, the Nete, the Kleine Nete, the Grote Nete, the Dyle, the Rupel, the Demer and the Zenne.

One of the activities to be mentioned in the Danube region is Action 1 of the European Union Strategy for Danube Region (EUSDR). The activity contributes to an improved waterway and port infrastructure & management, with the aim to optimally manage and improve navigability conditions as well as shore-side infrastructure in a harmonized and environmentally sustainable way. The key instrument in this regard is the Fairway Rehabilitation and Maintenance Master Plan (FRMMP) initiated in April 2014 by Priority Area 1a and elaborated by the Priority Area Coordination together with the Danube waterway administrations and the EC. The main objective of this document is to establish stable fairway conditions along the entire Danube by means of rehabilitation and maintenance measures.

When it comes to internal procedures, there are various fields where digitalization can help. In the **FAIRway Danube project**[26], which is one of the flagship projects emerging from the FRMMP, Hungary, Croatia and Romania implemented national waterway asset management systems (WAMS) for data collection and for certain internal procedures. Austria also developed and implemented WAMS separately from the FAIRway Danube project. In terms of data quality and acceleration of internal procedures, monitoring on hydrographical and hydrological data and water levels forecast through user information platforms facilitates data collection for potential users for needs of EIA. The establishment of national and transnational platforms where fairway related data is being combined to make it easier for engineers, project designers,

[24] European Court of Auditors, Special Report, 10, 2020, Special Report 10/2020: EU transport infrastructures: more speed needed in megaproject implementation to deliver network effects on time (europa.eu)
[25] https://www.sigmaplan.be/en/
[26] http://www.fairwaydanube.eu/

environmental authorities and waterway managers to collect the necessary data, also includes harmonized information on climate change adaptation. In addition, it provides monitoring of the parameters relevant for the fairway upgrade, hydrological, hydraulic, and morphological surveys as well as a catalogue of biodiversity components.

It has to be emphasized that given complexity of the environmental legislation requirements on IWWs infrastructure projects implementation defines the technological constraints in certain cases and the need to reconsider dredging activities on the free-flowing rivers. At the same time, climate change may bring its additional impact to existing environmental issues through changing temperatures, reduced precipitation, long drought periods, enhancing the adverse impact on the natural water bodies.

All aspects such as global warming, changes in precipitation, the decrease of groundwaters and high evapotranspiration have an impact on the discharge and the water level of rivers. As well as flooding and low-water periods, changes in river morphologies result in specific additional measures to be undertaken to maintain navigability of inland waterways, to ensure safety of navigation and to prevent future flow degradation on particular segments of the river tributaries.

All impacts brought by climate change affect the natural conditions of the IWW, but also affect adapted maintenance measures. The application of additional mitigation, adaptation and compensation measures, as well as the implementation of more intensive environmental monitoring, will be necessary. Once it comes to planning and technical study, especially when it concerns projects that take years to implement, this may lead to the need to reconsider technical solutions and design. That's why works on optimization of the IWWs depths are of a crucial importance in order to ensure navigability and reliability of the main IWT networks. One of the examples of such optimization measures is given on the river Danube and Rhine following in the Annexes II and III accordingly.

## 3.2. Perspective of inland ports infrastructure

While representing a smaller scale in terms of project scoping, inland ports infrastructure is largely dependent on the waterway conditions, namely fairway depths, ensuring regular accessibility of the port basin and to the port terminals. That`s why this subchapter is serving as a continuation of the previous subchapter and is interrelated with it, taking into account that creation and sufficient maintenance of the fairway is an important precondition of creation and development of port infrastructure.

Ports infrastructure is examined through an agreed set of introductory information on port position, ownership, administration and operation, followed by a number of infrastructure assets and elements. In the Danube Region, the vast majority of ports are publicly owned and privately operated. Private operators in ports are not necessarily companies owned by the private sector, but they can be publicly owned and operating under private company laws. Apart from the port land, the public sector (various governmental tiers – state, region, municipality) also owns the port infrastructure in most of the ports. This corresponds to the commonly accepted view that the port infrastructure is a strategic infrastructure asset, just like highways or railways. This, however, does not represent a barrier for their exploitation by the private sector.

From the point of view of infrastructure assets, an indicator of the port size and its ability to serve its core business – waterside cargo handling (a.k.a. ship-to-shore operations) - is the length of its operational quays. In this case, ports show considerable differences in total quay length, starting from just (currently) 120 meters in the Port of Slavonski Brod on the Sava River (Danube's largest tributary) in Croatia to 8.455 meters in Bratislava. The seaport of Constanta has, logically, the longest quay line of almost 30 kilometres. In port operations technology, vertical

quays are often seen as a preferred way of quay wall layout for inland ports, in spite of the higher costs of their construction when compared to the old fashioned sloped (inclined) quay walls. Therefore, a convenient measure of the infrastructure advancement of a port is a share of vertical quay wall in the total quay length.[27]

In terms of the scope of work of port projects in the Danube region, in general the largest share of projects belongs to rehabilitation and upgrade works and construction of new infrastructure assets. A smaller share of projects is reported to cover only studies, while some projects contain both studies and works, where studies are referred to as feasibility studies, master plans and designs studies, all targeting concrete physical works on port infrastructure. Most of the existing projects deal with the extension of the waterside capacity, which is a positive sign from the point of view of increasing inland waterways transportation. Partly, there are also projects which deal with the improvement of road connection or internal roads in ports, and the improvement of rail connection or internal rail capacities within ports.

What is especially encouraging is the fact that ports are keeping pace with other transport nodes and modes in terms of combating greenhouse gasses (GHG) emissions. To this end, there are some dedicated port development projects which are dealing with the construction of alternative clean fuels facilities, while other projects involve greening of port operations through incorporation of electric-driven equipment, solar power, LNG powered machinery, waste management, etc.

It has to be noted that the aforementioned considerations in terms of environmental regulations are applied also to the creation and maintenance of depth of the port harbour areas and of port terminals, construction of quay-walls and other structures. Same regulations are applied with regards to dredging activities addressing the sustainability of such operations. This means that the same issues as described in the previous sub-chapter are applicable to inland ports and terminals, therefore they are not listed here.

Construction of port infrastructure itself is also facing various barriers in terms of environmental, social and other constraints. Very often being located in or very close to the cities or densely populated areas, creation or upgrading of the port infrastructure is bringing its negative impact such as noise, vibration, air pollution, large energy consumption, as additional negative externalities, and often may be subjected to local opposition and protests. Dredging activities, conducted on the port entrances and harbor areas are often being opposed in case of location of the dredging and dumping sites close to public beaches or recreational or resort areas. Construction of rail and road accesses to ports often has to take into account proximity to residential areas and internal routes in order to avoid creation of noise and congestions in urban agglomerations.

The aforementioned also affects the choice of the necessary construction equipment, as in many cases, powerful installations (for pile drilling or masonry walls erection) produce lots of noise, vibration, water and air pollution.

Other requirements applied to ports are issues of environmental protection and safety with regards to port operations and potential negative impact they can bring. These are conditions, which have to be taken into account by investors on the stages of planning and evaluation of port infrastructure projects to be further elaborated with the correspondent mitigation measures in order not to become a barrier on the implementation stage. Commercial ports are large industrial hubs, where a number of activities, including transportation and handling of hazardous cargoes, are conducted. Environmental issues in construction of ports and terminals and their operations primarily include following:

- Air emissions;
- Wastewaters and solid waste management;

[27] D.5.1.1: Status of port infrastructure development along the Danube, iC, DAPhNE project, 2017

- Handling hazardous materials and fuels;
- Noise;
- Biodiversity impact.

However, modern technologies to reduce the negative effects generated by ports and port operations are being developed and implemented, especially with regards to air emissions reduction, the aforementioned “classical” issues of port functioning are cornerstones in port planning and infrastructure development in terms of technological and environmental considerations.

Considering that due to historical preconditions, a large number of inland ports is located close to the European cities often with a limited possibility to expand, unlike large maritime ports, which often can take their activities off-shore or reallocate their industrial sites further in the hinterland, this often creates an opposition to port development from local authorities and social groups, concerned about residential or recreational areas being affected by pollution and noise.

Another case, where complexity of environmental decision-making can affect port infrastructure development, is related to development of industries located close to or at port territories (if the port serves these industries as transportation/cargo handling hub): processing plants, refineries, chemical industries, waste handling, energy production or other industries subject to environmental and safety restrictions. In many cases terminals/ports are dependent on such activities and align their own development plans with the development plans of these industries. That`s why, carrying out environmental assessment for the industries interrelated with port activities can be an additional factor, to be taken into account considering port infrastructure projects implementation. In this case, depending on the Strategic Environmental Assessment (SEA) and EIA scenarios for construction, expansion/development or modernization of plants, delays and obstacles can occur in terms of environmental issues and local opposition, which can also lead to decommitment of such projects and therefore result in decommitment of correspondent port infrastructure projects.

# 4. Funding and financing barriers

## 4.1. Perspective of IWW infrastructure

Reliable and efficient financing instruments are key when it comes to development of any kind of infrastructure projects. While application for state aid and provision of national funding has always been a complex issue varying from economic development of the country and the density of IWT infrastructure network, the distinctive feature of IWT projects financing in Europe for the MS was also a possibility of getting support from the EU dedicated funding provided certain criteria for projects of common interest were fulfilled and an added value to the EU was present. Several EU instruments also provide funding for non-EU member states that are part of the main IWT under conditions laid down in the corresponding regulations. Over the last decades, a wide diversity of funding instruments on EU level was created[28]. The figure below demonstrates the most well-known and popular tools for financing transport infrastructure projects.


***Figure 3:*** *Sources of financing instruments for infrastructure projects.* ***Source****: EC*

At the EU level, upgrades and missing links in the IWT infrastructure are targeted by a dedicated policy framework, of which the Trans-European Transport (TEN-T) network (and the associated Connecting Facility Europe (CEF)) is the flagship programme focused on financing large-scale infrastructure. Since 2013, with the adoption of the TEN-T Regulation[29], the EU's plan was to develop the EU core transport network by 2030. While the responsibility for implementation of TEN-T projects was given to EU MS, the role of the EC in this regard was to ensure that the TEN-T core network corridors are being achieved on time in accordance with the TEN-T Regulation: core network by 2030 and comprehensive network by 2050.

Overall[30], in line with the TEN-T Work Plan, the CEF[31] for the multiannual financial framework of 2014-2020

[28] New ways of financing transport infrastructure projects in Europe (europa.eu)
[29] REGULATION (EU) No 1315/2013 (europa.eu)
[30] European Commission, The Connecting Europe Facility (CEF) Transport Inland Waterway Portfolio, CEF support to Inland Waterways
[31] REGULATION (EU) No 1316/2013 (europa.eu)

provided targeted investments of up to €3.72 billion, contributing to 121 projects out of the 736 projects identified in the work plan to reach a fully compliant TEN-T network by 2030. In total, for the IWT sector, corresponding to the implementation of 35 actions aiming at ensuring a GNS, a CEF funding of €235 million was approved. The aforementioned funding was ensured for a number of IWT projects in line with the CEF targets: to upgrade and construct infrastructure, to commission studies with pilots addressing environmental concerns and to ensure further River information services (RIS) implementation.

CEF2 is continuing funding key projects in the areas of transport, including IWT. It will run from 2021 to 2027, with a significant overall budget of €33.71 billion. The budgets for the transport sector amount to €25.81 billion (including €11.29 billion for cohesion countries) with a maximum co-financing for waterways of up to 50% for the general envelope, and up to 85% for the cohesion envelope[32]. At the same time, as indicated in the special report of the European court of auditors,[33] reflecting analysis conducted for evaluation of implementation of the EU co-funded transport megaprojects with a cross-border dimension (so-called "Transport Flagship Infrastructures" (TFIs)): "*different EU, national, and sometimes regional, environmental and legal requirements complicate and delay the planning and implementation of TFIs, while the most constraining factors still remain budgetary ones*". This means that in many cases the question of funding and financing of projects for creation, maintenance and modernization of IWT infrastructure is still open despite the availability of funding mechanisms. While focusing on large infrastructure projects, EU-funding is leaving small-scale projects, often requiring funding below €1 million, to be dealt with on an ad-hoc basis depending on the interest of the respective Member State[34], which means that such infrastructure projects often do not receive funding.

As an example, for a delayed implementation of infrastructure projects, the infrastructure renewal on the German inland waterways is described in the following (Table 1). The main water transport arteries of Germany are the rivers Rhine and the Danube. As mentioned in the second chapter, maintenance and upgrade of the IWW infrastructure in Germany is progressing rather slowly. Table 1 demonstrates the demand for the renewal of the main German IWT infrastructure, such as locks, weirs, culverts and bridges, many of which require solid maintenance for further normal operation and some have to be replaced to prevent accidents and to ensure safety of navigation. Several facilities have to be kept in operation through very expensive targeted repair operations. During the panel discussion in the framework of the PLATINA3 4$^{th}$ Stage event, it was discussed that neighbouring IWT networks face more or less similar conditions of the IWW infrastructure. Therefore, rebuilding of the waterway infrastructure is a key issue and an important challenge in many other European countries too, which definitely cannot be addressed without dedicated funding and financing.

In the Danube region, obtaining EU-funding for the implementation of CEF-funded cross-border projects between EU and non-EU MS has its peculiarities and issues too. An example was given for projects on the Danube and Sava River from the experience of Croatia, during consultations at the PLATINA3 4$^{th}$ Stage event. Croatia borders Serbia, and Bosnia and Herzegovina, which are not members of the EU. Joint cross-border projects, related to removing bottlenecks on both sides include transnational cooperation of national agencies, international commissions, and a lot of political interaction. The situation in relation to implementation of common projects between Croatia and the Republic of Serbia requires a new political initiative in declaring an exemption of waterways from the issue of administrative barriers stemming from differences in regulatory framework between EU and non-EU states. Without this step, further development of common IWW structures and sections of the Danube can be severely complicated.

From the existing experience, it has to be specified that in matters of joint projects of Croatia with Bosnia and Herzegovina, there was the problem of financing the Bosnian side of projects, especially construction works. In certain cases, this is due to the inability of non-EU MS to fulfill all the conditions of CEF funding, and also due to the limited flexibility of funding mechanisms of non-EU countries in combined projects together with

[32] REGULATION (EU) 2021/1153 (europa.eu)
[33] See footnote 24
[34] See footnote 28

EU MS. Experience gained in joint projects of Croatia with Bosnia and Herzegovina shows that there was often rejection of funding for the later partner. As an example, the construction of the Svilaj bridge may be mentioned where a common project between Croatia - Bosnia and Herzegovina had been submitted for CEF funding, but only Croatia received approval, while Bosnia and Herzegovina had to find its own funds to finance it.

| **Demand for infrastructure renewal on the German federal inland waterways** | | | | |
|---|---|---|---|---|
| Type of IWW infrastructure | Need for renewal in the next 10 years | Structures renewed since 2016 (actual) | Target average per year | Average per year (actual) |
| locks | 50 | 5 | 3 | 0.8 |
| weirs | 30 | 1 | 3 | 0.15 |
| culverts | 45 | 9 | 4.5 | 1.5 |
| bridges | 110 | 30 | 11 | 5 |
| Overall demand for renewal | 250 | 45 | 24 | 7.5 |
| Output for the renewal of locks needs to be 3-5 x higher to meet the target | | | | |

**Table 1:** Demand for infrastructure renewal on the German federal inland waterways. **Source:** Association for European Inland Navigation and Waterways (VBW).

State aid and national funding has always been addressed as per limitations in terms of available funds and in terms of complexity of rules. It has to be put in front that the main precondition for efficient funding for IWW infrastructure is related **to political will and support given to the sector**. This situation is varying from one MS to another, depending on the number of determining factors and preconditions for IWT development (e.g., existence of large state players in IWT market: industries allocated across waterway network of a state, large shipping companies operating on the particular section and ensuring stable cargo flow in inland ports, availability of new market opportunities etc.). In many cases the lower performance of the inland navigation sector in comparison with maritime, road or rail often is a limiting factor for private investment. Considering the fact that no charge is applied on the passage via waterways for vessels in transit (unlike for connecting, approaching channels in maritime ports, for instance), countries with low-level of intensity of industrial activities on such waterways often feel reluctant in undertaking solid investments into maintenance or modernization of such IWW for the sake of merely ensuring efficient functioning of the corridor and not benefiting from this activity. Another factor determining political support relates to the mode of transport being most dominant and creating the greatest benefits to the state. Therefore, IWW infrastructure projects have to take into account that improving navigability has an overall positive impact on the country's prosperity.

Other political preconditions for IWT funding often fluctuate depending on changes in political leadership or parties. This, depending on the concrete situation, may affect development plans covering large infrastructure projects if such plans were supported under the previous governance, while not receiving enough support under the new one. Such situations usually significantly affect funding perspectives, causing delays, leading to unwillingness in decision-making and other unanticipated consequences. This may not only be inherent to the implementation of IWT infrastructure, but also to the overall transport policies of a state.

When the costs for inland waterway infrastructure measures are covered by the state, the situation may vary depending on the overall performance of IWT in that particular state and the support given. The Danube waterway development program (version 2, 2020)[35] gives an example for Hungary showing the interrelation between IWT state-of-play and performance of the national fleet operator MAHART[36]: "*After the change of regime, water transport became a low priority sector for decision-makers and the state of inland navigation in Hungary deteriorated significantly. In 1992, as the first of the major transport companies, MAHART ceased to receive state subsidies, and later, in order to maximize privatization revenues, the proceeds from the sale of the company's real estate were diverted from MAHART, leaving no possibility to replace the obsolete fleet. The poor state of the waterway reinforced this attitude and, in turn, the low priority given to the condition of the waterway made it a low priority. The accepted economic approach is that a given economically and socially justified development task or objective should be achieved at the lowest possible direct and indirect cost. In the case of fairway development, the maximization of economic benefits is not the fundamental objective.*"

Political support given to IWT and overall orientation towards sustainable transportation in different MS is reflected through different national priorities which may or may not coincide with investment plans on EU transnational corridors. In cross-border projects, this shows that governmental reluctancy is backed up with low political priorities resulting in low speed of implementation of such projects. As also emphasized in the special report of the European court of auditors, mentioned above, the TEN-T Regulation, although legally binding, contains provisions which allow MS to diverge from the plan to be achieved by the 2030 deadline, which also creates certain preconditions for deviations from the initial planning relating to the implementation of projects.

As indicated in the report of the Italian institute for international political studies (ISPI)[37], another important issue in IWW infrastructure funding is that operational and maintenance costs are rather high, while often not adequately prioritized in infrastructure planning and too little financial resources are spent on maintaining existing facilities in relation to investments in new infrastructure. This poses additional challenges to efficient spending of financial resources and places additional stress on public finances.

Yet, even considering favorable political preconditions and available EU-funding support for IWT infrastructure projects, the number of processes stipulated by the general organizational framework of implementation of complex infrastructure projects, especially on a cross-border level, exists. Realization of IWT infrastructure projects, as any other complex large-scale transport infrastructure project requires in general up to 10 years to clear all necessary administrative procedures to start works, and for the ones with more routine up to five years. Multilevel administrative procedures (described in the following chapter), as well as long-lasting complex EIA procedures are often stemming from the complex regulatory framework and procedures on national level in line with the corresponding EU legislation. Usually these are main factors affecting the speed of implementation and efficiency of spending of dedicated funding. Different ways of coordinating large cross-border infrastructure projects are also affecting the overall performance. This often results in limited predictability in the procedures and a high level of uncertainty for projects. Finally, such legal uncertainty can also deter private investment from participating in TEN-T infrastructure projects and results in increased costs in terms of access to capital[38].

