

Green and efficient Danube fleet

“Towards modernisation & greening of Danube inland waterborne sector and strengthening its competitiveness”

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2 Abbreviations

Abbreviation	Explanation
AIS	Automatic Identification System
B2B	Business-to-Business
B2G	Business-to-Government
CCNR	Central Commission for the Navigation of the Rhine
CEF	Connecting Europe Facility
D	Germany
DINA	Digital Inland Navigation Area
DTLF	Digital Transport & Logistics Forum
DTP	Danube Transnational Programme
EC	European Commission
ECDIS	Electronic Chart Display and Information System
EHDB	European Hull Database
eIDAS	National electronic identification schemes (eIDAS Regulation ensures that people and businesses can use their own national electronic identification schemes (eIDs) to access public services in other EU countries where eIDs are available)
ENC	Electronic Navigational Chart
ECQDB	(Future) European Crew Qualification Database
ERDF	European Regional Development Fund
ERDMS	European Reference Data Management System
ERI	Electronic Reporting International
ERINOT	Electronic Reporting Notification message
ERP	Enterprise Resource Planning
ETA	Estimated Time of Arrival

EU	European Union
EUSDR	EU Strategy for the Danube Region
GDPR	General Data Protection Regulation (Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data)
HR	Croatia
Inland ECDIS	A system used within the meaning of the current Inland ECDIS Standard for displaying electronic navigational charts for inland waters and associated information, that displays selected information from proprietary electronic navigational charts for inland waters and optionally information from other sensors of the craft
IT	Information technologies
IWT	Inland Waterway Transport
LNG	Liquefied natural gas
MFF	Multiannual Financial Framework
NRMM	Non-Road Mobile Machinery
NtS	Notices to Skippers
PA	Priority Area
RIS	River Information Services
SK	Slovakia
UNECE	United Nations Economic Commission for Europe
VTT	Vessel Tracking and Tracing

3 Introduction

Danube fleet modernisation, technological & financial innovation as well as know-how transfer were key elements that defined the whole lifecycle of the GRENDEL project. Inspired by the **Green Deal for Danube River Transport**, a policy framework developed by Pro Danube International, the core objective of GRENDEL was to elaborate, based on the consultations held with EC services as well as based on the input provided by relevant national and transnational public and private entities, Danube vessel operators and innovative technology providers, efficient and enduring financial and technological solutions to modernise the outdated Danube fleet and adapt it to the needs and requirements of European markets and beyond. Continuing the well-established tradition in the framework of the DTP funded projects DANTE and DAPhNE – both initiated and led by Pro Danube International – the GRENDEL partnership managed to produce tangible results that were welcomed by both the public and private sectors.

GRENDEL represents a vital step forward in the more than challenging modernisation process of the Danube fleet. With an average age of more than two decades, Danube vessels fail to correspond with the strict environmental requirements as requested by the European Legislator. The reasons for this development are twofold: on the one hand slow innovation intake as compared to other modes of transport and on the other hand low investment capacities of Danube fleet operators. GRENDEL provided concrete solutions for these shortcomings by proposing a set of technological factsheets that highlight innovative measures to adapt/retrofit the outdated Danube vessels to the new legal provisions. A key element in this regard was the elaboration of vessel concepts that serve as a fruitful ground for the intake of innovative technological innovations. As a response to the low financial investment capacities of fleet operators, GRENDEL developed a **Model State Aid Scheme for IWT Fleet Modernisation**. Covering the five most important aspects of fleet modernisation – **(1) Environmental Performance, (2) Integration into Logistics Chains, (3) Increasing the Safety of IWT, (4) Renewal of Actors in IWT and (5) Innovative Solutions** – the Model State Aid Scheme was developed to serve as a guideline for Danube riparian countries to implement national state aid schemes according to their specific needs, requirements and administrative prerequisites. A widely harmonised state aid scheme at regional level – financed by both EU and/or national funds – would considerably increase the investment capacities of fleet operators and adapt IWT to a future-oriented transport system.

The achievements of GRENDEL went far beyond identifying the most challenges IWT is facing in terms of low technological intake, new legislative developments or reduced investment capacities of vessel operators. GRENDEL, as comprehensively described in this strategy, proposed concrete actions, measures and recommendations to overcome the most problematic issues faced by IWT in the Danube Region and well beyond: **(1) environmental quality through low emissions** and **(2) efficient integration of IWT into multimodal logistics chains**. The strategy proposes an in-depth policy analysis of the most important legislation directly and indirectly affecting IWT. This approach evaluates the available options to implement the set of goals as defined in the legislation. The second challenge discussed in the framework of this strategy deals with the **efficient and enduring integration of IWT into multimodal logistics chains**. This chapter provides an overview of available digital solutions and their positive impact of an uninterrupted transport flow across the region.

The strategy concludes with a **set of recommendations** to overcome the identified challenges. With the Danube being regarded as the economic backbone of a transnational region par excellence characterised by different levels of socioeconomic development, the recommendations proposed in the framework of this strategy aim at the overall improvement of regional development facilitating the implementation of the EU Strategy for the Danube Region (EUSDR).

4 Executive summary

The core objective of this strategy is to provide a comprehensive analysis on the most important challenges IWT is currently facing in terms of legislation and its efficient integration into multimodal transport and logistics chains. Initiated by Pro Danube International with the core objective to propose concrete actions and measures to facilitate the modernisation of the outdated Danube fleet, GRENDEL's ambitious plan to implement a widely harmonised **State Aid Scheme for Danube IWT Fleet Modernisation** already started to produce tangible results. Based on the fleet modernisation aspects as proposed by the project, Slovakia and Croatia already initiated preparations to integrate few of them in their national state aid schemes, whereas Austria is as well starting to have concrete discussions based on the achievements of GRENDEL. The impact of GRENDEL is as also in Bulgaria tangible since there is the possibility to make financing instruments for safety issues available. Moreover, the impact of GRENDEL on IWT fleet modernisation is highlighted in the **EUSDR Action Plan**. The EUSDR PA1a issued its Strategy on fleet modernisation in December 2019 which has already taken up GRENDEL's technological recommendations and the proposals for the financial support for modernising the Danube IWT fleet.