Besides long administrative procedures, various studies used for desk research in this report in terms of evaluation of funding barriers for IWT infrastructure projects indicated following main issues inherent to a large number of projects, in particular with regards to CEF funding, such as:

[35] The project of the Trans-European Transport Network - Trans-European Transport Network, DANUBE WATERWAY DEVELOPMENT PROGRAMME Version 2, improved in parallel with the development of the SEA, September 2020, 2014-HU-TMC-0606-S

[36] https://www.mahart.hu/

[37] Secchi and Belladonna "Infrastructure in a Changing World: Trends and Challenges", ISPI-McKinsey Report, June 2020

[38] See footnote 28

- lack of knowledge of project managers on the elaboration of a project proposal in line with funding requirements and program rules, addressing main priorities and advantages of the project in accordance with EU legislative and policy framework, ensuring project visibility. This often results in a number of weak proposals or low-quality, immature projects not meeting the requirements, therefore, leading to inefficient use of the funding already available.
- cost-benefit analysis (CBA) was addressed by numerous studies as one of the important weaknesses in project documentation, usually not covering all the stages of projects` implementation and not addressing maintenance (life-cycle approach). The CBA is an important tool used in decision-making for large scale projects to prove that they are economically feasible and sustainable before providing funding. However, conducted to evaluate social benefits and costs, the CBA is not always based on solid freight traffic assessments and reliable data, which leads to overestimation of projects` outputs.
- no lessons learnt from evaluation of previous projects, no ex-post analysis of failures or inefficiencies conducted as such at organization level in order to reflect possible improvements into future integrated planning processes. On EU level, reports and assessments are conducted by the EC regularly with an overview of implementation of TEN-T projects, while outcomes of such assessments are not always being duly reflected on national level.
- lack of proper knowledge of existing funding opportunities as well as lack of knowledge on available private financing;
- lack of involvement of stakeholders to support large IWT projects as well as to promote EU added value. This low involvement also affects the project visibility in terms of socio-economic, environmental and other benefits it can potentially generate, while being necessary to increase awareness and to avoid opposition to its implementation.

## 4.2. Perspective of inland ports infrastructure

From the perspective of inland port projects, lack of financing is one of the top relevant barriers too, considering the fact that a large number of small-scale projects require funding. An analysis conducted in 2021 by the Rhine-Danube Corridor (RDC) Study Team led by iC consulenten provided information on the development of the port infrastructure in the RDC and the update based on the RDC Development Plan. For the Danube region, in total 105 projects were analyzed, including recently completed projects, as well as 67 projects which had either started or are planned in the near future (by 2030). Different projects analyzed by iC consulenten from 2014 onwards for all transport modes had relation to inland ports on the corridor level. The status-quo of projects relating to inland ports of the Rhine-Danube Core Network Corridor, including projects relating to major ports of the Western Balkans was investigated considering 19 core ports (18 inland ports on the Danube + maritime port of Constanta). The main results are presented in the figures below.

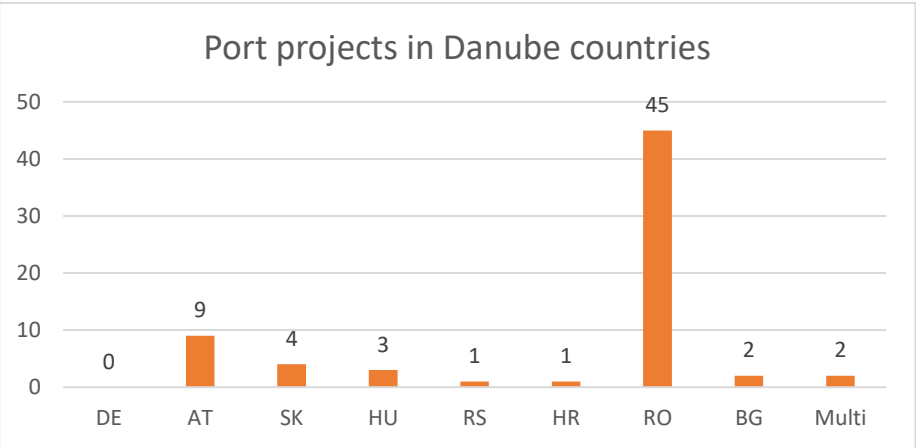


***Figure 4:*** *Distribution of port projects between Danube countries.* ***Source:*** *iC consulenten.*

Figure 4 shows that the largest share of on-going and planned port projects in the Danube region is located in Romania due to the largest number of core inland ports and the presence of Constanta seaport, which possesses a large infrastructure development plan out of which many projects are already being implemented. Romania also has a large number of inland core ports, which cover lots of on-going and planned projects too.

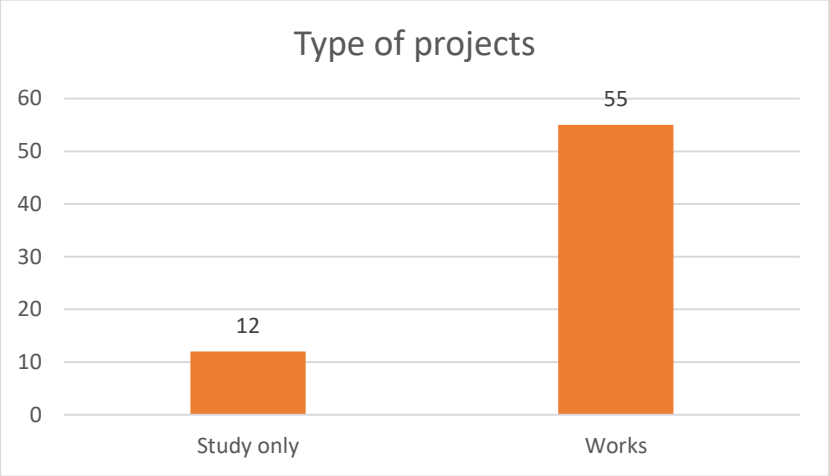


***Figure 5:*** *Distribution of port projects by types: studies and works.* ***Source:*** *iC consulenten.*

According to the analysis carried out, approximately the same share of on-going projects and projects planned in the medium term was considered, and as shown in Figure 5, the majority of projects relate to physical port infrastructure implementation (infrastructure works).

Speaking about cost of the projects (Figure 6) it has to be mentioned that €0.5 billion are dedicated for on-going projects in total for all the 19 ports, including ports of Western Balkans, and around €2 billion are dedicated for planned projects, which are not just planned, but present already different levels of maturity: either approved by the respective authorities or in the stage of the elaboration of feasibility studies.

To compare IWT port projects with projects relating to other transport modes, the average project costs for IWT were calculated, resulting in a value below €50 million. The analysis revealed that the vast majority of port projects fall into the category of project costs between €1 and €50 million, which is significantly less capital intensive than projects in the rail or road sector.

The only project exceeding the amount of €500 million is attributed to the port of Constanta and is actually representing a group of projects which were bundled together in one common project for funding.

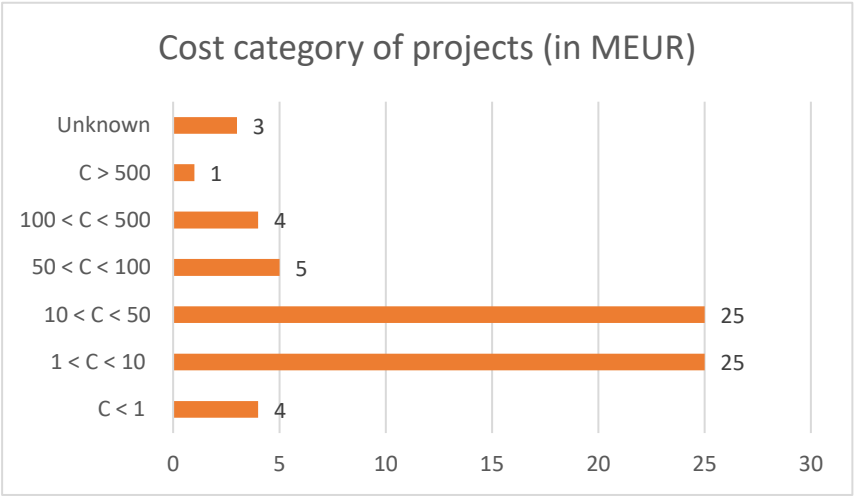


***Figure 6:*** *Distribution of port projects by cost.* ***Source:*** *iC consulenten.*

Another analysis was conducted based on data on ongoing and planned projects in ports from the DTP DIONYSUS project[39], which is slightly different from the data collected by iC consulenten within the corridor study. Data from DTP DIONYSUS includes information on on-going and planned projects in 20 ports (covering projects in 14 EU MS and in 6 non-EU).

This analysis also included IWW, rail and road projects that are of relevance for hinterland connections of selected ports and their integration into multimodal chains. The results (Figure 7, 8) demonstrate a big difference between the magnitude of works and capital invested in the rail and road sector on one hand, and IWT projects on the other. The road sector, for example, includes billions of investments (slightly less for rail), while investments into IWT are approximately 10 times less.

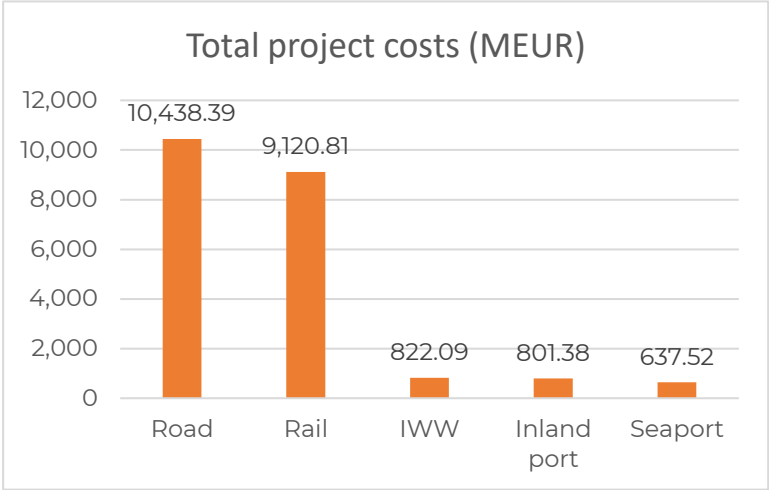


***Figure 7:*** *Distribution of infrastructure projects costs by mode of transport (road, rail, IWT, maritime).* ***Source:*** *DTP DIONYSUS.*

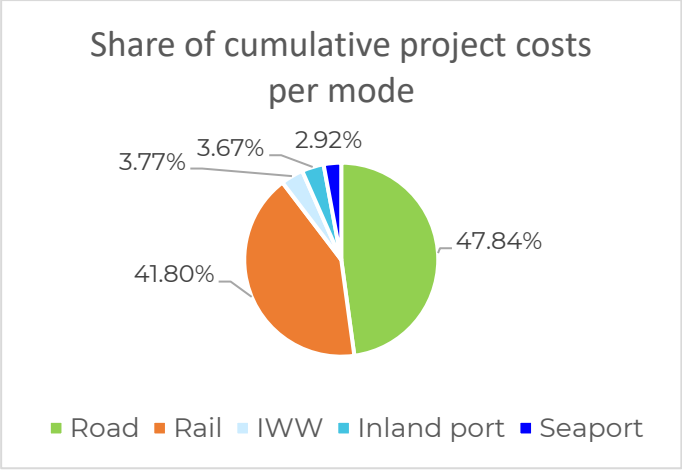


***Figure 8:*** *Share of cumulative project costs per mode of transport (road, rail, IWT, maritime).* ***Source:*** *DTP DIONYSUS.*

On figure 8 it is shown that the share of cumulative project costs for IWT (IWW and inland ports) is rather negligible in comparison with road and rail. Moreover, taking into account that only road and rail projects

[39] See footnote 15

providing connectivity with selected ports were analyzed in DTP DIONYSUS study, it can be assumed that the amount of funding for road and rail projects in general is much larger than for IWT.

Together with considerations provided in the previous subchapter, this leads to the question of how targeted modal shift to IWT can be achieved considering the aforementioned lack of funding and financing for IWT infrastructure projects.

In this regard, the port connectivity shall also be well addressed as in many cases inland ports are lacking rail and road connections, together with other issues of low quality and efficiency of existing railway services, insufficient depths at the port entrances and in harbor areas and lack of multimodal terminals in/around ports.

In terms of CEF funding, port and connectivity infrastructure projects (even such as rail sidings) have to be submitted separately. In this situation, if one of the projects is not considered to be eligible and doesn`t receive funding, the effectiveness of the implementation of another one is hindered due to the immediate reduction of projects Key Performance Indicators. At the same time, road connectivity for ports as well as multimodal centers shall be considered thoroughly in the light of current regulatory framework in terms of climate proofing and environmental performance. If the construction of new roads will increase the port capacity, but at the same time will add to more congestion (queues of trucks in ports, for example), the project may face a risk of being rejected, as the idea of CEF is to support sustainable modes of transport. This is closely related to the issue of climate proofing: proofing of climate impact mitigation and adaptation is required for all projects subject to an EIA according to the Technical Guidance on the climate proofing of infrastructure in the period 2021-2027[40]. This means that governments, port operators/port authorities have to be cooperative in this regard, as ports are nodes of the transportation network. Therefore, building a partnership between port authorities, concessionaires operating in ports and railway operators is vital. One step which can be definitely ensured on a strategic level is the creation of partnerships with authorities in charge for the implementation of a particular EU funding program in a particular country.

However, in this regard, the level of the development of the relationship between port stakeholders and state authorities has always been addressed as a key issue. As elaborated by European Federation of Inland Ports during the PLATINA3 4th Stage event, the definition of responsibilities amongst port stakeholders (port authority, terminal operator or the state) for infrastructure maintenance and upgrade is usually highly complex. If IWWs are governed and maintained by state authorities, various port facilities are often operated by either private companies or concessionaires and, usually, funding is provided to large operators, as smaller ones have difficulties with proving their project`s future performance.

A separate aspect of port infrastructure creation and operation, which has to be addressed in this chapter, is the level of development of private-public partnerships (PPP) in ports. This is often a predetermining factor for corresponding port development projects, which differ from conventional public sector projects. Private investment in infrastructure can be an important driving force of the economic development of ports. However, the complexity of PPP projects implementation may vary significantly in terms of the contract, which is a crucial element for maintaining business relationships between public and private sectors. Despite broad experience gained by European ports in terms of PPP, this form of interaction is still often hindered by a number of barriers preventing efficient cooperation. As long-term contracts, PPPs are tools for sharing liabilities for future risks. They can reduce the overall costs of a project and help to overcome budgetary constraints to ensure timely completion of infrastructure projects and to provide continued maintenance of infrastructure assets. However, PPPs, especially in terms of infrastructure development projects, are always facing certain barriers considering the long-term nature of PPP contracts and weak performance of infrastructure governance institutions. Some of these barriers are given in the following:

[40] European Commission, Commission notice (2021/C 373/01), September 2021, Technical guidance on the climate proofing of infrastructure in the period 2021-2027

- Absence of a clear definition of responsibilities and obligations in relation to port infrastructure, being a public property transferred to the private sector under concession.
- Lack of alignment of governmental strategic targets with the private partner's profit objectives in terms of infrastructure. Governments, port authorities and private parties do not necessarily share the same visions in the short term (immediate benefits) and mid/ long terms (further investments into main assets).
- Disagreements in terms of contractual provisions defining rights of both parties in PPP. In reality, the contract might however not be designed to ensure equality in terms of distribution of risks and benefits between parties, resulting in court cases and long-lasting trials.
- PPPs are legally complex as their implementation and application affect several branches of the law, which may lead to the need to elaborate and implement specific legal clauses.
- Lack of effective regulation and coordination process to remove regulatory constraints due to lack of coordination between government representatives and public and private stakeholders.
- Infrastructure PPP agreements are always characterized by long-term contracts (often 25 years or more). However, in certain cases, infrastructure maintenance can become a dispute between the contracting parties, which means that the question of responsibility for such an activity is not always addressed properly.

| Project phase | Type of project risk | Explicit fiscal risk, through contractual allocation? | Can implicit fiscal risks arise? |
|---|---|---|---|
| Risks during construction | Land issues and resettlement | Risk typically shared or fully allocated to public partner | Yes, when private partner cannot cope with risk |
| | Urban and other local licensing | Risk typically allocated to private partner | Yes, when private partner cannot cope with risk |
| | Environmental risks | Risk typically shared or fully allocated to one or the other partner | Yes, when private partner cannot cope with risk |
| | Geology and other construction risks | Risks typically allocated to private partner | Yes, when private partner cannot cope with risk |
| | Project design errors | Allocated to private partner | Yes, when private partner cannot cope with risk |
| | Cost of inputs | Risks typically allocated to private partner | Yes, when private partner cannot cope with risk |
| | Force majeure | Risk typically shared or fully allocated to public partner | Yes, when private partner cannot cope with risk |
| Risks during operation | Demand issues | Varies widely: allocated to one party or the other, or shared | Yes, when private partner cannot cope with risk |
| | Regulation of user fees | Allocated to public partner | Yes, when public partner is under pressure |
| | Maintenance and operational costs | Allocated to private partner | Yes, when private partner cannot cope with risk |
| | Policy change | Allocated to public partner | (not applicable) |
| | Changes in law | Allocated to one or the other partner, depending on change type | Yes, when private partner cannot cope with risk |
| | Force majeure | Risk typically shared or fully allocated to public partner | Yes, when private partner cannot cope with risk |
| Renegotiation | | ——— | Yes, public partner tends to accept higher costs and risks |

***Figure 9:*** *Infrastructure project risks in PPPs transformed into fiscal risks.* ***Source:*** *Matsumoto et al, 2021*[41]*.*

One of the key points, which is often lacking proper understanding from a governmental point of view, is that PPPs do not eliminate project risks related to funding. Yet, they bring a business-oriented partner able to make

[41] Matsumoto, Monteiro, Rial and Sakrak "Mastering the Risky Business of Public-Private Partnerships in Infrastructure", ISBN: 9781513576565, May 2021

swifter managerial decisions and to implement them with recourse to the financial markets. They also foster in the government a more comprehensive and holistic approach to project risks prior to drafting a contract.[42]

The figure above lists port infrastructure project risks associated with the most typical administrative and managerial barriers in the implementation of PPP projects and handling of public assets, transformed into potential fiscal risks through contractual allocation.

In addition, separate aspects related to PPP port infrastructure projects implementation are given in chapter 6 of this report.

## 4.3 Regulatory framework for funding and financing of IWT infrastructure projects with regards to energy transition and climate change

A number of legislative proposals inspired by the adoption of the EGD and SSMS was elaborated to support energy transition of the European economy and transportation sector. A detailed analysis of the introduced legislative proposals and their support given to the IWT sector was described in other deliverables of PLATINA3. Amongst others, Task 1.5. of PLATINA3 provided an overview of the policy measures and regulatory actions encouraging and facilitating the use of IWT. In the scope of this report, which is addressing barriers in terms of IWT infrastructure projects implementation, the potential future impact of several regulations on funding and financing of IWT infrastructure projects is considered.