Regarding the first challenge analysed in the framework of this strategy – **environmental quality through low emissions** – the document proposes an in-depth overview on the current legislation with a focus on the short and long-term impact of the strict environmental requirements on IWT. After providing this comprehensive policy analysis, the strategy proposes, based on the results of the GRENDEL project, solutions to adapt the fleet to the new requirements as defined by the legislation governing IWT. Hence, the GRENDEL project developed a series of **technological factsheets** that propose concrete innovative solutions to significantly reduce the environmental footprint of IWT, to make it more reliable and energy efficient. These factsheets are published on the website of GRENDEL and are not limited to a mere description of existing innovative technologies. On the contrary, the factsheets provide information on the advantages and disadvantages of each analysed technology, highlighting their suitability depending on the type of vessel. Moreover, the project continuously collected relevant data and developed an **IWT Innovative Technologies Database** covering a wide range of innovative technological solutions as a vital step to counteract the relatively low innovation intake in IWT. The database is available on the official website of the GRENDEL project.

The second challenge, **efficient integration of IWT into multimodal transport and logistics chains**, highlights the potential of digitalisation as an important step in making IWT more attractive to a multitude of industries operating in Europe and beyond. **Digitalisation** is considered as an important driver in simplifying administrative procedures, increasing efficiency and considerably reducing costs. It has the potential to make a more systematic use of the existing resources and infrastructure. Moreover, digitalisation sets the ground for the development or expansion of new businesses, it makes IWT more attractive and improves the transport flow on inland waterways.

Another important topic discussed in the framework of the strategy refers to the impact of the COVID-19 pandemic on IWT. In order to reduce uncertainty and secure a smooth transport flow, the strategy proposes concrete actions and measures to reduce the harmful impact of the crisis on businesses operating on the Danube.

Based on the results of the GRENDEL project, this strategy concludes with a set of recommendations reflecting the need for standardisation and harmonisation on **corridor level** to overcome the most urgent challenges IWT is currently facing from a twofold perspective: the existing legislation having a direct impact on IWT as well as its efficient and enduring integration into multimodal transport and logistics chains.

5 Policy context

Being a transnational river par excellence, the Danube is the economic backbone of a region that spreads over as many as ten different European countries. This unique transnational peculiarity is characterized by wide variations in terms of social and economic development.

Policies are a set of principles formulated to reach long-term goals, designed to influence major decisions and actions that shape the evolution of a given sector. Creating integrated transnational policies that address the genuine needs of the IWT sector is a more than challenging undertaking. A common transnational approach must take the specific interests, economic, political and administrative particularities of each involved partner into consideration.

In order to achieve the expected results, policies should be clear and consistent, setting according to the **“Same River, Same Rules”** philosophy developed by Pro Danube International, concrete standards that apply across borders. Policy harmonisation across the whole region therefore plays a decisive role in securing an uninterrupted transport flow on the Danube.

Acknowledging the potential of IWT to become a reliable alternative to other modes of transport, Pro Danube International proposed a policy framework entitled **“Green Deal for Danube River Transport”**. Inspired by examples of good practices in Western Europe, Green Deal proposes a set of solutions that focus on the modernisation of the fleet, the reduction of the environmental impact and the development of Danube ports as catalysts for economic development on the regional level and beyond. The framework’s development goals are based on 4 main pillars, having the core objective to bring together relevant decision makers from the local and national levels as well as fleet & barge operators, port & terminal operators and industrial users of the Danube waterway together with their logistics service providers. Its main pillars are:

1. National Governments of Danube States,
2. Vessel and Fleet Operators,
3. Ports and Terminal Operators,
4. Danube IWT and Logistics Operators.

Based on this, the following key elements are being addressed:

- Reduction of administrative barriers,
- Infrastructure and maintenance,
- State aid schemes for fleet and terminal modernization,
- Pilot projects/deployment projects,
- Development strategies/Action Plans.

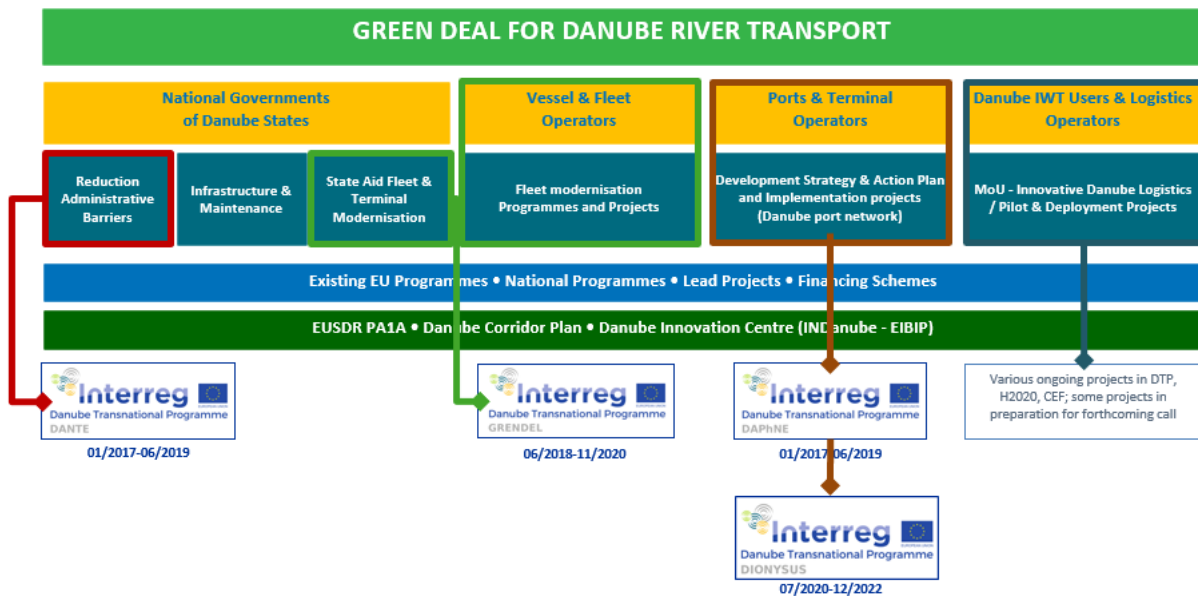
With GRENDEL having one of its core objectives to provide innovative financial instruments to efficiently and enduringly modernise the outdated Danube fleet, the project is integrated in the second pillar of Pro Danube’s Green Deal: vessel and fleet operators. The key element addressed by GRENDEL therefore refers to state aid schemes for fleet and terminal modernisation.

The advantages of developing projects based on existing policy frameworks are obvious: an existing framework provides a consistent information base for the policy-making process, project planning, initiation and, in the end, project implementation. Pro Danube’s Green Deal therefore stands for intensive and coordinated cooperation between public and private entities in providing consistent solutions for a sector not only challenged by low investment capacities, improper fairway

maintenance and underdeveloped port infrastructures, but also for a mode of transport heavily affected by the ongoing COVID-19 pandemic.

The following figure provides a detailed overview on the Green Deal for Danube River Transport, listing ongoing and already implemented projects that had a positive impact on the overall situation of IWT.

Figure 1. Green Deal for Danube River Transport



The aim of this chapter is to thoroughly analyse, discuss and present the current situation of IWT-related policies that shape the development of this sector.

5.1 Strategic position of IWT – challenges and opportunities

The development of inland waterway transport (IWT) on the Danube is a project that has to go beyond borders. Although tangible results were already achieved in the framework of relevant Danube Transnational Programme (DTP) projects such as DANTE and DAPHNE, the outstanding potential of IWT on the Danube and its navigable tributaries as an environmental-friendly and cost-effective mode of transport is by far not exploited at its full potential. Therefore, the strategic position of IWT must keep its crucial position on the European policy agenda and in the upcoming Multiannual Financial Framework 2021-2027.

Transport plays an essential role in the overall European integration process and is a shared competence of the EU and its Member States. European transport policies focus on overcoming obstacles between the Member States, having the core objective to create a single European transport area.

Transport directly affects the daily lives of European citizens and is a strategic sector of the European economy; it plays a key role in the future-oriented European Single Market, which main objectives are to promote economic growth, social well-being and increased competitiveness in a globalized society.

A comprehensive reflection on the importance of transport as a pillar of the Union's economy should however take the manifold negative effects it generates into consideration. Viewed from this perspective, it is a widely accepted fact that transport has a harmful effect on the environment. On the other side, growing transport activities support the increasing mobility demands of today's

societies and produce substantial socioeconomic benefits. The challenge therefore lies in Europe's capacity to further increase transport activities while at the same time taking concrete measures to reduce its damaging environmental footprint. The transportation sector is a major source for greenhouse emissions, being a significant contributor to global warming and noise pollution. It is a sector characterized by steadily increasing energy prices, being a large consumer of non-renewable resources. Increasing transport efficiency – both from economic and environmental point of views – largely depends on good governance practices and technological innovations.

Inland waterway transport has the potential to be a competitive alternative and an effective addition to rail, road and air transport, offering a reliable, sustainable and environmental-friendly mode of transport in terms of energy consumption, greenhouse emissions and noise pollution. It has to be furthermore mentioned that IWT is by comparison one of the most economical modes of transport with regard to infrastructure maintenance and related external costs. Additional crucial characteristics of IWT, as compared to other modes of transport, are low energy consumption, reduced noise pollution, superior level of safety, good reliability and high versatility (UNECE 2011: 8).

Due its obvious advantages, IWT should be a long-term priority beyond borders in order to achieve a truly sustainable transport system in Europe. Enhancing the modal share of IWT, efficiently integrating it in the transnational transport and logistics chains requires investments in adequate port infrastructure and in the modernisation of vessels. Limited investment capacities of vessel operators paired with the fact that technological innovations are much faster incorporated in road, rail and air transport than in IWT, is one of the biggest challenges waterborne transport has to cope with.

Increasing the operational efficiency of IWT relies on adequate investments in port infrastructure mainly in the lower parts of the Danube. A smooth transport flow along the Danube furthermore depends on the removal of some practical obstacles like different types of administrative barriers. These unnecessary bureaucratic procedures often result in time constraints that have negative effects on the service level of IWT.

5.2 Shaping IWT on the European level

The European Union has responded to the challenge of climate change by creating adequate policies that encourage the development of IWT as a reliable and eco-friendly alternative to other more polluting modes of transport. An important step in this direction was the publication of the **Transport White Paper**.

Released in 2011, the ambitious goal of the EU to profoundly change the European transport system by creating a Single European Transport Area and significantly reducing its environmental footprint cannot be achieved without further expanding the use of IWT for cargo and passenger flows. This major transport-related European strategic document furthermore emphasizes the need to create proper infrastructure to expand multimodality and as such to rely on more resource efficient modes of transport such as rail and waterborne.

The **NAIADES II** action programme (2014-2020) was released by the European Commission to facilitate through the extended use of IWT the implementation of the ambitious goals set by the Transport White Paper. The core objective of NAIADES is “to create the conditions for inland navigation transport to become a **quality mode of transport**: well-governed, efficient, safe, integrated into the intermodal chain, with quality jobs occupied by skilled workforce, and adhering to high environmental standards.” In order to enhance the competitiveness of IWT, interconnection and integration with other modes of transport is, rightfully acknowledged by the action program, of strategic importance. Prerequisites for the realisation of these ambitious goals are dedicated investments in specific waterborne infrastructure like ports, fairway maintenance and missing links

in the European Core Networks. Implementing the objectives of the NAIADES action program requires consistent and adequate financial resources. These resources are provided through EU financing by CEF for Infrastructure, Horizon 2020 for research, development and innovation, ERDF etc.