In January 2022, in order to enhance a competitive environment of the internal European market, while supporting the main objectives of the EGD, the EC adopted the revised Guidelines on State aid for climate, environmental protection and energy (CEEAG)[43]: *"to support a cost-effective and just transition to climate neutrality, and to facilitate the phasing out of fossil fuels, while at the same time ensuring a level-playing field in the internal market"*. The guidelines provide a mechanism on how the EC will assess the compatibility of environmental protection, including climate protection, energy aid measures and aim to facilitate economic activities in line with main regulations for environmental protection. Inland waterways are also reflected in this comprehensive policy document and fall into different categories of measures targeted by these guidelines. Article 16 indicates categories of environmental protection, which also includes IWT infrastructure for "clean vehicles", which is mostly focused on alternative energy infrastructure for IWT.

While CEEAG introduced funding mechanism for state aid for sustainable activities, the Taxonomy regulation[44], which entered into force on 12 July 2020, supplemented by its Delegated Acts, created a framework for private investments towards sustainable economic activities.

While significantly considering existing environmental impact, such as climate change, global warming, deterioration of water sources, pollution, loss of biodiversity and destruction of natural habitats of various species, the Taxonomy Regulation is emphasizing the importance of directing financing towards environmentally sustainable economic activities and projects. It is setting out main conditions to prove that an economic activity is meeting the requirements and can be qualified as environmentally sustainable to attract investments. The Taxonomy Regulation is conceived to serve as a guidance for investors to address future funding of activities contributing to environmental objectives, which subsequently can lead to elimination of funding for not sustainable ones (the ones, which are out of the scope of Taxonomy Regulation and its Delegated Acts). Incentives of this regulation aim at stimulating companies to measure the

[42] See footnote 41

[43] European Commission, Guidelines on State aid for climate, environmental protection and energy 2022, February 2022, Communication from the Commission (2022/C 80/01)

[44] See footnote 3

environmental costs of their business, thereby motivating them to transform their businesses into more sustainable ones.

At the same time, in particular with respect to IWT, the Taxonomy Regulation currently contains criteria for manufacturing of vessels, IWT infrastructure and waste management, which are rather difficult (to fulfil, even if the transition pathway towards zero emissions takes place as assumed for the innovative scenario by the Central Commission for the Navigation of the Rhine (CCNR)[45]. With respect to the IWT infrastructure, Annex I on Climate change mitigation includes in the list of sustainable activities (article 6.16.): *infrastructure enabling low carbon water transport: construction, modernisation, operation and maintenance of infrastructure that is required for zero tailpipe CO2 operation of vessels or the port's own operations, as well as infrastructure dedicated to transhipment*. Even though sustainable alternative fuels infrastructure is out of the scope of the current report, yet, it is touching upon port infrastructure (terminals, storage facilities) dedicated for transhipment of such energy carriers, as renewable and low carbon fuels, providing a significant decrease of GHG emissions and potentially can be generated from waste (contributing to circular economy principles), biomass or from other renewable sources.

Annex II on Climate adaptation (article 6.16.) provides a definition of sustainable activity: *"Construction, modernisation and operation of waterways, harbour and rivers works, pleasure ports, locks, dams and dykes and other, including the provision of architectural services, engineering services, drafting services, building inspection services and surveying and mapping services and the like as well as the performance of physical, chemical and other analytical testing of all types of materials and products and excludes project management activities related to civil engineering works."*

In alternate classification mapping of the Statistical Classification of Economic Activities in the European Community (NACE), which is an addendum to the report of the Platform on Sustainable Finance on technical screening criteria for the four remaining environmental objectives of the EU taxonomy[46], published in March 2022, the IWT infrastructure is identified as: "*Activity, which is currently not in scope of MSCI Sustainable Impact Metrics, due to its high environmental impact and absence of low-impact alternatives".*

Green taxonomy shall become an enabling tool for sustainable finance on the way to the energy transition. In the field of IWT, today, it is imposing rather an additional challenge than an opportunity to attract public financing for existing and planned infrastructure. The Taxonomy Regulation and its Technical Screening Criteria currently require alignment with other policy objectives of EGD, SSMS and NAIADES III criteria for IWT. In addition, a level playing field should be established between rail and waterway infrastructure with regard to the scope of eligible activities in the regulation.

The Taxonomy Regulation is crucial for ensuring private financing for infrastructure based on a clear overview of existing bankable projects, which can help to close a financial gap in IWT infrastructure by means of private investments. Yet, it is important to reflect in the TSC that IWT infrastructure is an activity which foresees changing climate conditions (global warming, rising sea levels, extreme weather events, precipitation patterns, etc.), anticipates the damage they bring and reduces the risks of such events. To achieve these goals, a common misconception with respect to IWT infrastructure shall be avoided, e.g., referring only to zero-tile pipe emissions infrastructure or excluding dredging works from the list of sustainable activities. It has to be considered that climate-resilient infrastructure contributes to climate change mitigation with minimal impacts on the environment. Such type of infrastructure should not be blamed for its environmental impact, e.g., caused by dredging, if it can prevent larger environmental disruptions, e.g., flooding or low water. Moreover,

[45] https://ccr-zkr.org/files/documents/EtudesTransEner/Deliverable_RQ_I.pdf
[46] https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/220330-sustainable-finance-platform-finance-report-remaining-environmental-objectives-taxonomy_en.pdf

an important policy objective in relation to IWT should be also seen through its contribution to the decongestion of the overloaded road networks in densely populated regions, capacity utilization of the available space, reduction of externalities like noise, general pollution and number of accidents and traffic casualties (a high degree of safety, in particular with regards to the transportation of dangerous goods), relieving strain on the railways and establishment of a more sustainable transport system as a whole. This is another missing link in the current edition of the regulation, which is not addressed.

Overall, the regulation is not aligned neither with the targets of the EGD, SSMS, and NAIADES III on modal shift to IWT nor with the targets of the TEN-T regulation ensuring a corridor approach in IWT networks by removing the bottlenecks in IWT infrastructure development. The regulation is omitting inland port infrastructure (only "pleasure ports" and "harbour and river works" are considered) and superstructure, e.g., for storage, fixed equipment (such as warehouses and terminal buildings) located in a port for the provision of transport related port services as well as multimodal connections. It is also excluding the maintenance of the IWT infrastructure, while infrastructure investment projects have to address a "life-cycle approach". Excluding dredging from the list of sustainable activities, while including construction, modernisation and technical operation of waterways creates confusion as no construction of the fairway is possible without dredging considering the technological approach existing in hydrotechnical engineering.

The TSC criteria provided in the Delegated Acts do not provide a method to quantitatively assess the impact of the infrastructure project implementation and are mostly based on assumptions, while they can be rather be aligned with the requirements of the main legislation in the field of SEA and EIA (link with Water framework Directive is provided), which are based on clear indicators and parameters giving a possibility to quantify and to assess an impact. This means that a clear indication for the assessment and quantification of the impacts of an undertaking must be provided in the TSC, as in the future it may deter institutional investors from engaging more actively with the sector when not having a clear framework in place with respect to the application of the TSC.

**Climate change mitigation and adaptation in the context of IWT infrastructure projects**

Yet, this deliverable of the PLATINA3 project is not addressing the climate change impact on the IWT infrastructure as such, as it was analysed in detail in the deliverable 4.1. "Climate change adaptation strategies - information package for European inland waterway and port infrastructure managers". However, in the context of the implementation of IWT infrastructure projects, dedicated questions related to climate change adaptation and mitigation shall be taken into account. The identification of potential barriers resulting from the circumstance that the concept of considering climate change impacts on the infrastructure is relatively new and not much experience is gained in this regard affecting predictability and forecasting. As indicated by Marcu & Gasparotti[47], climate change is determined by using climate model simulations, containing still significant uncertainties, making it difficult to reliably quantify the concrete effects of climate change on inland waterways and inland waterway transport.

In addition to the wide range of uncertainties resulting from the climate change projections, the lack of proper understanding how to deal with climate change in infrastructure projects in terms of project evaluation, data collection, design monitoring, maintenance and modernization, and, in particular when elaborating the proposal for EU-funding constitutes a potential barrier.

As defined by the AR5 Synthesis Report of the Intergovernmental Panel on Climate Change (IPCC)[48] - climate change adaptation is the process of adjustment to the actual or the expected climate and its effects. It is not

[47] Marcu and Gasparotti "Administrative Barriers -Influence on Port Management Operations", Euro Economica, Special Issue 2(39)/2020, August 2020

[48] https://www.ipcc.ch/report/ar5/syr/

a one-time emergency response, but a series of proactive measures to deal with extreme weather events, vulnerability, and natural disasters.

The EU Strategy on Adaptation to Climate Change[49] addresses the resilience of infrastructure and measures to contribute to EU and national climate change targets, considering also that transport infrastructure has to be ready to withstand possible disruptions brought by climate change.

On pan-European level, climate change is addressed in the 2030 Agenda for Sustainable Development (SDG 9 "Build resilient infrastructure") and in the United Nations Economic Commission for Europe (UNECE) Group of Experts on Assessment of Climate Change Impacts and Adaptation for Inland Transport 2020-2025[50] key tasks: (i) raise awareness, build capacity and integrate knowledge from countries and scientific community on climate change impact assessment and adaptation for transport, and (ii) further advance the state of knowledge, the analysis of climate change impacts on inland transport and identification of suitable and costs-effective adaptation measures.

A new tool of adaptation policy of the EC – Technical guidance on climate-proofing of infrastructure in the period of 2021-2027[51] was introduced by the EC in line with the provisions of the European Green Deal[52] for climate neutrality by 2050 and of the European Climate Law[53] addressing climate vulnerability and risk assessment as basis for climate change adaptation to ensure that by 2050 the EU will be a climate resilient society adapted to the unavoidable impacts of climate change. The EU Climate Law has a binding nature for MS claiming to have a certain level of adaptation policy in place: "*MSs will also be required to develop and implement adaptation strategies to strengthen resilience and reduce vulnerability to the effects of climate change*". This guidance is considered in this report as one of the important regulatory documents introduced recently by the EC, which shall be taken into account as a part of infrastructure projects' planning and implementation. As indicated by the EU Climate Law: "*EU funded projects should include climate vulnerability and risk assessment and relevant adaptation measures, and cost-benefit analysis should cover GHG emissions and mitigation measures*".

Introduction of this new tool precisely for infrastructure projects means that climate proofing becomes an integral part of the project, which shall ensure that climate change mitigation and adaptation measures are duly taken into consideration and integrated in the projects` planning and implementation, aligned and duly reflected in EIA and SEA.

Moreover, requirements on climate proofing of the infrastructure are included in the legislation laying down the requirements for EU funding in the period 2021-2027. They have to be taken into account when applying for EU funding for IWT infrastructure projects as certain differences took place in the current Multiannual Financial Framework (MFF) of the EU as compared to the previous one. If during the period of 2013-2020 only projects applying for funding of over €50 million (so-called major projects) were required to present sound climate mitigation and adaptation measures, in the current MFF this rule is applied also to projects with a smaller financing. In the current financial framework this includes: adaptation to climate change – vulnerability/risk assessment and adaptation response; mitigation of climate change: application of the EIB

[49] European Commission, "Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change", February 2021, COM (2021) 82 final
[50] https://unece.org/sites/default/files/2021-09/Agenda4a-b_5a-b_Climate_Change_Impacts_Adaptation_Inland_Transport%282020-2025%29.pdf
[51] See footnote 40
[52] See footnote 7
[53] European Commission, "European Climate Law", June 2021, EGULATION (EU) 2021/1119

carbon footprint methodology[54] and the EIB price of carbon. Such measures shall be reflected correspondently in the project documentation (EIA, SEA) as well as in the application form, integrated in the CBA and the project management cycle, which were discussed and addressed during the Platina3 4th Stage event[55] by the representative of the EIB – Mr. Txema Urrutia Aldama. The carbon footprint methodology for calculating the carbon footprint of the infrastructure projects elaborated by EIB shall be applied and reflected accordingly in the CBA.

As described by the EC in the technical guidance, the climate proofing process is divided into two pillars (mitigation, adaptation) and two phases (screening, detailed analysis). The mechanism presented for the climate neutrality part in the screening phase identifies whether there is a need for a detailed analysis (such as carbon footprint assessment) or not depending on whether the project is reaching a threshold on GHG emissions or not. In the case of exceeding the GHG emissions' threshold, the GHG emissions shall be monetized using the shadow cost of carbon and to provide a proof that the project contains actions aligned with the pathways towards EU GHG emissions targets by 2030 and 2050 (EU Green Deal). All this must be duly documented in the project planning phase of the project documentation.

The climate resilience screening based on a sensitivity, exposure and vulnerability analysis, as well as identification of the potential climate risks shall be taken into account in the phase of the detailed analysis. The detailed analysis includes an in-depth risk assessment on the project according to the guidance, further monitoring and follow-up of critical assumptions in relation to climate change. Consistency with EU, national, regional, and local strategies on climate change adaptation is highly important in this regard. All this has to be taken into account in the assessment and analysis during the preparation of the project application for the EU funding to be applied for.

In the context of this report, it has to be mentioned that while being an important instrument to address the impact of climate change and to ensure implementation of mitigation and adaptation measures, requirements of this technical guidance are included into conditions for EU funding for infrastructure projects. In this regard, correct application and single interpretation of such requirements in order to avoid further complexion of the existing EIA process, in particular for the IWW infrastructure, shall be tackled further. As indicated by the guidance, EU MSs are the ones who decide on how the technical guidance can be incorporated in the EIA legislation. There are no rigid rules on how this has to be reflected in national EIA legislation, implementing the EC Directive on EIA[56]. In certain cases, as the former expertise gained in the implementation of large cross-border projects in IWT[57] shows, different interpretation and different approaches in EIA in MSs already have generated certain barriers, which could potentially lead to significant delays in IWW infrastructure projects implementation as well as to continuous discussions and disagreements in terms of methods of evaluation and calculation of the impact in the EIA, national risk assessments, vulnerability assessment and climate sensitivity analysis or critical design parameters.

It is clear that climate proofing will become a mandatory part of CEF II calls. Therefore, it will become an important integral part of the documentation packages for CEF applications. Obligation for climate proofing is already foreseen in the CEF regulation (paragraph 5 of the preamble)[58]. Thus, CEF II funded infrastructure projects will have to prove that all the necessary measures are taken in order to reduce a project`s impact in terms of GHG emissions. This also will have to prove that a project includes measures addressing possible

[54] European Investment Bank, "EIB Project Carbon Footprint Methodologies", Version 11.3, January 2023, EIB Project Carbon Footprint Methodologies
[55] See footnote 4
[56] European Commission, DIRECTIVE 2014/52/EU, April 2014 (europa.eu)
[57] FASTDanube; Seine-Scheldt
[58] See footnote 32

future climate change. It must be emphasized that the technical guidance is not mandatory to be used, it is a tool helping project promoters in their elaboration of the related documentation while working on the preparation of CEF applications. It is possible to prove a project`s climate impact differently by not necessarily using the guidance, yet, it is questionable whether such projects will be covering the rules described in CEF if not following the guidance. Most likely that investment decisions will be based on this rule too. That's why the better knowledge of the environmental processes on the global scope (not only on the country level), case studies, best-practices, as well as databases, and improvement of methods of data collection through international cooperation are important in order to eliminate potential bottlenecks, which can arise due to the introduction of new requirements for EU funding.

Climate proofing must be integrated in the EIA and the SEA, and the technical guidance is showing how it can be done to receive CEF, European Regional Development Fund (ERDF), Cohesion Fund (CF) funding, etc. It also makes sense that a project is addressing climate change from a technical point of view proving that it will not lose its functionality after its completion, for example, in the case of extreme weather events (flooding, drought etc). As identified in the EC`s report "Climate change and major projects"[59]: adaptation shall be based on a mix of structural and non-structural measures, such as changes in design, adoption of innovative alterations, improved environmental and operational monitoring of the environment and of the physical infrastructure itself, development of strategic and corporate climate risk assessment frameworks, financial insurance against supply chain failure or alternative services. In many cases, as indicated in the technical guidance, the project location is determining the main strategic importance and can be decisive from the perspective of climate change influence and risks assessment.

In this chapter, climate change issues are considered a potential barrier to IWT infrastructure implementation, as an additional number of actions will need to be carried out in order to receive funding and aspects relating to insurance (risk assessment) have to be taken into account. In certain cases, it can also lead to reluctance in investments if the project potentially can be affected by the climate change hazards expected, resulting possibly in interruption of the operation of the infrastructure facility or insufficient fairway conditions hampering IWT. It has to be mentioned that a number of examples have been reported where IWT and logistics were disrupted due to low water levels caused by extreme droughts. In consequence, significant interruptions in supply chains and reorientation of cargo flows[60] to other transport modes took place. In terms of infrastructure investments, this issue shall not be underestimated. If the risk assessment and exposure analysis does not cover all the potential hazards and/or resilience and climate change adaptation is not addressed properly, the infrastructure project under consideration may not receive the necessary investments or funding due to not being considered as a resilient one. This is highly relevant with regards to both private investments and general funding, which often include a substantial share of EU-funds demanding a climate proof infrastructure. IWW infrastructure projects are to be set up and evaluated in a way that the major uncertainties resulting in possible negative impacts caused by climate change hazards and maladaptation are accounted for.

Phases of the project development cycle, including measures for climate change adaptation and mitigation as described in technical guidance are presented in the Annex I to this report.

[59] European Commission, "Climate Change and Major Projects"
[60] PLATINA 3 (2022). Options for shallow-water / climate resilient vessels D2.2. https://platina3.eu/options-for-shallow-water-climate-resilient-vessels/

# 5. Institutional barriers

The institutional system of IWT infrastructure governance is represented by firmly established national and international organizations having particular knowledge and experience relating to specific national waterway sections or for the river basin itself. In the course of time, their own processes and procedures have been established by these organizations, which in certain cases can be characterized by a high level of complexity. Different tasks of IWT and water management are assigned to different ministries: Ministry of transport and infrastructure – formulating policies and transport strategies, development plans; Ministry of environmental protection – for implementation of the policies in the field of environment and nature preservation (a.o. in relation to protection of water bodies and rivers); Ministry of economy and finance – for state budget relocation and funding, as well as for defining the financial and political framework of economic strategy; Ministry of development of the territories and regions – for land attribution and construction permits; Ministry of foreign affairs – for international cooperation; etc.; and to organisations responsible for operation of the IWWs infrastructure and its efficient handling and maintenance. This list is not exhaustive as it can also include various regional authorities, local governments and administrations having a relation to IWT. This division, characterised by its multistage structure and complex hierarchy, regulated and governed by state authorities, is following rigid and strict rules, which often makes decision-making rather complex and, in certain cases, causes lacking integrity between different governmental structures on the national level. This institutional structure has an impact on administrative processes, affecting also IWT infrastructure projects at the same time. When speaking about IWT port infrastructure, very often it is also involving private stakeholders of different forms of ownership. Depending on how well the PPP mechanism is implemented in a particular country and depending on the level of correlation of priorities on private and governmental level, institutional barriers can be considered differently. It is worth mentioning that in case of implementation of the port infrastructure which has a multimodal aspect and is interrelated or incorporated in a single funding project with other transport modes (road and rail), state authorities/private organisations and institutions representing other transport modes have to be involved.

In case of cross-border projects, this institutional structure is getting duplicated, as several countries have to become involved and, thus, an international scale will be reached. This all is adding a complexity to the project implementation at various stages of the process. In cases when policies between two countries are not aligned or national priorities do not receive equal support on governmental level, the overall process of project implementation can be significantly delayed.

A separate aspect to be considered in this chapter, especially with regards to EU-funding for IWT infrastructure projects, as well as from the perspective of formulating policies and priorities for the EU transport sector, is the institutional structure of the EC. Within the EC, Directorates-General are departments differentiated by their areas of expertise and responsibility which are equivalent to ministries at national level. While policies for IWT, legislative proposals and funding programs for IWT projects are generally formulated by the Directorate-General for Mobility and Transport (DG MOVE)[61], environmental protection and climate actions are under the competences of the Directorate-General for Environment (DG ENV)[62] and of the Directorate-General for Climate Action (DG CLIMA)[63] accordingly. Some separate aspects on IWT projects infrastructure implementation can relate, for instance, to common implementation of projects by EU and non-EU MSs and alignment of the EU policies and support programs for the neighbouring countries, which is a competence of the Directorate-General for Neighbourhood and Enlargement Negotiations (DG NEAR)[64]; or to

[61] https://knowledge4policy.ec.europa.eu/organisation/dg-move-dg-mobility-transport_en
[62] https://knowledge4policy.ec.europa.eu/organisation/dg-env-dg-environment_en
[63] https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/climate-action_en
[64] https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/european-neighbourhood-and-enlargement-negotiations_en

separate aspects of EU legislation in terms of financial risks, banking, insurances and other financial issues, which the Directorate-General for Financial Stability, Financial Services and Capital Markets Union (DG FISMA)[65] is in charge for.

When it comes to implementation of EU-funded projects[66] under shared management, a system under which the responsibility for spending the budget is shared with the MS can be described in the following way: "the Commission establishes guidelines for planning operational programmes (OP), and negotiates, approves and monitors the implementation of the OPs proposed by the MS. The Directorate General for Regional and Urban Policy (DG REGIO) supports transport projects through the ERDF and the CF and bears the overall responsibility for the proper use of funds. At national or regional level, a managing authority is responsible for managing OPs, including project selection, monitoring and reporting on project implementation." The EC is responsible for approving the EU's contribution to transport projects with a total eligible cost higher than €75 million (major projects). Applications for EU co-funding are made through the Connecting Europe Facility (CEF) programme (CEF 1 for the period of 2013-2020, CEF 2 for the period of 2021-2027) applied in accordance with the periodic calls for proposals. Project proposals are evaluated according to funding conditions and eligibility by the EC with the support of the European Climate, Infrastructure and Environment Executive Agency (CINEA) - the successor organisation of the Innovation and Networks Executive Agency (INEA), officially established on 15 February 2021.

Considering that various stages of IWT infrastructure projects implementation require different approvals, decisions and permits, in certain cases, negotiations on national, international or EU-level can become rather long processes and potentially can be seen as an additional barrier. This barrier can be inherent to both IWWs and inland port infrastructure. One important way to overcome this barrier is the alignment of national policies and strategies in the field of transport, mobility, environmental and climate objectives on both national and EU-level. From the point of view of IWWs, it is important that the corridor approach is put in place and coordination on the level of a particular EC coordinator is ensured.

Another important aspect to be addressed is corridor alignment (also with other transport modes). Amongst identified critical issues for RDC in the Study on the RD TEN-T Core Network Corridor[67] unresolved national bottlenecks are described to block the efficient functioning of the entire Corridor. One of the main reasons for this is a lack of coordination/integration of national strategies/plans (all modes) towards TEN-T objectives and milestones, particularly for cross-border sections. That`s why the need for improved cross-border and transnational cooperation and exchange of best-practice in order to achieve coordinated trans-national development of corridor infrastructure and mobility services is crucial, as infrastructure planning and construction remains strictly within national frameworks.

It is worth mentioning that staff turnover in the governmental structures often results in the lack of institutional capacity and lack of continuity. High level of fragmentation of the institutions on national and international levels brings another issue: the high number of different specialists and professionals needed to be involved from different organizations and institutions to implement IWT projects. This tackles directly and indirectly institutional capacity issues regarding education and training for river and port engineers, which becomes crucial from different perspectives:

- ensuring enough of work force considering high volatility of technical staff at ministries and waterway administrations;

[65] https://commission.europa.eu/about-european-commission/departments-and-executive-agencies/financial-stability-financial-services-and-capital-markets-union_en
[66] See footnote 24
[67] European Commission, "Fourth Work Plan of the European Coordinator Karla Peijs", May 2020

- training to increase experience and knowledge of EU-funding and financing framework for implementation of IWT infrastructure projects;
- application of modern approaches in design and construction;
- need for new knowledge, new education methods and approaches to climate change mitigation and adaptation.

By being conservative in methods of handling infrastructure projects and overall functioning of the transport system, governmental institutions can be reluctant in terms of adoption of modern approaches, restrain learning, for example, by imposing strict compliance to current rules and procedures. Yet, the other way around, these structures can also enable learning, for instance, through stimulating stakeholder involvement and interactive decision making.

To conclude this part, it can be mentioned that institutional constraints often play a role of an important limiting factor even when overall transport policies are in favour of IWT. Therefore, the political will must first exist towards the sector, and shall then be backed up with relevant capabilities (including institutional capacity) of various governmental, public and private stakeholders to eliminate barriers in IWT infrastructure implementation as well as bringing modern state-of-art solutions to IWT on a continuous basis with concrete results. An iterative approach shall be brought in practice in combination with existing successful practices on the governance structure and institutional capacity of a country.

## 5.1. Perspective of IWW infrastructure

This sub-chapter, amongst others, is addressing existing limitations in terms of institutional capacity of organizational structures in charge for implementation of IWW infrastructure and follows-up with the ways to diminish these barriers. It describes the overall institutional structure consisting of organizations involved in IWW infrastructure projects implementation. It also addresses issues related to building up institutional capacity of organizations in charge for implementation of such projects through education and training.

As described above, while IWT port infrastructure is often subject to mixed environments in decision-making (private/public), IWW infrastructure management and operation is mainly a public competence where certain activities are attributed to the responsibility of national authorities. The role of the state in this regard is crucial in approving concepts and national development strategies for shipping, ports and waterways, followed by infrastructure projects developed in line with these concepts as well as with the corresponding environmental objectives and with the needs of the state and society. On a national level, the task of formulating transport policies and development strategies is usually attributed to the Ministry responsible for transport and Ministry of foreign affairs. The same authorities are responsible for promoting national interests and bearing the obligations in international relations in the sector. Creation, operation, maintenance, modernization and development of waterways and state-owned waterway structures, in line with national targets and international obligations, as well as the establishment of inland ports and harbours on state-owned IWW is attributed to waterway administrations (usually under the governance of the Ministry of transport). Elaboration of the legal framework conditions for state aid, funding and financing schemes for the development of IWW involves the Ministry responsible for transport together with the member of the government responsible for the use of EU funds, the Minister responsible for economic policy and the Minister responsible for public finances.

With regards to design, construction and bringing into operation of the IWW infrastructure various ministries can be involved:

- Ministries in charge for construction and development of the territories are responsible for reviewing and approving the construction (reconstruction) plans and issuing permits;
- Ministry of transport, Ministry of environment are in charge for establishment of environmental and nature conservation requirements for shipping, reviewing and approving SEA and EIA documentation, issuing environmental permits, conducting monitoring of works;
- Naval authorities (usually governed by the Ministry of transport) responsible for the establishment, commissioning, maintenance, operation and decommissioning of navigation facilities of the IWW, and for the approval of its operating rules (except for national public ports), authorizing work on the waterway and the use of signals to guide water traffic, as well as authorizing diving works on the fairway;
- Waterway transport accidents and calamities prevention (the Ministry of transport together with the Ministry responsible for disaster prevention).

This list is non-exhaustive and serves as an example, while it can be extended depending on the specifics of works conducted on IWWs. As described already in the first part of this chapter, due to the large number of different stakeholders involved on the governmental level and due to the complexity and slow procedural environment of ministries, decision-making for large infrastructure projects creation and maintenance usually is supplemented with significant delays in time, which can in certain cases also result in inability for timely spending of budget funds as well as EU-funds for EU-funded IWW infrastructure projects (see chapter 4). Very often there is a lack of a singular approach towards IWW infrastructure implementation from the perspective of transport and environmental policies, which, in its turn, becomes a conflicting factor in project implementation, resulting in long discussions on ministerial levels, which in certain cases can take years for finding a solution or waiting for changes on governmental/political decisions in the favour of the project under consideration. In this multilevel governance structure, different stakeholders on different levels have their distinct time horizon and own organizational aims. Often public governments have difficulty finding each other for comprehensive dialogs. Local and regional governments are only partially included in discussions on national infrastructure investments. This issue is also tackling the involvement of publicity, yet, this aspect was better addressed already in chapter 3.

Speaking about institutional barriers for IWW infrastructure projects implementation, it can be emphasized that they can occur at different stages of the project implementation: from conceptual phase (feasibility study) to construction.

Today, in the light of climate and emission reduction targets of the EU, as also described in the previous chapters, an important attention is being paid to climate change adaptation and mitigation, especially with regards to the implementation of IWW infrastructure projects. This issue is also highly relevant with regards to the current new regulatory approach targeting climate neutrality, emissions reduction, climate change and other environmental issues to ensure overall project feasibility, sustainability, respect environmental protection and resilience stability components. As it was described in the previous chapters, there is still often a lack of knowledge on how to address and how to deal with climate change in an infrastructure project.

Usually on governmental level, due to fragmentation, learning has an individual character limited by the area of expertise of a particular institution. Each actor has a narrow strictly defined mission, while playing a central role in IWW infrastructure projects implementation. Waterway administrations are often limited by monofunctional aims, such as ensuring safety of navigation of IWT, which has to be done in a cost-efficient manner.

In the light of climate change, new challenges for future sound ecological river engineering arise, as described in the previous chapter, and a high level of expertise is needed to address various aspects of climate change

(also on the international level). This was already highly recognized both in the Rhine[68] and in the Danube region[69]. This makes all the involved stakeholders not only think about solely institutional fragmentation and lack of cooperation between different authorities, yet also needs to consider future requirements for education of engineers and waterway managers have to be taken into account. This might also require structural reorganization of the existing institutions in terms of being capable not only to deal with infrastructure aspects, but also with environmental issues, like climate change.

Certain feedback regarding institutional capacity issues, possible solutions and good practices were collected during stakeholders` consultations at the 13th JS meeting[70], organized at the Danube Commission office in Budapest on 13-14/09/2022.

Ms Dorothe Herpertz, the Federal Institute of Hydrology of Germany (BfG), emphasized the importance of education and training for ensuring "ecologically sound river engineers". There are different levels of impact and different requirements when it comes to education for all aspects of the complex river system. She noted the Interdisciplinary Studies in Koblenz as an example of good practice. She also focused on the topic of administrative and institutional capacities and in that sense stated the importance of the implementation of the WFD, which is the link mechanism between the GNS and GES. The issue of governance and distribution of responsibilities between different state authorities often increases the complexity of implementation of the IWT infrastructure projects, as such projects often involve different state authorities, which don`t ensure a high level of cooperation. The current reform is taking place in German IWW institutions, where one out of five sectors will deal with ecological water protection. The German government transferred functions related to the implementation of the WFD to waterway and shipping administration, which is now responsible for both: environmental and navigational issues. The same is done at operational level: biologists, environmentalists, river engineers are working together in the implementation of various infrastructure measures, resulting in enhanced knowledge and awareness.

## 5.2. Perspective of inland ports infrastructure

The situation regarding institutional barriers in terms of port infrastructure is not significantly different from the situation described above for IWW infrastructure, yet, some aspects can be more complicated due to a high number of public and private actors involved. The need to ensure multimodal connectivity in ports in addition involves different transport modes and different authorities responsible. Ensuring road and rail connections necessary for the proper functioning and development of inland ports involves other departments and subdivisions of, for instance, the Ministry of transport responsible for other transport modes. The lack of governance and large number of actors involved in port infrastructure creation has always been addressed as one of the important barriers, which appears at an early stage of port infrastructure creation. While in case of IWWs (fairways, locks, bridges) the ownership in many cases is public, the situation relating to the port infrastructure (especially regarding land acquisition and attribution) has rather a multilateral character.

As, for instance, was concluded by research for the Danube region conducted in DTP DIONYSUS Project on port governance structures, Danube ports show differences in the way they are managed and operated. Their development is dependent on the local political and economic situation, prospects of investments and availability of funding options. The majority of the Danube region ports are publicly owned and privately operated. Most of the port land is owned by the state, regional or other public entities. Approximately half of

[68] "**Rhine 2040**" adopted by the Conference of Rhine Ministers in February 2020

[69] "Climate change adaptation strategy" updated in 2018, ICPDR: icpdr.org/main/activities-projects/climate-change-adaptation

[70] https://www.danubecommission.org/uploads/doc/2022/JS_presentations/JS_report_final.pdf

the analysed ports infrastructure and superstructure is also owned or co-owned by the state, especially in the Middle and Lower regions of the Danube. The majority of the ports are governed by a public entity that acts as a port authority. Most common partnership of public and private sectors is the use of a concession (landlord) model, either as a concession for construction, service or use of public property. Any sort of port development is largely dependent on the availability of sufficient funds and on the level of efficient interaction of PPP parties within the landlord port model. The choice of a PPP model depends on the local economic and regulatory situation, as well as on individual objectives and characteristics of the port. In this regard, an important aspect in the PPP is to apply a non-discriminatory principle in order to prevent monopolistic behaviour and promote competition, thereby increasing the efficiency of port operations. The coordination between official port entities and other stakeholders is therefore an important aspect to be addressed. A number of issues, such as port pricing policies, tariffs and fees, services and port development have to be taken into account in order to ensure competitiveness of the IWT. In Figure 10, the interrelation between the port activities of the government, as well as the private and public sector is displayed.

The involvement of a great number of stakeholders representing the government and the public and private sector hampers the implementation of a project usually due to difficulties in defining the correct responsibilities of port stakeholders (port authority, terminal operator or the state). This makes it difficult to ensure that all the stakeholders are involved properly. Many actors have to be convinced to support the project, which takes lots of time in the preparatory stage. Another key aspect in port development is multi-modality, demanding the improvement of the interconnectivity between different modes of transport. Especially in cases when the last-mile connections are missing, the creation of an intermodal infrastructure beyond the port area is of high importance. Further, upgrading a road/railway link can also be of high significance to a port. Although, road/railway authorities may give less weight to the matter. In the Study on RD TEN-T Core Network Corridor, 3rd Phase, Work Plan, 2020, lack of functional railway connections was specified as significant bottleneck for the port development[71], with an example given for the Hungarian port of Komarom and the Romanian port of Cernavoda in RD corridor.

Main barriers:

- Lack of mutual understanding of the objectives, which causes long lasting negotiations between public and private stakeholders;
- Lack of understanding of responsibilities and roles of the stakeholders;
- Lack of trust between stakeholders.

[71] See footnote 67

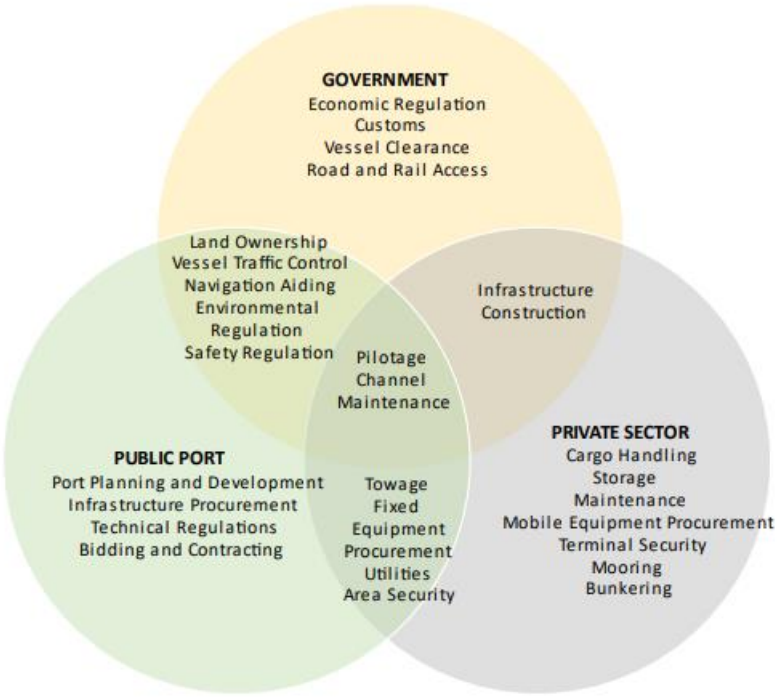


***Figure 10:*** *Functions of government, private and public sector in port activities.* ***Source:*** *DIONYSUS project.*

In some cases, the institutional governance structure in ports is weak and fragmented. Operational players such as railways may dominate. The governance and reform of a port can be hampered by multiple corporate interests. Fragmented concessions and control over port services may lead to duplication of efforts and shifting institutional and managerial concerns. In certain countries, old management systems are in place which are not fully able to meet the modern requirements of port development.

Despite intensive plans for the development of river ports, there are systemic constraints that hinder the development of port activities and reduce their competitiveness:

- lack of effective interaction between the state and private business in the development of port infrastructure;
- unsettled land and property relations in ports.

Cooperation between ports and within them is definitely an important aspect, which can contribute to efficient overall interaction between stakeholders. According to the level of interaction, the cooperation can be of an internal, regional or intra-port character. By the type of interaction, the cooperation can be conditionally divided into institutional (for example, institutional exchange of experience at the country level), industrial (for example, exchange of practical experience at the level of individual ports) and commercial (for example, the creation of joint ventures) cooperation. Events involving inter- and intra-port cooperation for the exchange of best practices, knowledge, and the creation of mutually beneficial regional platforms for interaction must be better addressed.

# 6. Administrative barriers

## 6.1. Perspective of IWW infrastructure

The aforementioned complex hierarchy of the institutional system and international character inherent to a large number of IWT infrastructure projects, high level of bureaucracy, lack of flexibility and adaptation, as well as involvement of public and private stakeholders results in a number of administrative barriers described in this chapter. Therefore, this chapter is considered not as a stand-alone one, meaning it is closely interrelated with the previous one. It also has to be mentioned that the following barriers aren't novel, but mostly predetermined by the complex nature of governmental structures and therefore, procedures and tasks handled by these structures. A predominant number of these barriers exists not only in IWT, but is also inherent to other construction projects, implemented on national/international scale.

As it was already described in chapter 4, lots of these barriers are interrelated and associated with funding (public or private) and can be met in various stages of project implementation. Reasons for these barriers are quite diverse: lack of knowledge and experience of staff handling such projects (i.e. institutional capacity shortcomings), complexity of the regulatory framework and need of a better knowledge on application of existing legislation, lack of political agreement and support between different ministries on national and international levels, lack of professional education and training in the field of implementation of IWT infrastructure projects (amongst others also in terms of climate change), different business environments, and national procedures in the MS, which may significantly slow down or even oppose the implementation of such projects.