The active promotion of IWT has to continue after NAIADES II ends. Recognizing the multitude of positive effects of NAIADES II on the development of IWT, the European Parliament adopted early 2019 a Motion of Resolution to urge the European Commission to renew and update the NAIADES program by 2020 in order to ensure that IWT can be exploited at its full potential. The European Legislative called the Commission to ensure that the new NAIADES program receives adequate and dedicated funds to improve the overall situation of IWT in Europe.

Adopted by the European Commission in 2010, the main objective of the **European Strategy for the Development of the Danube Region (EUSDR)** is to address the challenges the region is facing in terms of societal and economic development. Dealing with strategic domains such as rail, road and waterway mobility, biodiversity & landscapes, sustainable energy etc., EUSDR aims to implement strategic projects that promote the overall well-being of the Danube Region's inhabitants. A dedicated priority area (PA) deals with the enhancement of IWT in the region.

With the Danube being the economic backbone of a region that is characterized by different stages of regional development, **PA 1A Waterways Mobility** strives to significantly increase cargo transport on the river, reduce navigability obstacles in terms of fairway maintenance, modernise the Danube fleet and the related waterborne infrastructure. Multimodality, harmonized River Information Services (RIS), removal of administrative bottlenecks and transnationally accepted education standards in inland navigation are further targets of the ambitious goals set by PA 1A.

Equally important for the policy frameworks that currently shape the future of waterborne transport in Europe is the **Non-Road Mobile Machinery (NRMM) Directive**. This crucial piece of legislation is in effect since 01 January 2017 and has manifold effects on both EU citizens and on the development of the Internal Market. Its core objective is to progressively and enduringly reduce the harmful effects of pollutant emissions on the environment and consequently on the population's health. This will be achieved by phasing out equipment with the most pollutant engines. Non road mobile machinery refers to any mobile machine, transportable equipment with or without bodywork or wheels. The list includes – but is not limited to – generators, mobile cranes, pumps, construction machinery, industrial trucks etc. The directive is of vital importance in the modernisation process of the Danube fleet.

The core objective of the GRENDEL project is to create a widely harmonised and accepted State Aid Scheme on the transnational level in order to provide attractive financial incentives to operators in adapting their fleet to the needs and requirements of a future oriented environmental-friendly transport system. This ambitious endeavour must be shaped according to the strict requirements set by the NRMM directive.

Released by the new European Commission in December 2019, the **European Green Deal** provides an ambitious roadmap with concrete actions to stop climate change. It covers all sections of the economy. With transport being a massive polluter, the document makes a plea to encourage the development of IWT in Europe and to efficiently integrate it in the intermodal transport and logistics chains. Inland waterway transport will therefore play a major role in overcoming the massive challenges Europe will face in the long run.

6 Danube fleet modernisation - challenges and strategy

Adapting the severely outdated Danube fleet to the specific needs and requirements of a future-oriented, multimodal and efficient transport system is an endeavour that has to go beyond borders. Since the average age of inland vessels is above 30 years, modernising the Danube fleet is no longer an option, but a must. It is therefore of utmost importance to propose harmonised solutions on the transnational level that enhance the potential of IWT as a reliable, safe and economically viable mode of transport.

The Danube Fleet Modernisation Strategy proposed by GRENDEL will identify and analyse specific challenges faced by IWT and develop customized actions, solutions and recommendations to overcome them in a well-defined and coordinated manner. The main challenges discussed in the framework of this document refer to the greening process of inland vessels and the efficient integration of IWT in the multimodal transport and logistics chains.

6.1 Challenge 1 Environmental quality through low emissions

The Danube Fleet Modernization Strategy builds on a variety of guidelines, visions, declarations and legislation which address the ambitious transition towards a zero-emission and climate neutral economy. These documents are crucial in paving the way for the efficient implementation of the strategy proposed in the framework of GRENDEL.

Decarbonization is one of the main challenges that a future oriented European transport system must cope with. According to the **UN Climate Change Conference** held 2015 in Paris, the short-term climate and energy objective of the European Union is to significantly reduce greenhouse gas emissions by at least 40% by 2030 compared to 1990. With the transport sector being a major contributor to climate change representing almost a quarter of Europe's greenhouse gas emissions, IWT can play a major role in reducing the sector's overall environmental footprint.

The European Union released in 2018 a strategy entitled **A Clean Planet for all**. This document represents the EU's long-term vision for a prosperous, modern, competitive and climate neutral economy by 2050. The strategy explores how this ambitious goal can be achieved by examining the key sectors of the European economy like energy, transport, industries and agriculture. Given the increased mobility needs in today's globalized society, all transport modes – rail, air and waterborne – need to contribute to the decarbonization of the transport system. In this sense, targeted investments in the development of new technologies and an efficient reorganisation of the entire transport system are pointers to future directions which might further enhance the effectiveness of the sector as a vital component of the European economy. Digitalisation plays in this regard an indispensable role.

This long-term vision to significantly reduce greenhouse gas emissions by 2050 is the cornerstone of the **European Green Deal** and is in line with the EU's commitment towards the goals enshrined in the **Paris Agreement**. In its capacity as a global player in terms of climate protection, representing one of the most prosperous economies worldwide, the EU has vowed to cut CO₂ emissions in a cost-effective and efficient manner, without a negative impact on economic performance and industrial competitiveness. In order to achieve this goal, promoting innovation and low-carbon technology in all facets of the economy is of utmost importance. A fundamental step in this direction lies in the EU's and its Member State's capacity and willingness to accelerate the development and diffusion of new breakthrough technologies.