Administrative barriers in the Danube region, the most international river basin in the world, were assessed in detail in the DTP Project: Improving Administrative Procedures and Processes for Danube IWT (DANTE)[72]. Barriers identified in this study solely stem from the different nature of work of various governmental institutions, languages, procedures, working schedules, regulations and legislative frameworks. The studies conducted within this project emphasized the high level of complexity of interaction between authorities on international level, addressing amongst others infrastructure management, and a need to re-arrange the existing framework to ensure seamless services in IWT on the Danube. Even though the DANTE project was mostly addressing barriers inherent to IWT navigation authorities (RIS, border control, police, customs, port dues, waterway administrations), it was also addressing challenges arising for waterway managers in the context of insufficient fairway maintenance.

As given in the research of Marcu & Gasparotti[73]: the effective harmonization of bureaucratic processes and requirements is a necessary condition for a successful process of European integration - for both MS and the candidate countries. However, administrative reforms that stimulate internal efficiency are by definition quite a long process, taking years for their alignment. Therefore, adapting administrations to the particular needs and requirements of the IWT sector must go beyond periodic administrative changes. An in-depth reform process is mainly based on the political will of the responsible national authorities and legislators, which is a challenging and rather long-term undertaking.

Amongst the main administrative barriers in terms of IWT infrastructure projects implementation the following ones can be mentioned as the most important ones:

- paperwork/bureaucracy;

[72] https://www.interreg-danube.eu/approved-projects/dante
[73] See footnote 47

- lack of standardization on the national level;
- lack of unified regulations between MS;
- lack of mutual recognition of documents and agreement on the composition of project documentation (EIA, SEA, CBA, feasibility studies, design);
- lack of transparency in the decision-making processes, which often is based on contradictions between long-term transport policy planning and short term (annual) budget relocations (based on financial planning of governmental institutions: ministries and waterway administrations);
- silo-thinking in decision-making and lack of practical analysis on different steps of projects` implementation;
- lack of qualified personnel and therefore inadequate staff allocation from preparatory phase (designs, permitting procedures and public procurement) to the completion (construction works supervision);
- lack of automation of a number of processes referring to documents' handling, missing software applications in design, calculations etc.;
- uncommon working language (design documentation, as well as EIA, usually is elaborated in national languages);
- complex construction and environmental permitting procedures;
- complex procurement procedures, especially for cross-border projects;
- complex processes of land attribution, acquisition and expropriation procedures due to low project management capacities;
- lack of cooperation between different ministries and institutions (public & private) on national and international level (in case of cross-border projects);
- lack of sound financial management of EU co-funding, e.g., lack of coordinated implementation and supervision.

In a concise form, the structure of the main administrative barriers in IWT infrastructure can be explained by Figure 11, which shows the consequences, such as cost overruns, delays and decrease in investments due to a low level of the performance of the administrative framework.

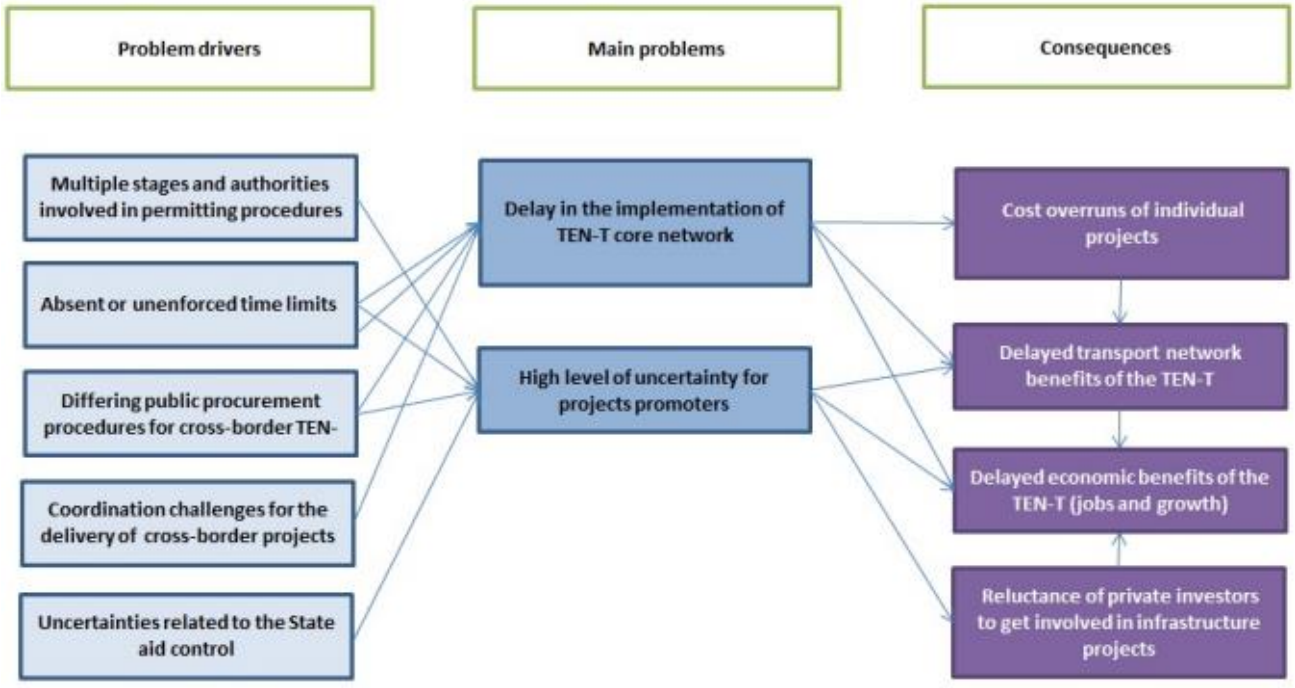


***Figure 11:*** *Structure of main administrative barriers and their consequences.* ***Source:*** *EC*[74]

[74] European Commission, Proposal for a Regulation of the European Parliament and of the Council on streamlining measures for advancing the realisation of the trans-European transport network, May 2018, COM(2018) 277 final

MS often have different procedures for carrying out works and different timings associated with their implementation.

EU MS have their own procedures and regulations in place regarding design, calculations, environmental impact assessment (EIA), on which permitting processes are built and strictly followed. Yet, in many cases, as various studies conclude, 'simply following the rules' doesn't ensure timely implementation of the project, as perception and application of the same or similar set of rules and regulations may differ from one country to another and lead to different approaches in decision-making processes[75]. These differences may be attributed or associated with:

- Cultural and behavioral differences, which also affect the quality of organizational and administrative processes, as well as due diligence. In certain countries strict enforcement of the rules and regulations is considered as sufficient, whereas in other countries the same or similar rules and regulations are considered merely as a set of guidelines for preparing and implementing projects;
- Different levels of socio-economic development can also lead to differences in appreciation and evaluation of social, economic and environmental interests, values and priorities. This means, for instance, that in certain countries environmental concerns and therefore "greening" targets can be highly followed and applied to all projects, while in other countries, on national level, this is not always put in practice;
- Differences in the way societal groups, representatives of publicity are organized, empowered and the way they are involved and have an impact in the decision-making process. This not necessarily addresses the EIA or the SEA, but different stages of implementation of the project;
- Differences in stakeholders` organization are determinant to what extent stakeholders and beneficiaries develop as a driving force in the decision-making process.

The complexity of construction and environmental permitting procedures on the national level represents another important barrier affecting the implementation of IWT infrastructure projects. Delays in permitting often occur due to the involvement of multiple steps and multiple authorities. The reasons for this barrier vary from the content of the submitted documentation to the lack of technical clarification and/or guidance on how to correctly apply state rules and regulations in a single correct manner. Some of the aspects related to these barriers are characterized by:

- interpretation of the results of studies and application of the existing regulations often differ from the perspective of different responsible authorities, which leads to disputes, increasing the lead-time and requiring additional steps to be made in design and evaluations.
- Data availability. Information gaps: lack of information often results in inefficiency. Planning may not always be supported by adequate and reliable data. Improvements may be needed in the collection, updating and sharing of data between relevant participants.
- Quality and data transparency may not be sufficient for in-depth and technically sound planning, monitoring and stakeholder engagement.
- Quality of documentation used for planning. Some of the documents used for planning are declarative and do not indicate a specific implementation schedule, detailed measures or scope and sources for the necessary funding.
- Appropriate assessment of risks and uncertainties may not be available. Long-term programs are sometimes adopted at different time intervals and may overlap/duplicate goals, leading to confusing implementation sequences.
- Lack of streamlining permitting procedures in line with the EU legislation. Bodewig & Secchi[76] in their progress report in 2018 already addressed a strong need for a single contact point ("one-stop-shop") for

[75] European Conference of Ministers of Transport (ECMT) "Strengthening inland waterway transport: Pan-European co-operation", OECD Publications, 2006

[76] Bodewig and Secchi "Making the best use of new financial schemes for European transport infrastructure projects", January 2018, Progress report

applying for permits for a project, notably for cross-border projects. It was addressed, amongst others also to different procedures by the EIA, Natura 2000 and the Water Framework Directive. Certain proposals and guidance for the simplification of the EU permitting were elaborated in the study on the facilitation of the implementation of TEN-T projects promoted by DG MOVE in cooperation with other EC services. One of the solutions was suggesting to create a single permitting authority for TEN-T projects including all environmental assessments, either at EU level or via a single leading authority at national level acting as a "single window" for project promoters. Another measure proposed was to set time limits for the permitting procedure overall and in distinct phases of a total of 3.5 to 4 years.

Complex state procurement procedures constitute another significant barrier in infrastructure projects implementation in terms of lead-time and complexity. In the evaluation report, Karla Peijs[77] spoke about long delays occurring precisely for procurements during the implementation of TEN-T projects: "*Although aiming at simplifying public procurement procedures and making them more flexible, the 2014 EU public procurement Directive has triggered significant changes in national procurement legislation. As a result, beneficiaries were obliged to adopt new internal practices and, in some cases, to resort to new additional legal services and expertise. These changes, often combined with complex administrative processes, have lengthened the time taken in tender procedures, in all sectors and across Member States*".

Public or even commercial procurement has always been characterized as a multi-stage and complex process associated with:

- the complexity of the tender procedure;
- separate contracting for design of infrastructure, construction of different assets, the provision of equipment, the maintenance of facilities and equipment, and the operation of services, as well as technical supervision.
- the risk of dishonest behavior and incompetence of the participants, resulting in the risk of non-execution of the order;
- the growth of failed tenders, for which only one participant remains, with whom a contract is concluded at the starting price;
- participation of suppliers, who are allowed to the auction, but do not take part in it, as a result of which the contract is concluded at the starting price;
- disruption of tenders by participants through demping in bids or unfounded complaints about the actions of the customer;
- delays due to the disputes in connection with untimely or unfair performance of the obligations of the parties.

In certain cases, an outcome as a result of a serious dispute between contractor and supplier evolve into complaints and court trials, which can take years to be solved. In case of large-scale infrastructure projects, such cases unfortunately aren`t occasional. This can seriously hinder overall project implementation or can even lead to termination of the contract.

Bodewig & Secchi addressed a need to simplify procurement procedures for cross-border TEN-T projects by means of setting up special (single) procurement rules at EU level for cross-border projects – covering for example the applicable law, jurisdiction and the language to be used – which is another possible way forward. It was also recommended to introduce, when appropriate, a special treatment of strategic infrastructure investment under the Stability and Growth Pact rules.

Nevertheless, public procurements remain a very long-lasting process, in many cases imposing significant

[77] See footnote 67

barriers for infrastructure projects implementation. These delays may arise already in the stage of procurement of design works or different studies, as well as in further stages for procurements of works and other services.

## 6.2. Perspective of inland ports infrastructure

The aforementioned administrative barriers described in sub-chapter 6.1. are not only inherent to the IWW infrastructure, but to the port infrastructure as well. That's why in this subchapter they are not repeated, while other barriers having a relation precisely to ports are given.

Port ownership and land rights have often been described as complicated issues in port infrastructure development. There are two main characteristics that determine the basis of the functioning of the port: the infrastructure and the territory on which this infrastructure is located. If the port infrastructure (berths, anchorages, warehouses, railways and roads, etc.) can be modernized and reconstructed from time to time, depending on the availability of engineering solutions and proper financing, the port territory (understood as the territory on land and under water within the boundaries of the water area) may have significant natural or artificial restrictions that do not allow the port to develop in breadth and depth. Many European ports, which were formed centuries ago across the waterways on the nodes suitable for navigation, are now "overgrown" with city blocks that tightly fetter the boundaries of the ports, not allowing development of additional infrastructure and transhipment facilities. In this regard, several barriers can be mentioned that may significantly complicate the development of port infrastructure. One of those is the ownership of the land and its efficient governance, the provision of land plots to ports on legally defined basis, followed by the establishment of legally justified payment mechanisms for the land plots used. Acquiring the piece of land for infrastructure development often becomes a cornerstone in project planning. Commercial exploitation of ports is entrusted, in most of the cases, to private port operators, while land is usually a public asset. A common example of the problem of land attribution also relates to local opposition due to possible negative social impact of construction of a new terminal or expansion of the port territory or adjacent industrial sites. As mentioned above, in cases when inland ports are located within/close to cities, residential, recreational areas or natural sites, the problem of land acquisition also involves opposing environmental authorities, governing authorities of local communes and administrations (City Halls).

As an example, in the Danube region, a private terminal operator`s construction project may be mentioned, aiming at the establishment of additional silo storage capacity in the free zone of Galati at the Romanian Danube. The facility under construction has been designed for the reception of grain from trucks, and its transhipment into barges. Project is targeting an increase of the efficiency of logistics operations and decrease of unnecessary operational costs. The project required attribution of land, which was a property of the Administration of the Maritime Danube Ports of Romania, and additional approvals from the former partner of the project initiator, the City Council, the Prefect and other local authorities. The overall process associated with the land attribution and obtaining a construction permit turned into a rather long-lasting process, facing disputes on building permits among the parties involved. The issue has been brought to the attention of the General Secretariat of the Government that forwarded the case to the Ministry of Transport and Prefecture for a solution.

Different studies evaluating problems with land attribution and ownership rights, such as, for instance, Secchi[78] in the ISPI report suggest bringing in private investors and multilateral development banks to remove this burden from the government and distribute the ownership of the project. According to this, to address

[78] See footnote 37

the first risk that private investors of infrastructure projects face – which is related to port governance and politics – land trusts should be introduced.

A separate question, which, depending on the national legislation, is varying from one EU MS to another one can be of a different legal complexity – is the question of attribution and legal registration of reclaimed land. While in the Netherlands, for example, the maritime terminal of the port of Rotterdam - Maasvlakte II can serve as a successful example of the practice of construction on reclaimed territories, the situation is different in other countries and at other IWWs. While this issue is more relevant for maritime ports, which often try to expand their territories due to land reclamation, in certain cases, this issue is also relevant for IWT and river ports in the delta. The legal status of such territories in national legislation is often not clear enough and requires better addressing from the point of view of national regulations.

In addition to PPPs related issues, addressed also in chapter 4 of this report, it has to be noted that infrastructure projects implemented by PPPs require more comprehensive and costly administration, especially in terms of tendering and contracting. The evaluation of such projects, adopting appropriate management structures, and designing draft contracts for related services (design and constructing works, technical supervision, operation etc.) are all complex administrative tasks, requiring specialized knowledge[79]. Managing such tenders is also complex and sensitive, as potential bidders face high bidding costs. The adequate contract management over the full life of the contract is also complex and costly. These inconveniences can be mitigated through contract standardization and central provision of PPP expertise. Several governments already include the line ministry's contract-management capacity in the assessment of their ability to procure PPP efficiently.

[79] See footnote 41

# 7. Recommendations on barriers elimination and sustainable practices

## 7.1. Sustainable technological and environmental approach

The implementation of IWT infrastructure projects has always been related to intervention in the vulnerable environment of waterways and having impact on natural processes. Comprehensive legislation in the field of environmental protection implemented on EU and national level established a solid framework to ensure that construction processes conducted on IWW are carried out in a sustainable way in order to minimize risk brought to the environment. Climate change and all the consequences it is bringing to nature (extreme weather events, calamities, global warming, decrease in water discharge etc.), definitely has a direct impact on the IWT sector development. This fact is bringing a primarily engineering task to a different level – the level of cooperation between technology and sustainability. This means that river engineering projects shall not only fulfil their primary functional requirement – ensuring safety of navigation, but also bring an added value to natural and socio-economic systems through better understanding of natural processes, implementation of sustainable solutions and proactive cooperative involvement of stakeholders throughout.

Environmental protection measures, reflected in the current EU regulatory and policy framework and implemented on a national level gradually brought new approaches into river engineering and infrastructure design, taken beyond the scope of primarily engineering activities, but establishing a broader context to IWT development projects. This includes, amongst others, wetland and natural floodplains restoration, nourishment of the coastal areas, measures mitigating low water, preventing flooding, preservation of flora and fauna. Nowadays, a more holistic and proactive approach is being applied in IWT projects being developed in the context of their natural and socio-economic setting, while in the past the main focus was put on solely reimbursement of negative impacts and application of possible mitigation measures. As an example, given by Heintz Marc Daniel – Head of the International Commission for the Protection of the Rhine Secretariat, during the 13th JS meeting, for the Rhine region, in the last 20 years, approximately 140 $km^2$ of floodplains along the Rhine have been reactivated. At the same time, 124 oxbow lakes have been reconnected to the main river and 166 km of riverbanks have been made more natural. Continuing this strategy, there are further plans to reactivate another 200 $km^2$ of floodplains, reconnect another 100 lateral water bodies and renaturalize another 400 km of riverbanks until 2040. A number of sustainable practices and measures is given in the chapter 3 of this report, in addition, different projects and solutions for IWT infrastructure and fairway management on the Danube and Rhine are following in the Annexes II and III of this deliverable.

However, today environmental issues become more and more urgent, requiring proper addressing of existing problems through both: structural and non-structural measures to avoid causalities, to lower the negative impact brought by construction, as well as in order to integrate new findings on an accelerating climate change into adaptation strategies. It is clear that no solution fits all, and measures have to be considered in a case-by-case manner. River adaptive capacities have to be assessed on a river basin level in a comprehensive way. This can be done through exploring funding opportunities on the EU-level (CEF, operational programs) to conduct studies on integrated environmental measures in the design of the projects not only for the sake of biodiversity conservation, protection of species and environmental protection, but also building adaptive capacity of river engineering measures and infrastructure management for a particular river basin.

On the other side of this equation, there is the optimization of the IWT infrastructure network in terms of port infrastructure and fairway depths (GNS). Operations in connection with IWT significantly depend on the prediction of water levels and availability of adequate water depths. Temporary blocking of waterway sections has to be avoided and prevented, ensuring uninterrupted operations throughout the year. Otherwise, such

disruptions are seriously undermining the capacity of IWT and decreasing the attractiveness and competitiveness of this type of transport. This is one of the aspects, which is given a high priority in the EU policies. It is necessary to ensure a coordinated approach for maintenance on a regular basis all across the river basins. It is crucial to remove existing bottlenecks, to ensure GNS compliant conditions, to improve navigation on the European IWWs, and to complete and upgrade the IWT sections of the TEN-T network. Better coordination and cooperation not only between MS, but between environmental and transport sectors is one of the main cornerstones. Enhanced governance to ensure a dedicated cooperation framework between different MS and between sectors shall facilitate better coordination of cross-border actions and projects.