An equally important aim at the transnational level is to improve air quality. The EU has adopted in this regard a wide range of legislative tools to monitor air pollution, control emission sources and, if

necessary, to ensure that adequate measures are taken in order to comply with air quality standards. In this sense, the 2018 adopted **Communication on Clear Air for all**, adopted by the EC, details the steps that need to be taken in order to improve air quality. With the transport system being a major contributor to air pollution, directly affecting the health of European citizens, the document contains dedicated sections dealing with this issue. Both the Mobility Packages – a dedicated set of policy initiatives concerning the governance of road transport in the EU – and the pillars of EU policy defining air quality standards, are briefly described. Noteworthy to mention is the third pillar – comprising emission standards for key sources of pollution, from vehicle and ship emissions to energy and industry.

Another important topic as highlighted in the Commission’s aim to adapt the transport system to the requirements set by the European Green Deal and moreover by the more stricter climate target for 2030 as announced by EC’s President Ursula von der Leyen – to reach an EU-wide greenhouse gas emission reduction by at least 55% instead of 40% compared to 1990 levels – the **Sustainable and Smart Mobility Strategy** plays in times of the COVID-19 outbreak a central role. The Strategy will “(...) set a pathway for the sector towards the sustainable and digital transitions, building a resilient and crisis-proof transport system for generations to come and delivering on the ambition set out in the European Green Deal and Europe Fit for the Digital Age Communications.”¹ With IWT being an unrivalled transport system in terms of energy efficiency, sustainability and greenhouse gas emissions, becoming more efficiently integrated into the new “digital age” is a prerequisite in order to be able to compete for emerging markets with other modes of transport. Pro Danube International, in its capacity as the sector’s representative, provided, based on discussions held with Danube IWT businesses, feedback and input in the preparation phase of the strategy.

It is a widely acknowledged fact that IWT is characterized by its reliability, energy efficiency and relatively low infrastructure maintenance costs. Compared with other modes of transport, IWT is not confronted with congestion, has a superior exploitation capacity and a low environmental footprint. In view of this obvious advantages, measures in order to increase IWT’s role in fighting climate change must be further strengthened. Therefore, the **International Ministerial Conference on Inland Water Transport** held 2018 in Poland plays a significant role in shaping IWT’s position on the transnational policy agenda. It furthermore gives more impulse to appropriate measures for the promotion of IWT while acknowledging that efficiently integrating IWT in the transnational transport and logistics chains is an endeavour that has to go beyond borders. Equally important for IWT’s role on the transnational policy agenda is the **Danube Ministers of Transport Conclusions on effective waterway infrastructure rehabilitation and maintenance on the Danube and its navigable tributaries**. This document, adopted in March 2020, is a reinforcement of the Ministries of Transport commitment (apart from Hungary) to significantly improve navigation conditions on the Danube and its navigable tributaries.

As already mentioned, and briefly described in a previous chapter of this strategy, the **European Green Deal**, released shortly after the newly elected European Commission took office, is a more than ambitious long-term vision to make Europe climate neutral by 2050. The core idea behind the document is to reconcile the development of a vast, prosperous economy with climate neutrality. It clearly identifies the key areas that drive emissions and proposes a roadmap with actions towards the use of renewable sources of energy in order to reduce pollution. Being a rather broad legislative vision towards CO₂ neutrality, the ambitious Green Deal remains rather vague in terms of its concrete

¹ <https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12438-Sustainable-and-Smart-Mobility-Strategy/public-consultation>, accessed on 02.10.2020

implementation. Unlike the Green Deal, the recently published **European Climate Law**² has an EU-wide legally binding character, if adopted. It addresses the necessary steps and a well-defined trajectory to reach climate neutrality by 2050. With the Regulation still having to pass the ordinary legislative procedures, it remains to be seen whether it will have the intended effect of being a major instrument for the complex implementation process of the European Green Deal.

Even though published well before the European Green Deal, the **NRMM Regulation** can be regarded as a vital step in reaching climate neutrality. As was already described in the framework of this strategy, the regulation introduces strict emission requirements of non-road mobile equipment, having a huge impact on the future development of the inland shipping industry. This legislative act is therefore directly linked with the objective of reaching 0 emissions in the foreseeable future. However, since the actual number of new engines entering the market is relatively low and technological innovation in IWT is compared to other modes of transport underdeveloped, this highly disputed regulation has a rather limited effect on the modernisation of the fleet. Several voices representing the IWT sector have even expressed their concern related to the actual effects of NRMM on the overall business development capacities of the sector: with an industry lacking the capacity to make considerable investments in a technological outdated Danube fleet, with currently no existing financial incentives in force to encourage the retrofitting or the acquisition of new vessels, the future of IWT doesn't look promising at all. Therefore, in order to achieve the expected positive effects of the NRMM Regulation on the shipping industry without hampering its development, providing adequate financial incentives to promote the proper integration of IWT in the intermodal transport and logistics chain is of crucial importance. GRENDEL, by providing a widely harmonised Model State Aid Scheme on the transnational level, makes in this regard a major step forward.

Last but not least, the **Mannheim Declaration**, adopted in October 2018 by Belgium, Germany, the Netherlands, France and Switzerland plays – even though not being legally binding, a vital role in the overarching objective to modernise the IWT fleet beyond regional border. The signing countries commit themselves to enduringly contribute to the reduction of greenhouse gas emissions and to facilitate herefore the ground for better coordination between national and transnational development programmes.

Unlike vehicles in other modes of transport, inland vessels have a lifecycle that is measured in decades – usually between 30 to 50 years. This involves high costs not only for building them, but also to maintain, repair and operate them throughout their service life. Major costs furthermore occur through constant changes in rules and regulations. This requires significant retrofitting costs that may additionally increase the actual costs of a ship's longevity. A good example for such a development is the introduction of the NRMM Regulation. Even though the aim of this regulation is to increase the environmental performance of inland vessels and other non-road mobile machineries, it poses a serious financial challenge, since it forces ship owners to invest a considerable amount of money in their existing fleet in order to adapt it to the new legal requirements. Already heavily affected by the ongoing COVID-19 crisis, with no considerable financial incentives for fleet modernisation or acquisition currently available, the investment capacities in the Danube Region have to be regarded as low to non-existent.

Noteworthy to mention is further the fact that there is currently no clear vision yet on fuels of the future that have the capacity to fully comply both from the economic and environmental point of views with the strict requirements set by the Legislator. The challenge therefore lies in the capacity to find a proper solution that is compatible with both economic and environmental aspects.

² The European Climate Law was presented by the European Commission on 4 March 2020. It is currently (October 2020) undergoing the ordinary legislative process at EU level.

6.2 Challenge 2 Integration of inland waterway transport into the multimodal logistics chains

In order to efficiently use IWT as a safe, reliable and environmental-friendly alternative to other more polluting modes of transport, successfully integrating IWT into the multimodal transport and logistics chains is an indispensable prerequisite. This chapter is based on the findings made in the framework of the project.

One of the objectives of the GRENDEL project is to improve transport & logistics management processes of fleet operators making use of digitalization and considering available tools and services, including RIS, as well as future requirements derived from modern global logistics. The GRENDEL project therefore proposed concrete actions and measures based on the current European legislative framework to secure a more efficient integration of IWT into multimodal transport and logistics chains and as such to set the ground for a more competitive mode of transport that has the capacity to respond to the needs and requirements of emerging markets.

The European Council adopted the following conclusions on digitalisation in early 2018, underlying the vital importance of this issue for the Single Market and as such for the general European economy and its competitiveness. It furthermore plays a central role for Europe's place in a globalized economy. The conclusions envisage the following:

- Comprehensive and multimodal digitalisation strategy for the transport sector;
- Importance of the GDPR for the transport sector;
- Impact of automation and digitalisation of transport on society;
- Continuation of the work of Digital Transport and Logistics Forum (DTLF);
- Encourages railway, logistics, maritime and the inland waterway transport sectors to share data.

6.2.1 Digitalisation – framework and specific challenges in IWT

Digitalisation is considered an important driver in simplifying administrative procedures and increasing efficiency. It has the potential to considerably reduce costs and to make a more systematic use of the existing resources and infrastructure. Moreover, digitalisation sets the ground for the development or expansion of new businesses, it makes IWT more attractive and improves the transport flow on inland waterways.

The main pillars of digitalisation in European IWT are the following:

- **River Information Services**

The RIS Directive establishes a framework for the deployment and use of harmonised, interoperable and open River Information Services (RIS). It requires Member States to develop and implement RIS in an efficient, expandable and interoperable way and to provide interfaces with transport management systems and commercial activities. Member States must provide RIS users with the data necessary for voyage planning, electronic navigational charts for waterways and notices to skippers shall be provided as standardised, coded and downloadable messages. In line with the RIS Directive, the Commission laid down technical guidelines and specifications for RIS through five implementing acts.³

³ Commission Regulation (EC) No 414/2007 concerning the technical guidelines for the planning, implementation and operational use of RIS; Commission Implementing Regulation (EU) No 909/2013 on the technical specifications for the electronic chart display and information system for inland navigation (Inland ECDIS); Commission Regulation (EU) No 415/2007 concerning the technical

- **Digital Inland Navigation Area (DINA)**

DINA is a concept which aims to interconnect information on infrastructure, people, operations, fleet and cargo in the inland waterway transport sector and to connect this information with other transport modes.

- **Digital Transport and Logistics Forum (DTLF)**

The DTLF is a group of experts that brings together stakeholders from different transport and logistics communities, from both the private and the public sector, with a view to build a common vision and road map for digital transport and logistics. The DTLF also contributes to identifying needs for measures at EU level and supporting their development and implementation where relevant.

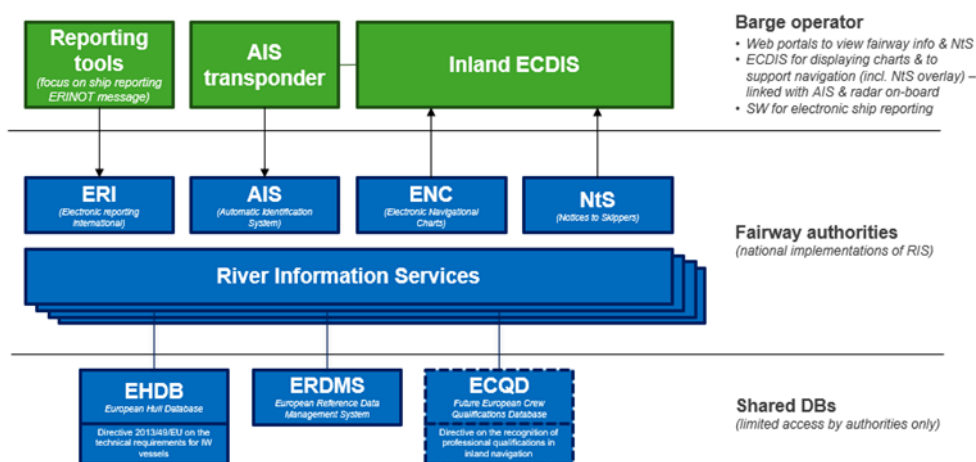
- **CEF Building Blocks**

The CEF Building Blocks are tools consisting of eID, eSignature, eDelivery, eInvoice and eTranslation which aim to ensure interoperability between IT systems and to facilitate the delivery of digital public services across borders, while the relevant rules and regulations (e.g. the eIDAS Regulation and the GDPR) are fully complied with.