When discussing existing barriers in IWT infrastructure implementation, stakeholders emphasize that waterway development projects lack support and even face public opposition, though IWT is generally considered an environmentally friendly, safe and clean transport mode in comparison to road or rail. Various studies emphasize that very often this opposition hampers the project progress. This means that room for improvement exists, and a comprehensive solution is still lacking. Moreover, the question has to be answered how a further integration of transport and environmental policies can be achieved. There is a strategic vision for the water quality (Water Framework directive) for example, of a binding nature. Yet, a similar policy approach on the strategic development of IWT is missing. EGD, SSMS, as well as NAIADES III are emphasizing an important role of IWT to be performed in emissions reduction and energy transition, at the same time implementation of IWT infrastructure projects often is facing opposition in terms of environmental aspects, meaning that the bridges between environmental legislation and IWT policy have to be built to bring more balance into decision-making and the necessary political support at both: national and international level.

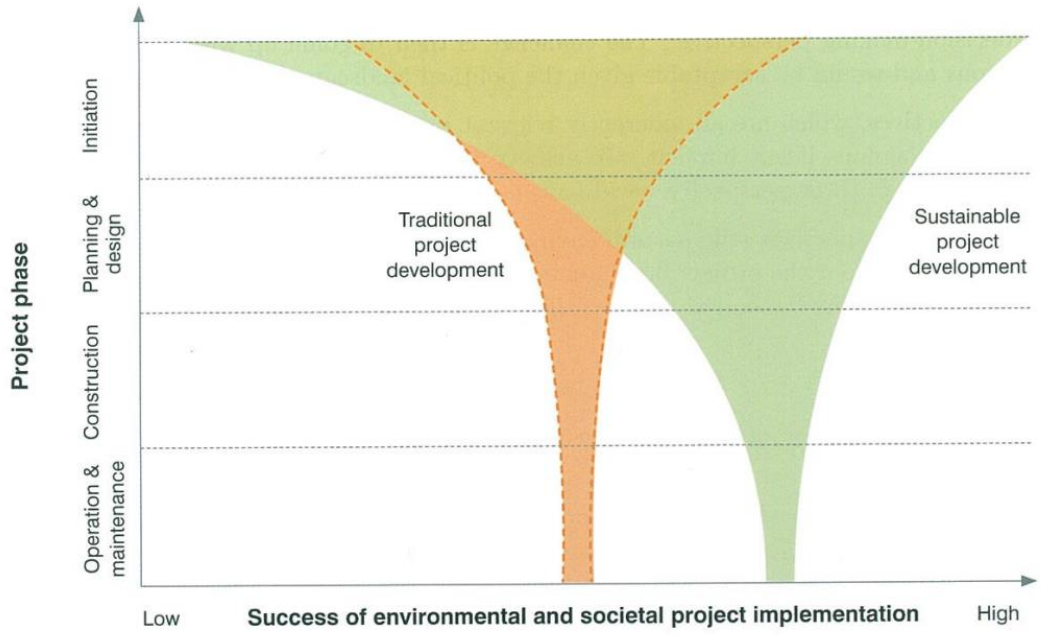


***Figure 12:*** *Influence of sustainable project development on success of environmental and societal project implementation in different project phases.* ***Source:*** *Dredging for sustainable infrastructure, CEDA / IADC, 2018.*

The importance of nature-based solutions[80], as cost-effective measures that are inspired and supported by nature, simultaneously providing environmental, social and economic benefits and helping build resilience, shall not be underestimated. Figure 12 is showing a comparison of traditional and sustainable project

[80] https://research-and-innovation.ec.europa.eu/research-area/environment/nature-based-solutions_en

development on different phases in terms of stakeholder`s acceptance from environmental and societal point of view. The increase of degrees of freedom during consecutive stages of sustainable project development is likely to result in successful project implementation.

## 7.2. Funding and financing for IWT infrastructure projects

Stakeholder consultations as well as various studies and analyses conducted in order to evaluate implementation of IWT infrastructure projects specify lack of funding as a main barrier towards projects` implementation. The analysis conducted in chapter 4 provides particular figures on the demand for infrastructure renewal in ports and on IWW, as well as the share of IWT projects of the total scope of transport infrastructure projects. These figures show that the sector requires dedicated support. Factors like budget constraints, economic uncertainty, inefficient and complex decision-making processes limit the IWT infrastructure development and, in certain cases, have lengthened the implementation of projects in European countries for up to 10 years if major infrastructure projects are considered.

Existing regulatory framework supplemented with EU-funding is targeting finalisation of the IWT infrastructure projects of TEN-T core, the extended core and the comprehensive network by the given deadlines 2030, 2040 and 2050 respectively. A solid legislation was elaborated in order to ensure the energy transition of the sector as well as to address investments into sustainable infrastructure projects. Yet, considering the current situation in terms of private financing, the Taxonomy Regulation is proposing criteria, which are questionable in terms of fulfilment by the sector in the current scenario and by means of currently available technological solutions. It is possible to conclude that the Taxonomy Regulation and its TSC currently require alignment with the other policy objectives of EGD, SSMS and NAIADES III criteria for IWT. In addition, a level playing field should be established between rail and waterway infrastructure with regard to the scope of eligible activities. From the perspective of IWT infrastructure TSC have to take into consideration that modern IWT infrastructure is not only aiming at the facilitation of navigation, yet in many cases it contributes to environmental protection, efficient water management, flood protection and nature restoration. The Taxonomy Regulation is crucial for ensuring private funding for infrastructure projects. A clear overview of green and bankable infrastructure projects can help to close the financial gap in IWT infrastructure financing by means of private investments.

Another important document – the Technical Guidance on climate proofing of infrastructure in the period 2021-2027, brought a holistic methodology to ensure that an IWT project subject to EU-funding is covering the aspect of climate change. Together with this, it means that another possibility to ensure funding for IWT infrastructure is given by the combination of engineering and environmental measures under one project. It has to be mentioned that for many projects, budgets are often allocated to individual works for either construction or upgrade of infrastructure facilities, while a variety of current instruments for EU-funding allows the combination of the primary objectives of infrastructure projects relating to transport with other ones eligible for EU funding like climate change mitigation and adaptation, as well as energy transition. A combination of budgets for one IWT infrastructure project covering several objectives can be a solution to tackle the issue of budgetary constraints. A good example is given by the renovation of the Ijmuiden Sea lock in the Netherlands and on the Meuse River[81]. The upgrade project of the Sea Lock IJmuiden was carried out by an efficient combination of national renewal budgets with regional development investments. The project targeted as the main function of the lock for passage of vessels. In addition, a climate proofing component by protecting the city of Amsterdam from rising sea level and energy transition by development of an adjacent wind park providing renewable energy for the region[82] was addressed. In this case, the grouping of budgets

[81] https://pure.uva.nl/ws/files/52378723/1087724x18798383.pdf
[82] https://www.projectcargojournal.com/ports-and-terminals/2022/06/27/worlds-largest-sea-lock-helps-port-of-amsterdam-bring-in-new-clients/

shows that an integrative approach can help to close the gap in financing for large infrastructure projects in comparison with a traditional planning approach focusing on ensuring merely the functionality of waterways and receiving only limited public and political attention. The grouping of budgets achieved through co-funding can help to create an infrastructure that serves multiple purposes and contributes to the main targets of EGD. Moreover, innovative pilot projects help to demonstrate the wide range of possible strategies to deal with climate change, as well as stimulate new ideas and new engineering solutions. Another example, the reconsideration of the Meuse River system in the Netherlands, which consists of seven interrelated weirs, has brought forward ideas related to hydro-energy, protection of waterworks as cultural heritage, and recreation as part of regional economic development. While complementing the original transportation-related aims of the waterways, the aforementioned projects go beyond the existing functionality of the network.

Moreover, it has to be added that the project planning should consider the overall transport development as an interconnected system, rather than only the river engineering solution, taking into account environmental impacts and cost-effectiveness to ensure that proper compliance with EU/national/regional targets is achieved. There is a need to ensure coherence of the development infrastructure projects with important complementary measures in terms of climate change mitigation and adaptation as well as energy transition. Often focusing on one primary function of the infrastructure, such as port development or fairway maintenance, potential of IWT projects is being underestimated and misconceived, resulting in lack of support to be eligible for future funding. Responses to the extreme weather events expected to result from climate change and the significant reduction in water resources should be a priority.

As it was described in chapter 4, lack of funding sources is an important, yet, not the only problem inherent to implementation of IWT infrastructure projects. Lack of experience and proper knowledge on identification, access and application for available funding, elaboration of feasible and solid project proposals in line with funding requirements and program rules, as well as efficient spending is another important barrier addressed. This often results in a number of weak proposals or low-quality, immature projects not meeting the requirements set. This means that education and training of staff involved in IWT infrastructure projects implementation is an important aspect to be considered. A number of training programs exists on EU-level, as an example, JASPERS[83], The Joint Assistance to Support Projects in European Regions of the EIB advises on strategies, programs and projects for investments supported by the European Grant Funds, with the aim of promoting growth and paving the way to a smarter, greener and more connected Europe. JASPERS' addresses the EU MS and Western Balkan candidate countries for EU accession. In light of the impact of recent conflicts on the global economy, uncertainties linked to challenges of climate change adaptation and the transition to a carbon-neutral economy, JASPERS provides support to close the knowledge gap and helps to avoid mistakes in project application and planning.

Receiving support and the necessary funding for infrastructure projects is definitely an important aspect, but avoiding main mistakes in the project management is equally important to ensure successful implementation of a project.

## 7.3. Institutional capacity

The institutional structure in association with the IWT infrastructure projects implementation is described in chapter 5 of this report. It is characterized by its historically predetermined organizational complexity stemming from a great number of different political interests on national and international level. A traditional system of governance of public infrastructure is not only inherent to the IWT sector, but to any other public domain. Such systems, despite their complexity in functioning and decision-making, represent a structure in which different functions are attributed to different authorities, responsible for certain separate policies in

[83] https://jaspers.eib.org/expertise/index.htm

connection with separate aspects of an IWT project (transportation, engineering, environment, regional planning, finances, economy, strategic development etc.). In certain cases, this approach lacks coordination between stakeholders, policymakers, public and private organizations, as well as national and regional authorities. This further evolves to a number of administrative barriers, complex bureaucracy, long lead times, slow decision-making and other factors having a negative impact on the implementation of IWT infrastructure projects. There is no doubt that an absolute transformation of this hierarchy into a single authority responsible for the decision-making is not feasible. However, interpenetration and coherence of key aspects of project implementation aligned with the legislative and policy level have to be ensured and better addressed. Bringing together specialists from different fields from different institutional levels for cooperation in the coordination of such projects is also vital.

Another facet of the institutional structure is its fragmented capacity. Considering high fragmentation of the institutional system for IWT infrastructure management, it can be stated that the same fragmentation can be observed in the educational system on the university or vocational levels. Creation, operation, maintenance and modernization of the IWT infrastructure is a complex process, which involves different experts in separate dedicated areas like navigation, safety, engineering, environment, biology, hydrology, geology etc. This means that the engineer cannot incorporate all the knowledge from the different fields. In general, as it was emphasized by Prof. Habersack (University of Natural Resources and Life Sciences Vienna) during the 13th JS meeting, this is due to a subject based education and training with the focus on single themes – integration with other sciences is not always addressed properly. A general approach in engineering education is mostly covering classical design aspects with a limited knowledge provided on the basics of environmental protection. At the same time, environmentalists are only focused on the environmental aspects, neglecting the one of engineering. Now, when climate change is causing an extra task to adapt the existing and to create a new climate change resilient IWT infrastructure, a combination of the knowledge in navigation, environmental protection and implementation of engineering measures is needed. These tasks are interrelated and must be duly addressed and integrated in the educational processes as well as in regular training programs to build-up and to reinforce existing institutional capacity in the IWT sector. Figure 13 demonstrates the process of capacity building from the level of core (individual capacity) to the highest (institutional capacity) level.

Willems & Busscher[84] introduce a double-loop learning in order to better understand modern IWT infrastructure needs by reconsideration of its original aims. The need to reconsider infrastructure system boundaries and its functionality in a more interdisciplinary and integrated manner is crucial. This doesn't mean that the whole educational system has to be rearranged, but rather refined. Both single-loop and double-loop learning are considered essential, while existing functionalities of IWT infrastructure can be optimized and potentially transformed, to refine and develop new approaches to accommodate extreme weather events (e.g., creating either robust waterworks or more flexible designs).

The aforementioned considerations can be partially addressed through combined courses conducted together for biologists or ecologists, hydrologists, and engineers to exchange and share the knowledge on practical aspects in project implementation. A multi-disciplinary approach, which was already addressed in Platina2 Good Practice Manual on Inland Waterway Maintenance[85] can also provide examples where engineering solutions represented by classical methods are combined with new sustainable practices. An integrated approach shall be applied to bring together authorities from the operational environment, hydrotechnical engineering design and environmental sector to come up together with solutions backed up theoretically and with practical investigations and research.

[84] See footnote 81

[85] savacommission.org/UserDocsImages/05_documents_publications/navigation/eng/platina_2_manual_on_waterway_maintenance_final.pdf

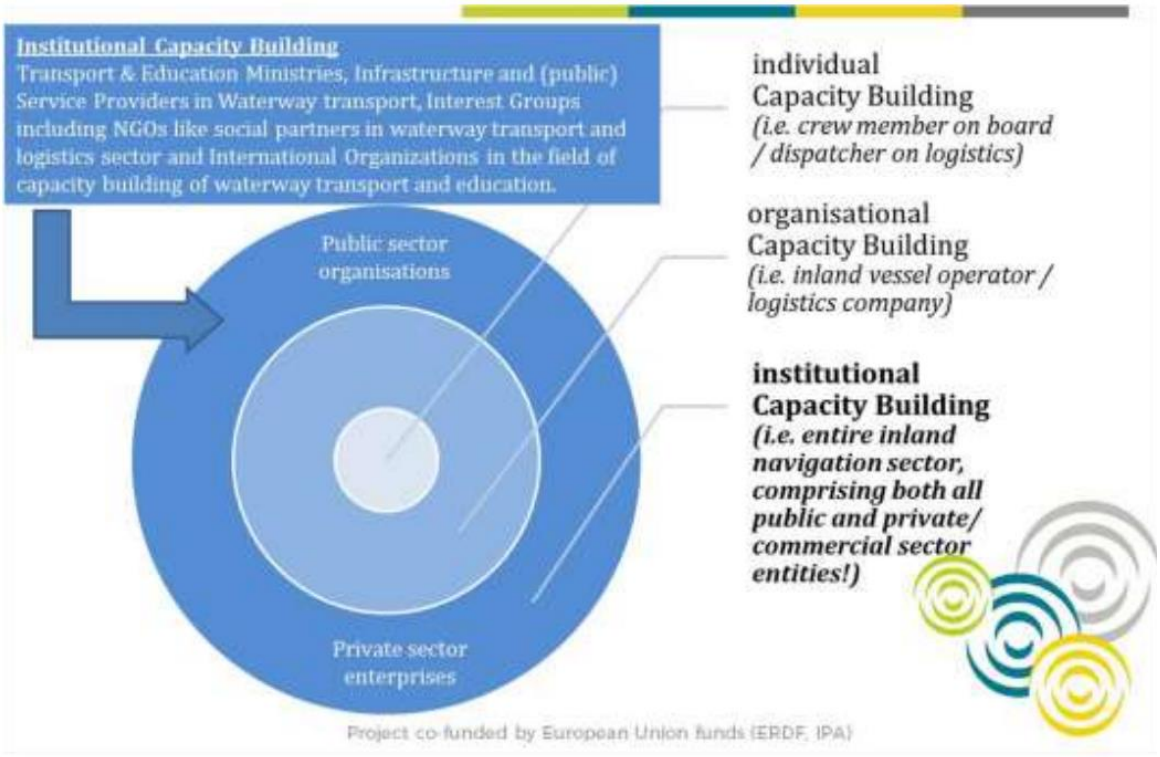


***Figure 13:*** *Institutional capacity building.* ***Source:*** *DTP Danube SKILLS*[86]

Other examples on good practices with respect to training can be given for the Danube region:

- The JS[87] initiative was launched in 2007 by the International Commission for the Protection of the Danube River (ICPDR) in cooperation with the Danube Commission and the International Sava Commission to develop and commit to a "Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin". In order to improve inland navigation and river system protection in the Danube River basin JS introduced principles of integrated planning. In order to guarantee an interdisciplinary approach and broader acceptance of the ongoing and future planning process from the beginning, the ministries responsible for environment, water management and transport, scientists and experts in river engineering, navigation, ecology, spatial planning, tourism and economics as well as representatives of other stakeholders, such as environmental non-governmental organizations and relevant private sector representatives, are involved to discuss relevant issues and follow-up measures also in relation to training.

- METEET[88], a Mixed Environment Transport External Expert Team was set up to provide training on Integrated Planning of Inland Waterways Transport (IWT) Projects in the Danube River Basin. The goal of this initiative was to assist the competent national authorities on inland waterway transport on a voluntary basis to explain and foster an integrated approach when developing infrastructure projects in the field of inland navigation. The METEET initiative is managed by a steering committee composed of representatives from the Danube Commission Secretariat, the ICPDR Secretariat, and the EC Directorates for Mobility and Transport (DG MOVE), the Environment (DG ENV) and Regional Policy (DG REGIO).

[86] https://www.interreg-danube.eu/approved-projects/danube-skills/outputs
[87] https://www.icpdr.org/main/activities-projects/joint-statement-navigation-environment
[88] https://www.icpdr.org/main/meteet-initiative-first-workshop-integrated-planning-inland-waterways-transport-projects-hailed

Harmonization, simplification and alignment of administrative procedures in terms of permitting, tendering, due diligence and execution of IWT infrastructure projects is targeted through this initiative.

## 7.4. Administrative procedures

As was already emphasized in the previous chapter, the vast majority of administrative barriers stem from institutional complexity and procedures, which are following the established hierarchy, defined on the national level of EU MS. In many cases, for large infrastructure projects, and especially for cross-border projects (with involvement of several MS, budgetary approvals, technical and administrative complexity of permit granting procedures, public procurements etc.) this complexity is understandable as it relates to large investments, public funding and complex decision-making. It is obvious that major infrastructure projects take a long time. Projects mature during the preparatory steps, and therefore can evolve in terms of objectives, scope, alignment, technical parameters, etc. However, not always administrative barriers are inherent only to large infrastructure projects. As described in chapter 6, infrastructure project implementation is often hindered by barriers derived from general bureaucratic processes and procedures, resulting in the necessity for provision of the same data several times for different authorities during different stages of the project implementation. Together with long lead-times for checking the same documents, significant delays in project implementation are the result. These delays occur in particular in relation to procedures for the receipt of permits, due diligence, audits and public procurements. A number of these processes require simplification and harmonization across the borders, as well as adaptation of existing administration to realistic time-frames from the point of view of an efficient implementation of a project. Achieving a harmonization process of administrative procedures on the transnational level is even more challenging, as it has to take the specific national preconditions of each of the involved countries into consideration.