6.2.1.1 River Information Services

River Information Services have been developed with a view to providing telematics systems Inland AIS in order to enhance safety of traffic and establishing comprehensive information services (inland ENCs, fairway information systems, notices to skippers, etc.) in order to increase efficiency of inland waterway transport. The figure below provides a simplified overview of the current RIS System.

Figure 2 Current RIS system (simplified). © DINA (with input from INDanube & PDM)



specifications for vessel tracking and tracing systems (as amended by Commission Implementing Regulation (EU) No 689/2012); Commission Regulation (EU) No 164/2010 on the technical specifications for electronic ship reporting in inland navigation (as amended by Commission Implementing Regulation (EU) 2019/1744); Commission Regulation (EC) No 416/2007 concerning the technical specifications for Notices to Skippers (as amended by Commission Implementing Regulation (EU) 2018/2032)

6.2.1.2 Legal challenges in the data sharing process

In order to efficiently implement digitalisation in IWT, several legal aspects must be taken into consideration. Based on the findings of DINA, several bottlenecks have been identified:

➤ Privacy legislation

- European Hull DB (EHDB): underlying regulations prohibit data sharing with 3rd parties (only fairway authorities and other actors specified in the service agreement for EHDB).
- Location: skippers & crew living on the vessel. In this case the position is not considered personal data (acc. to EU Data Protection Directive 95/46/EG), BUT it can be considered as such when linked to other identifying info about persons on-board.
- Crews & their qualifications: IWT workers' qualification directive "(...) *personal data may be processed only for the purposes of implementation, enforcement and evaluation of the directive and exchange of information between the authorities and producing statistics.*" This means that the re-use of data for other purposes or controlled sharing with third parties is not foreseen.

➤ Commercial sensitivity

- RIS directive "(...) *the introduction of RIS should not lead to uncontrolled processing of economically sensitive data relating to market operators*" (e.g. to traffic patterns and individual voyages and calls in terminals. Fairway authorities can collect this data for VTT purposes, but it is not intended to share this data with third parties).

➤ Liability

- Based on voyage plans & traffic patterns it is possible for a fairway authority to calculate ETAs or schedule lock operations. However, delays may happen, and potential providers of such services want to limit liability or are reluctant to share such data at all.

➤ Commercial agreements

- Customer-supplier specific agreements require certain level of confidentiality regarding details of the cargo carried and the specific customer served.

6.2.2 Digital Inland Waterway Area

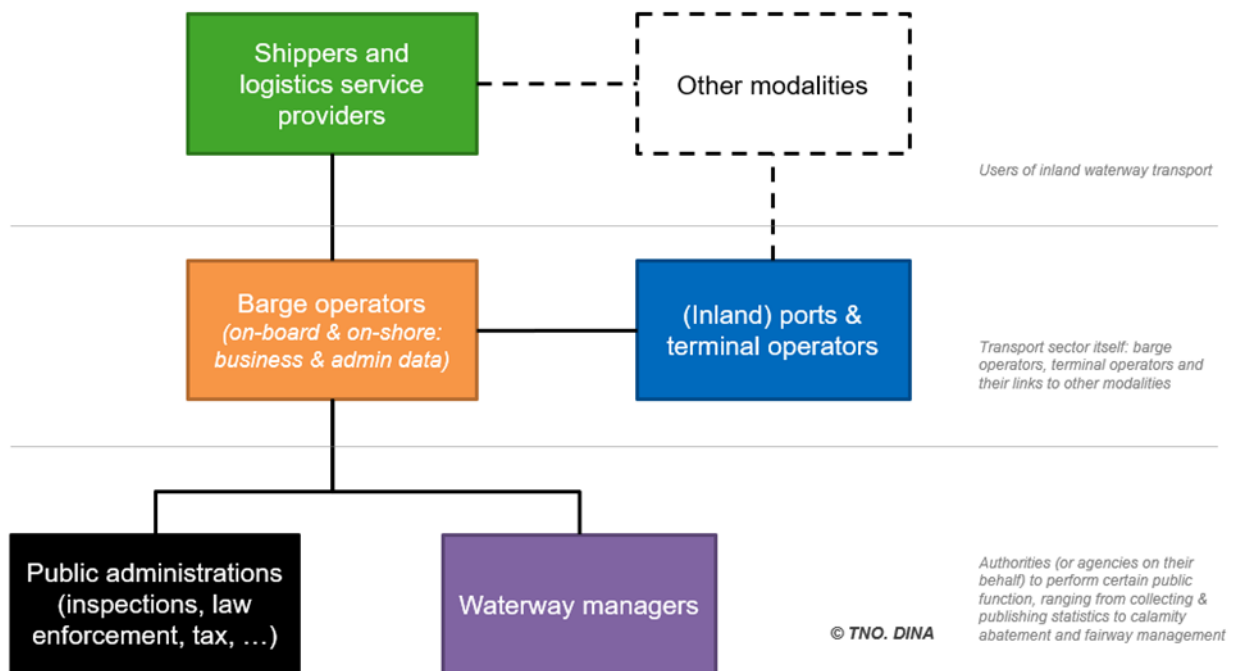
The "**Digital Inland Waterway Area - Towards a Digital Inland Waterway Area and Digital Multimodal Nodes**" study was finalised in October 2017. The study helps to frame the discussion on the digitalisation of the inland waterways transport sector. DINA is a concept which aims to interconnect information on infrastructure, people, operations, fleet and cargo in the inland waterway transport sector and to connect this information with other transport modes.

DINA identified three areas where digitalisation is critically important for IWT:

1. The improvement of navigation and management of traffic: this is necessary to make more efficient use of the capacity of the infrastructure and to reduce fuel costs for vessel operators.
2. The integration with other modes of transport, especially in multimodal hubs: this is necessary to optimise processes in terminals and to allow for improved integration of IWT in supply chains and multi-modal logistics operations, thereby potentially attracting additional customers.
3. A reduction of the administrative burden: reducing the number of business-to-government declarations (thereby saving costs & improving efficiency) and making law-enforcement more efficient and effective.