Very often due to the lack of communication, low involvement of public authorities in the early stages of setting up a project, long discussions and argumentations at later stages affect significantly the timely preparation and implementation of a project causing delays. In this regard, an open planning process (especially if substantial environmental impact is expected) and early involvement of all relevant stakeholders to participate in the scoping process and to contribute to identifying alternatives will help to reconcile or reduce conflicting interests and to lower risk of delays at later stages. The stakeholder involvement process is the responsibility of project promoters and respective authorities in charge. Thus, a better promotion of the positive impacts of IWT due to its high energy efficiency contributing to the climate objectives can lead to a higher acceptance of the proposed infrastructures by environmental authorities and the society. The involvement of local stakeholders can be a good tool to avoid opposition and to increase awareness of the benefits of a project.

There is a clear need to simplify procurement and permitting procedures, especially in terms of their governance structure, as well as for implementation of a one-stop-shop for technical assistance for project structuring, financing and provision of legal advice, which was already targeted on EU level to provide support for cross-border transport projects[89]. Several MS have already integrated various steps – environmental permitting, spatial planning and construction permitting – into a single permitting procedure. In some cases, a leading authority has also been appointed for this procedure.

It was already noted that a large number of barriers identified for IWT infrastructure projects, especially in terms of administrative procedures, are existing also for other transport infrastructure projects as well as civil engineering projects. This means that cooperation and establishment of monitoring, efficiency assessment mechanisms backed up with an analysis of good practices and measures for improvement on national level

[89] See footnote 76

can strengthen management practices in relation to future EU co-funded cross-border projects. Lessons learnt from other infrastructure projects implementation as well as from other transport modes can potentially contribute to certain extent to cross-sectoral learning in order to elaborate common solutions to eliminate existing barriers.

# 8. Selected bibliography


1. Bodewig and Secchi "Making the best use of new financial schemes for European transport infrastructure projects", January 2018, Progress report.
2. Bruntdland, Khalid, Agnelli, Al-Athel, Chidzero, Vadika, Hauff, Lang, Shijun, De Botero and Sing "our common future", technical report, United Nations, 1987.
3. Cavalcante de Barros, Bulhões de Carvalho and Pinho Brasil Junior. "Inland waterway transport and the 2030 agenda: Taxonomy of sustainability issues". *Cleaner Engineering and Technology,* June 2022.
4. Central Dredging Association, International Association of Dredging Companies, CEDA-IADC Handbook: Dredging for Sustainable Infrastructure, 2018.
5. Marcu and Gasparotti "Administrative Barriers -Influence on Port Management Operations", Euro Economica, Special Issue 2(39)/2020, August 2020.
6. Matsumoto, Monteiro, Rial and Sakrak "Mastering the Risky Business of Public-Private Partnerships in Infrastructure", ISBN: 9781513576565, May 2021.
7. Secchi and Belladonna "Infrastructure in a Changing World: Trends and Challenges", *ISPI-McKinsey Report,* June 2020.
8. Willems and Busscher, "Institutional Barriers and Bridges for Climate Proofing Waterway Infrastructures", *Public Works Management and Policy*, 24(1), 63-70.
9. European Parliament, Study IP/G/STOA/FWC-2013-1 - LOT 2/C5, March 2018, New ways of financing transport infrastructure projects in Europe.
10. European Court of Auditors, Special Report, 10, 2020, Special Report 10/2020: EU transport infrastructures: more speed needed in megaproject implementation to deliver network effects on time (europa.eu).
11. European Commission, "A European Green Deal", December 2019, A European Green Deal | European Commission (europa.eu).
12. European Commission, Council Directive 85/337/EEC, June 1985, Council Directive on the assessment of the effects of certain public and private projects on the environment.
13. European Commission, Habitats Directive, May 1992, Council Directive 92/43/EEC .
14. European Commission, Water Framework Directive, October 2000, DIRECTIVE 2000/60/EC.
15. European Commission, TEN-T Regulation, December 2013, REGULATION (EU) No 1315/2013.
16. European Commission, CEF Regulation, December 2013, REGULATION (EU) No 1316/2013.
17. European Commission, DIRECTIVE 2014/52/EU, April 2014, DIRECTIVE 2014/52/EU.
18. European Commission, Proposal for a Regulation of the European Parliament and of the Council on streamlining measures for advancing the realization of the trans-European transport network, May 2018, COM(2018) 277 final.
19. European Commission, The Connecting Europe Facility (CEF) Transport Inland Waterway Portfolio, June 2018, CEF support to Inland Waterways.
20. European Commission, "Staff Working Document SWD(2019)439", December 2019, FITNESS CHECK of the Water framework Directive, Groundwater Directive, Environmental Quality Standards Directive and Floods Directive.
21. European Commission, "Fourth Work Plan of the European Coordinator Karla Peijs", May 2020, 4th_workplan_rhd.
22. European Commission, Taxonomy Regulation, June 2020, REGULATION (EU) 2020/852 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL (europa.eu).
23. European Commission, "Sustainable and Smart Mobility Strategy", December 2020, Mobility Strategy (europa.eu).

24. European Commission, “Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change”, February 2021, COM(2021) 82 final.
25. European Commission, “European Climate Law”, June 2021, EGULATION (EU) 2021/1119.
26. European Commission, “NAIADES III action plan”, June 2021, NAIADES III action plan (europa.eu).
27. European Commission, CEF2 Regulation, July 2021, REGULATION (EU) 2021/1153.
28. European Commission, Commission notice (2021/C 373/01), September 2021, Technical guidance on the climate proofing of infrastructure in the period 2021-2027.
29. European Commission, Guidelines on State aid for climate, environmental protection and energy 2022, February 2022, Communication from the Commission (2022/C 80/01).
30. European Conference of Ministers of Transport (ECMT) “Strengthening inland waterway transport: Pan-European co-operation”, OECD Publications, 2006; https://www.itf-oecd.org/sites/default/files/docs/06watpaneurop.pdf
31. The project of the Trans-European Transport Network - Trans-European Transport Network, DANUBE WATERWAY DEVELOPMENT PROGRAMME Version 2, improved in parallel with the development of the SEA, September 2020, 2014-HU-TMC-0606-S.
32. UNECE, Convention on environmental impact assessment in a transboundary context, 1991, Espoo Convention.
33. UNECE, “White Paper on the Progress, Accomplishments and Future of Sustainable Inland Water Transport”, January 2020, IWW_WhitePaper_ECE_TRANS_279.
34. CCNR, Study on financing the energy transition towards a zero-emission European IWT sector, July 2021 https://ccr-zkr.org/files/documents/EtudesTransEner/Deliverable_RQ_I.pdf
35. The Intergovernmental Panel on Climate Change, AR5 Synthesis Report: Climate Change 2014, SYR_AR5_FINAL_.

# Annex I – Integration of climate change requirements in IWT infrastructure projects[90]

Figure 2. Integrating climate change requirements in the development of major projects

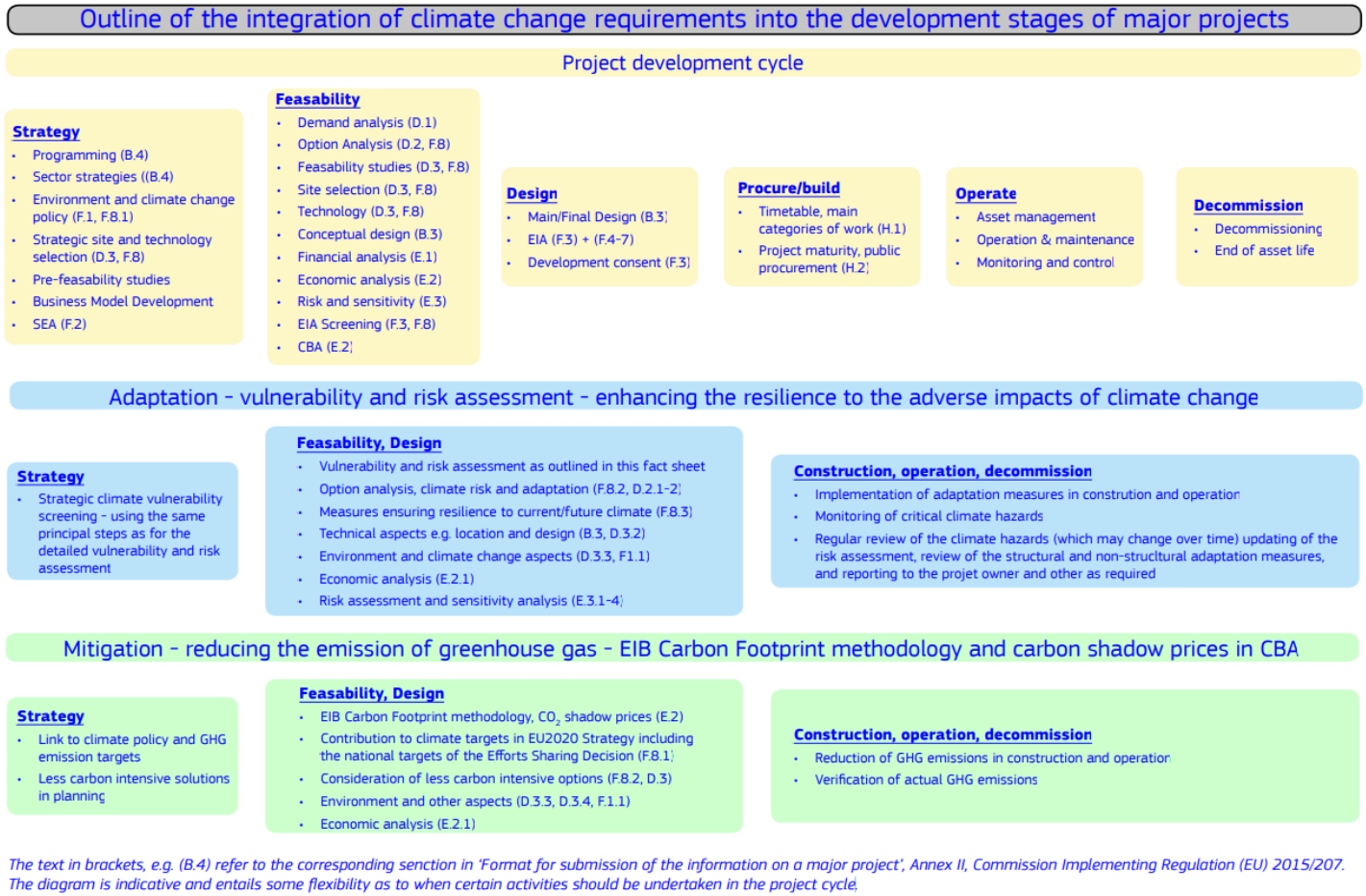


***Figure 14:*** *Integrating climate change requirements in the development of major projects.* ***Source:*** *EC*

[90] See footnote 40

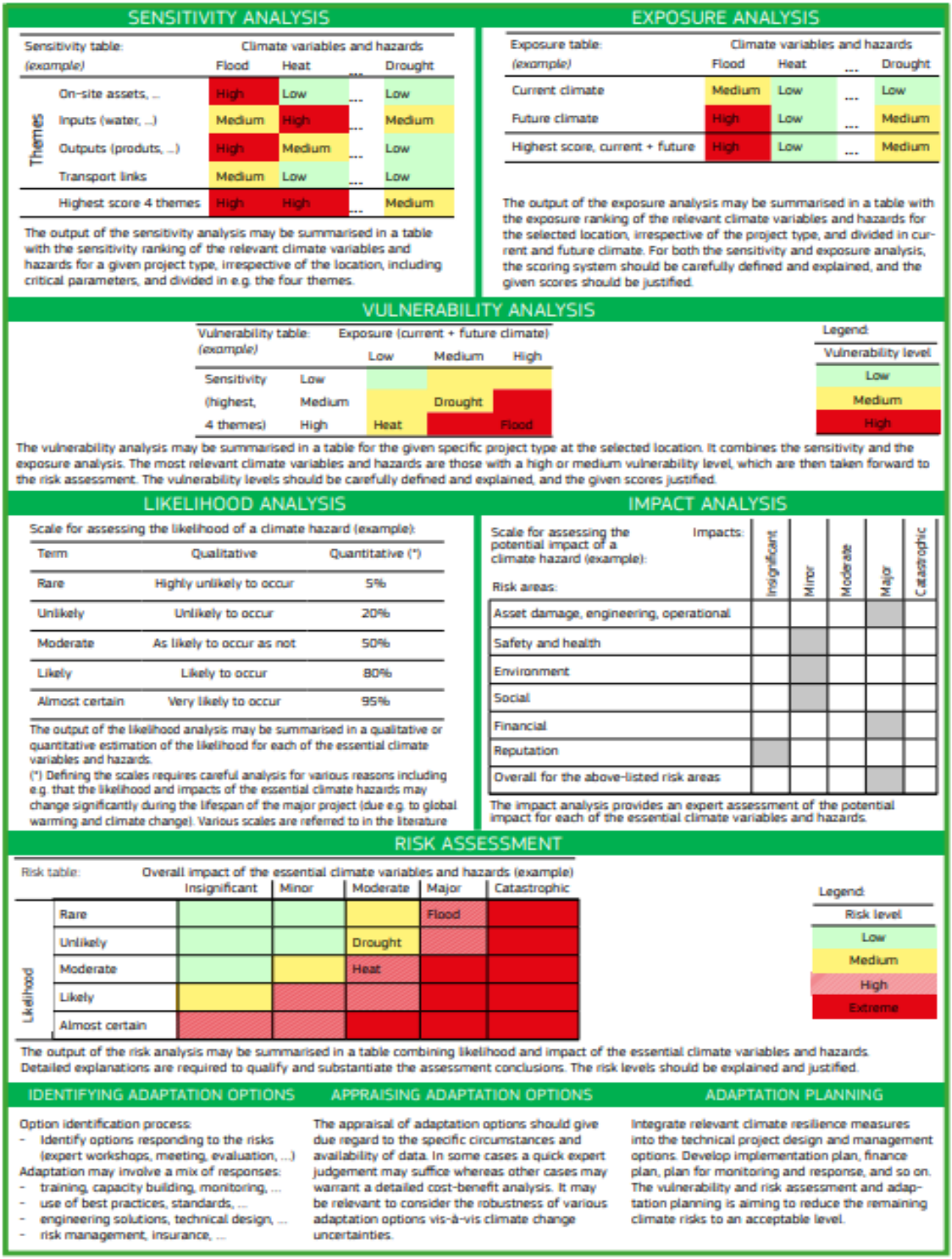


***Figure 15:*** *Indicative overview of the climate vulnerability and risk assessment, and the identification, appraisal and planning/integration of relevant adaptation measures.* ***Source:*** *EC*

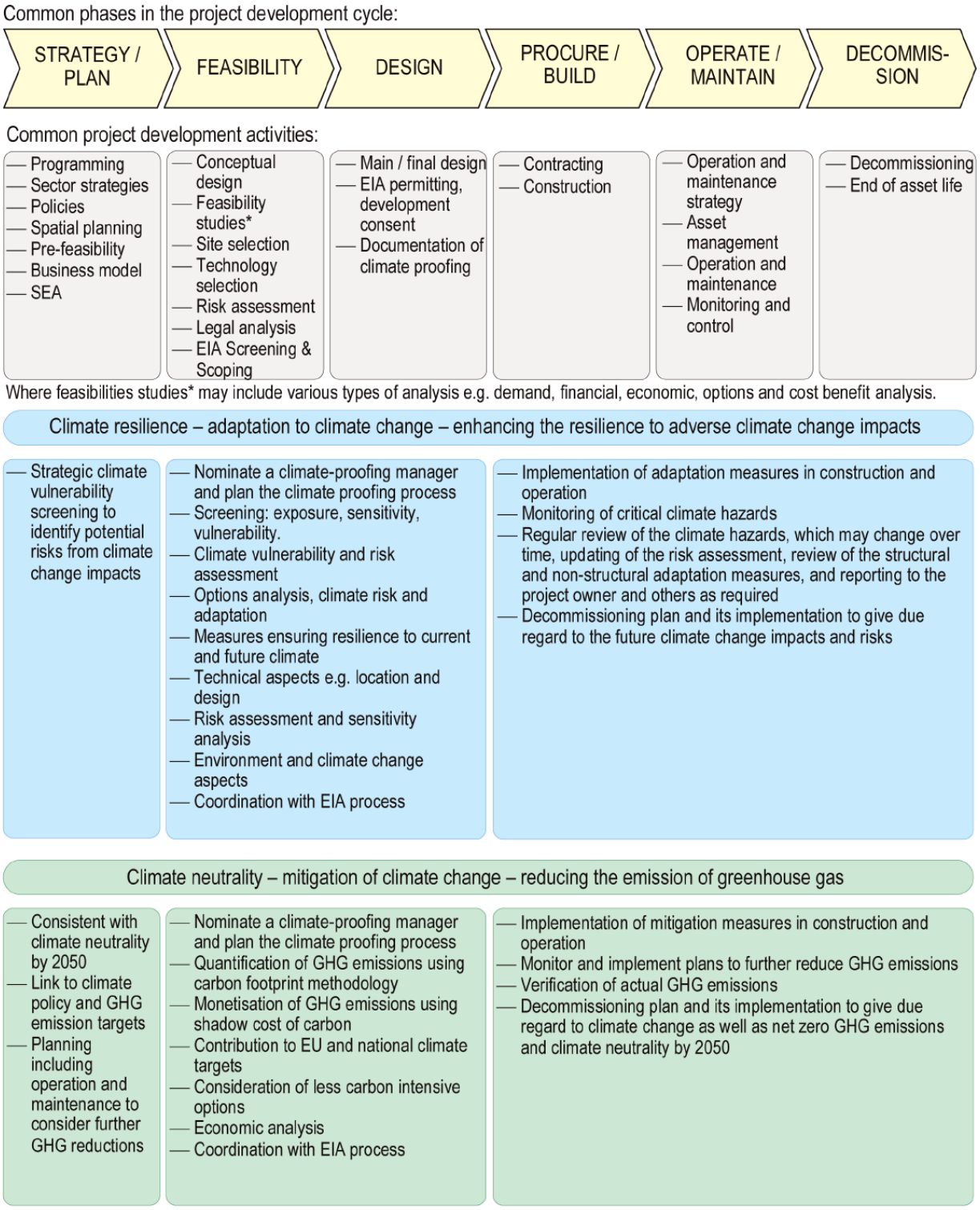


***Figure 16:*** *Overview of climate proofing and project cycle management.* ***Source:*** *EC*

# Annex II - Relevant projects in the Danube region

**The JOINTISZA**[91] project will enhance the status of waters of the Tisza River Basin. It will focus on the interactions of two key aspects of water management — river basin management (RBM) and flood protection — while taking into account the relevant stakeholders who play a pivotal role in the Tisza RBM planning process. The main aim of the project is to further improve the integration of water management and flood risk prevention planning and actions for the next RBM planning cycle, in line with the relevant EU legislation.

The JOINTISZA project will ensure that flood risk management planning becomes more deeply embedded in the RBM planning process, and will also facilitate the involvement of interested stakeholders and relevant sectors (e.g. flood risk-, water resource-, urban hydrology- and drought management).

A long-term goal of the project will be to generate momentum for improved implementation of the Floods Directive and Water Framework Directive, targeting four specific groups: national water administrations, water research institutes, international organisations and other interested stakeholders, and NGOs.

The project will involve the joint efforts of the five countries that share the Tisza River Basin — Hungary, Romania, Serbia, Slovakia and Ukraine. The ICPDR Tisza Group, EUSDR Water Quality Priority Area (PA4) and Environmental Risks Priority Area (PA5) platforms will build a bridge between stakeholders for conveying information from expert levels to policy levels. Furthermore, the pilot actions, focusing on urban hydrology management and drought management, will enable the involved actors to develop new approaches which are unprecedented in a comparable environment, and contribute with their outcomes to the updated management plan.

Finally, the main output of the project will be an updated final draft of the Integrated Tisza RBM Plan, which already includes the primary aspects of the Floods Directive.

**DTP SIMONA**[92] - Sediment-quality Information, Monitoring and Assessment System to support transnational cooperation for joint Danube Basin water management. The main objective of SIMONA is to respond to the current demand for effective and comparable measurements and assessments of sediment quality in surface waters in the Danube River Basin (DRB) by delivering a ready-to-deploy Sediment-quality Information, Monitoring and Assessment System to support transnational cooperation for joint DRB water management. The main result of SIMONA will be the improved, harmonized and coordinated sediment quality monitoring of the water body status in the Danube River Basin. Together with experts trained in sediment quality management by SIMONA, the project will also generate international cooperation between stakeholders concerning the monitoring of HSs concentration in water, in sediments, and in biota. The immediate and middle term benefit of the project will be a transparent method supported by the SIMONA-tool for sediment quality monitoring that will encourage cooperation in transnational water management.

**DTP DAREFFORT**[93] - Danube River Basin Enhanced Flood Forecasting Cooperation. The project aims to explore the current status of the national forecasting abilities where from the partners and the stakeholders could derive the common goals in order to develop the existing system in an inclusive way, therefore improve the forecasting system of the area. In order to secure sound flood forecasting, transnational hydrologic data was gathered from across the region. This included an overarching assessment of the consistency, reliability, and delivery systems used by the project's network of participants to send and receive hydrological data. Standardised hydrologic and ice data services and harmonised distribution for all Danube catchment countries were provided through interface software. Thanks to this, estimates of minimum warning lead time required, plus suggestions for E-learning tools to create a more equitable flood risk forecasting knowledge across the Basin were also made.

[91] https://www.interreg-danube.eu/approved-projects/jointisza
[92] https://www.interreg-danube.eu/approved-projects/simona
[93] https://www.interreg-danube.eu/approved-projects/dareffort

**DTP DanubeSediment**[94]: Closing the knowledge gaps on a changed regime of sediment flowing from the Black Forest to the Black Sea in the Danube River, and strengthening Danube Region governance pertaining to sediment have been the core objectives for the past years that were finally achieved. The Danube Sediment Management Guidance (DSMG) and Sediment Manual for Stakeholders were produced to offer assistance for sediment-related actions in the Danube River Basin and for future programmes of sediment-related measures, including: measures to preserve and improve river morphology, the establishment of a harmonised sediment monitoring network, assessment of sediment quality (not just quantity), elaboration of transnational and cross-sectorial roadmap for the Danube sediment.

One main project output is the Danube Sediment Management Guidance (DSMG). It contains recommendations for reducing the impact of a disturbed sediment balance, e.g. on the ecological status and on flood risk along the river. By feeding into the Danube River Management Plan (DRBMP) and the Danube Flood Risk Management Plan (DFRMP), issued by the ICPDR, the project directly contributes to transnational water management and flood risk prevention.

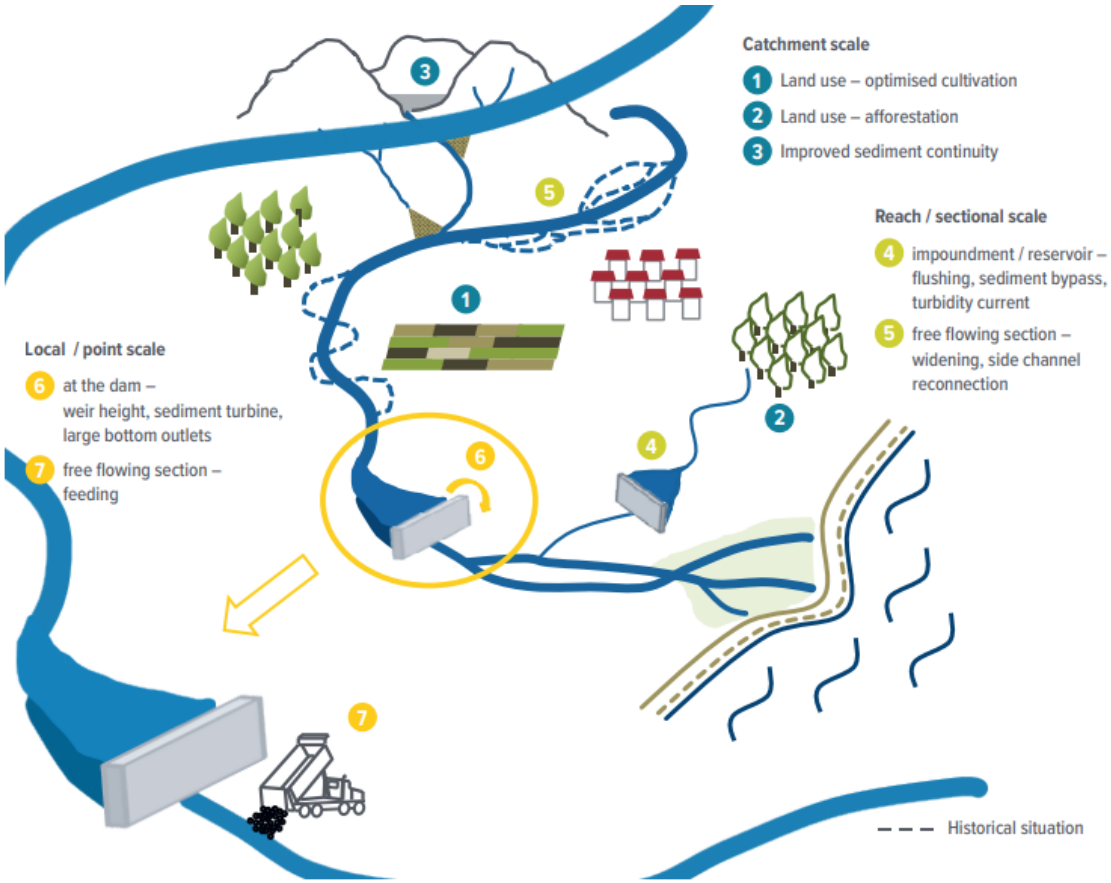


***Figure 17:*** *Location of selected measures within the basin.* ***Source:*** *DTP DanubeSediment*

**DTP DriDanube**[95]: The main objective of the DriDanube project is to increase the capacity of the Danube region to manage drought related risks. The project aims at helping all stakeholders involved in drought management to become more efficient during drought emergency response and to prepare better for the next drought. Established to increase the Danube Region's capacity to cope with drought, homogenisation of previously

[94] https://www.interreg-danube.eu/approved-projects/danubesediment
[95] https://www.interreg-danube.eu/approved-projects/dridanube

heterogeneous methodologies of assessing and forecasting drought impacts within the Danube River Basin was reached through the Drought User Service – branded and released to the public as DroughtWatch.eu – and a powerful new framework: the Danube Drought Strategy. By identifying common steps to be taken and strengthening forecasting abilities in the Danube River Basin, vast headway in a Basin-wide switch from a reactive to a proactive drought management approach was made.[96]

**DREAM[97] – Danube River Research and Management** provides the umbrella and coordination for setting up research topics. These topics are interconnected and cover several disciplines, from basic research, to be represented by advanced hydraulic labs and sophisticated 3D models on high computational technology, to applied research, providing field data to mitigate hydrological extremes and to improve existing situations in water regimes, sediment regime, flood risk, drought problems, revision of bio-engineering measures, restoration of streams and flood plains, etc.

Objectives of the project are:

a) An important aim is to enable research of hydrodynamics, sediment transport, morphodynamics and ecological processes in the various reaches of the Danube River by means of adequate hydraulic laboratories, that provide a significant discharge (up to 10 $m^3/s$ without pumping) and space (large scale models).

b) On the basis of an improved process understanding, derived by large-scale physical models in the labs, computer-based simulations should be improved, leading to hybrid models. A further aim is to establish commonly agreed field study sites and stations along the Danube River to calibrate and validate physical and computer-based models as well as to develop and test advanced river engineering measures under 1:1 condition.

c) The cooperation of research institutions and laboratories along the Danube River is intended to improve scientific progress and to stimulate the transfer from basic research to the knowledge society.

[96] https://www.oerok.gv.at/fileadmin/user_upload/Bilder/4.Reiter-Contact_Point/DTP-DRP/DTP_2014-2020/AoB/2020-10_Interreg_Danube_brochure.pdf

[97] https://navigation.danube-region.eu/dream-danube-river-research-and-management/

# Annex III - Relevant projects in the Rhine region

**Measures on optimization of channel depth in the Middle Rhine**[98]

The river Rhine is one of the most important waterways in Europe. Around 50,000 cargo ships pass through the stretch between Budenheim near Mainz (Rhine-km 508.0) and St. Goar (Rhine- km 557.0) every year. They transport almost 60 million tons of cargo and play a prominent role in freight transport along the Rhine axis as an environmentally friendly mode of transport. To make it future-proof, the Rhine should also be able to cope with future transport and logistics demands. This is particularly true in view of the fact that the forecasts for the Middle Rhine section predict an increase in yearly freight volumes to more than 75 million tons.


***Figure 18:*** *Overview of the Rhine (left) with representation of the project area (right).* ***Source:*** *CCNR/WSV.*

Among the different Rhine sections, the Middle Rhine is considered as a bottleneck for through passing inland navigation vessels. The optimization project focuses on making six distinct spots in this critical stretch just as deep as the adjacent upstream and downstream river stretches.

Low water levels, as seen in 2018 and 2022, can make this challenging sector, which also includes the Loreley section, even more challenging (see also figures above). Already in the 1970s, Germany launched several large-scale dredging operations to guarantee a navigable channel depth of at least 1,9 meters at equivalent water level (the reference water level of the Rhine, or GIW (Gleichwertiger Wasserstand)). The objective of the new project is to guarantee an additional 20 cm for inland navigation at equivalent water level and to optimize the situation at average water levels while at the same time creating a win-win situation for the environment and inland navigation.

[98] https://www.abladeoptimierung-mittelrhein.wsv.de/

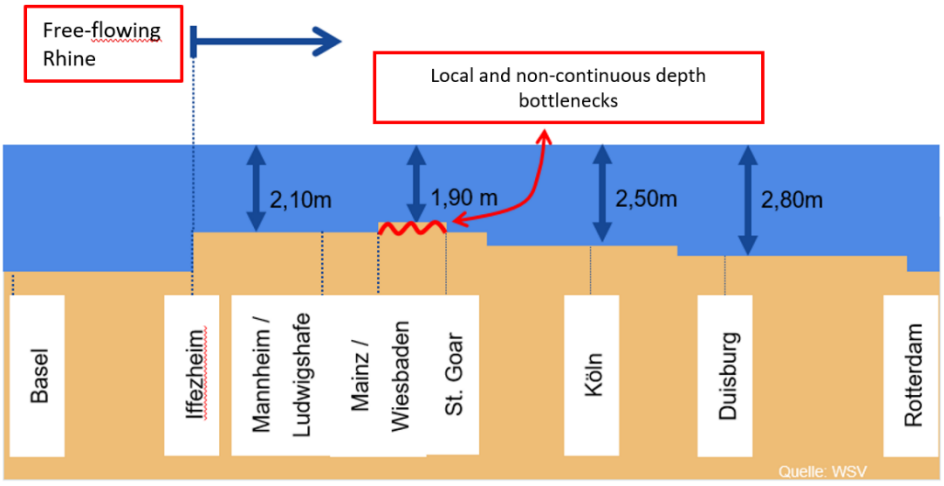


***Figure 19:*** *The navigable channel depth along the Rhine from Basel to Rotterdam, including the bottleneck section around Kaub.* ***Source:*** *WSV.*

Nowadays, new technology, machinery and techniques allow for the rocky riverbed between Bingen and St. Goar ("Gebirgsstrecke") to be dredged and thus to potentially attain a navigable channel depth of 2,10 metres at low water in the bottleneck section of the Middle Rhine valley. But not only dredging operations are planned– the idea is a combination of dredging and water level supporting measures.

In 2014, the German Federal Waterways and Shipping Administration (WSV) started the ambitious project to optimise the navigable channel depth around the identified six locations between Mainz and St. Goar. Although an expensive endeavour (180 million euros), these works are expected to have a high benefit-cost ratio, mainly due to the increase of transport capacity of inland navigation vessels passing the Middle Rhine. Ecological and nature conservation as well as water management measures are integrated into the project from the very beginning.

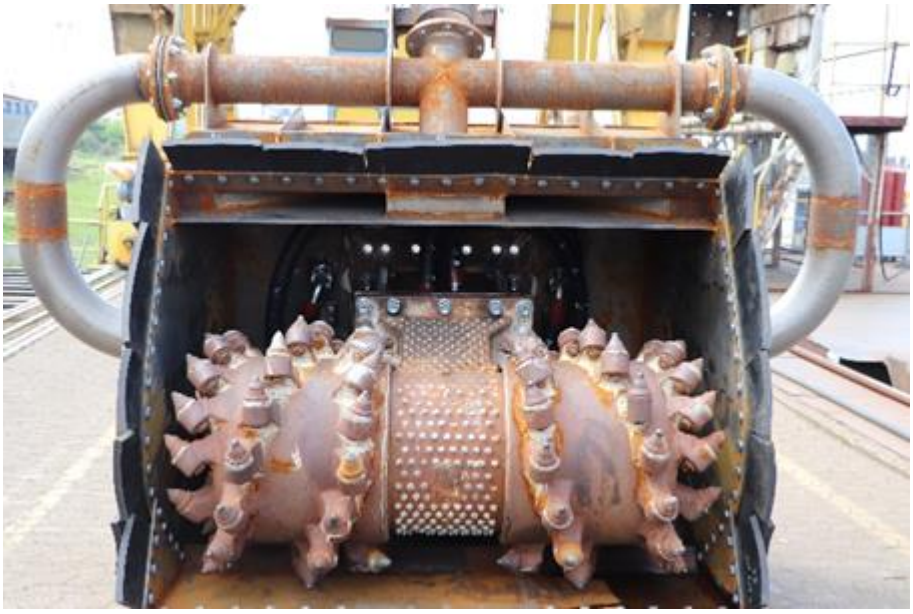


***Figure 20:*** *One of the massive dredgers being used to deepen the navigable channel in the Middle Rhine.* ***Source:*** *WSA Rhein.*

The planning is being carried out by the Wasserstraßen- and Schifffahrtsamt (WSA) Rhein as the responsible body for the project. The investigations are mainly carried out and accompanied by the Federal Waterways Engineering and Research Institute (BAW) and BfG.

In order to realize the project objective, combinations of river engineering measures are being developed, tested and modified by the BAW, among others. These include, for example, longitudinal and transverse structures as well as base sills (supporting the water level and increasing the shear stress in the watercourse), scour barriers, bank modelling and bed adjustments (rock removal and dredging measures). Basically, the water level supporting measures through regulating works are preferred over the removal of bed material according to the processing strategy. Thus, optimizing the navigable channel depth does not, however, mean deepening the Middle Rhine on a large scale. In each project phase, it is examined whether the project objective can be achieved with the developed measures – without causing unwanted side effects.

The WSV is making use of every optimization opportunity to accelerate the project. This also includes parallel processing of the planning services, preliminary mapping work for the environmental impact assessments as well as early practical tests for the removal of rock peaks on the Rhine bed.

After conducting a consultation between December 2017 and January 2019 with all involved stakeholders at, national, regional, and local levels, the project is expected to finish its planning and approval phase in 2027, before the core construction operations can begin. However, it is crucial that the implementation of the project, which is demanding in terms of hydraulic engineering, requires an approval procedure in which all interests (including water management, the environment, tourism and, as a special feature, the World Heritage status of the Upper Middle Rhine Valley) must be considered and weighed against. According to the current status, the completion of the measure on the Middle Rhine is possible in the early 2030s.

**CCNR activities to tackle low waters in Rhine navigation**

Climate science indicates that climate change will amplify low water phenomena in the future, making them more likely, frequent, and severe. For the Rhine, the CCNR bases its actions mainly on the reports of the IPCC[99]

[99] https://www.ipcc.ch/

and the International Commission for the Hydrology of the Rhine basin (CHR)[100]. As seen in 2018 and 2022, low waters lead to lower cargo handling capacity (more vessels are needed to transport the same amount of cargo), and higher costs for shippers as well as lower reliability of IWT, which causes temporary to sometimes permanent reverse modal shift away from inland waterways. It may also cause lower availability of goods and issues in the provisioning of important products for the industry and the society, such as the gasoline shortage in some parts of Germany and France in 2018 proved.

On 18 January 2023[101], the CCNR held a follow-up expert workshop dedicated to low waters in Rhine navigation, after the successful first Workshop held in 2019[102]. Participants from the IWT sector (regulators, policymakers, shipowners, shipyards, shippers, research institutes, logisticians, industries…) took stock of progress made since the 2018 low water and examined how to make Rhine navigation fit-for-future.

This calls for quick and bold action, with the need to "Act Now!"[103], namely by bolstering resilience through adaptation measures. These include digital tools for water level prediction and mapping, infrastructure projects such as navigable channel depth optimization to better adapt to climate change, especially at critical bottlenecks such as the Middle Rhine, new and innovative vessel designs with reduced draught for shallow water navigation, and public/private financing and funding opportunities to accelerate these transformations at scale.

It goes without saying that also climate change mitigation measures need to be implemented in addition. These measures are integrated in CCNR's main policy tool, the Roadmap for reducing inland navigation emissions by 2030 and 2050[104].

The CCNR workshop demonstrated that the enormous challenge posed by low water conditions can only be met by a package of measures incorporating multiple levers. Just as there is no silver bullet, nor is there a single actor capable of solving every problem. The outcomes of the 2019 workshop were integrated into the "Act now!" reflection paper, which is available already in a second edition on the website of the CCNR. The reflection paper will be regularly updated by the CCNR.

[100] https://www.chr-khr.org/en
[101] CCNR, "Low water and effects on Rhine navigation" (2023), https://www.ccr-zkr.org/13020156-en.html.
[102] CCNR, "Low water and effects on Rhine navigation" (2019), https://www.ccr-zkr.org/13020151-en.html.
[103] CCNR, "Act now! on low water and effects on Rhine navigation", 2021, https://www.ccr-zkr.org/files/documents/workshops/wrshp261119/ien20_06en.pdf.
[104] https://www.ccr-zkr.org/12090000-en.html

| | |
|---|---|
| Project coordination | Stichting Projecten Binnenvaart |
| Contact | info@platina3.eu |



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101006364. The opinions expressed in this document reflect only the author's view and in no way reflect the European Commission's opinions. The European Commission is not responsible for any use that may be made of the information it contains.