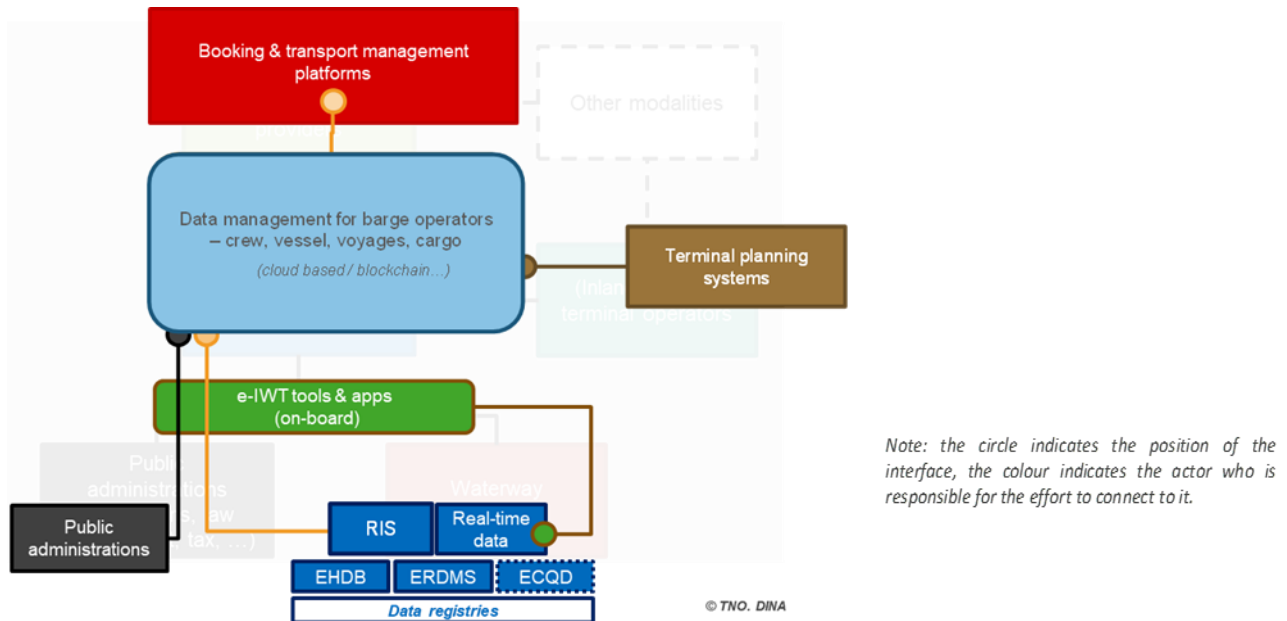
The following figure provides an overview on the involved actors in the digitalisation process of IWT:

Figure 3 Overview of the actors involved in the digitalisation of IWT. © TNA. DINA



The following figure provides a precise overview on a proposal that provides a controlled sharing of information which can serve as a platform for future developments:

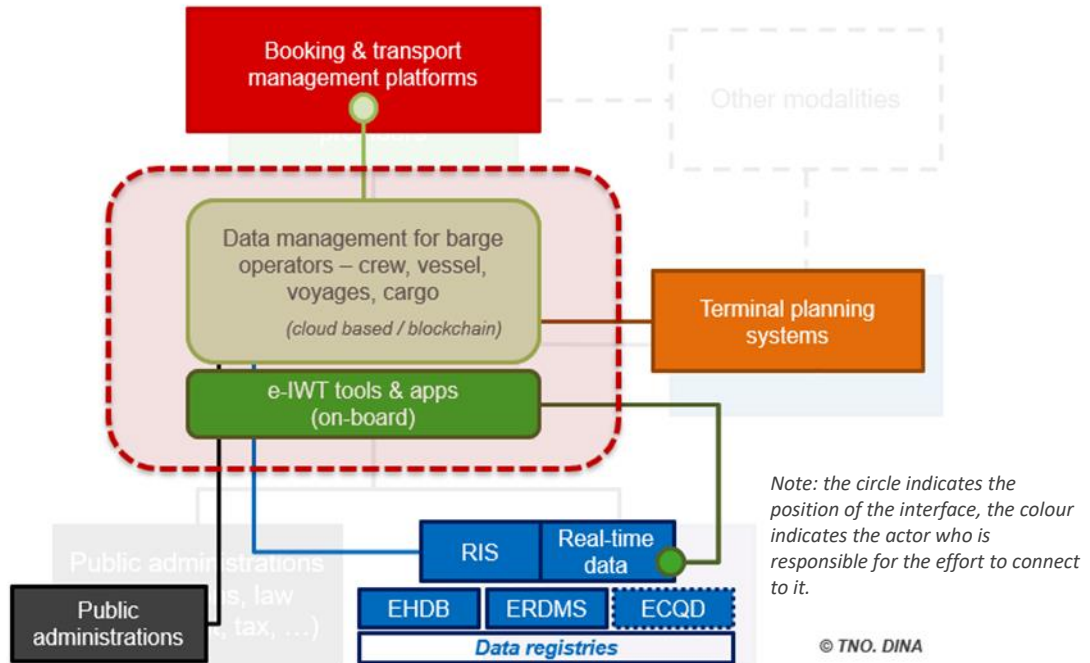
Figure 4 DINA architecture (1). © TNO. DINA



The proposal for future developments can be summarized as follows:

- **An extension of RIS:** providing additional (real-time) data between infrastructure managers and barge operators, making it more interoperable and useable for barge operators using new on-board e-IWT tools and applications.
- **Data platform(s) for barge operators:** allowing them to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals.
- **Integration with booking and transport management platforms** of shippers and logistics service providers. This should provide better visibility and better integration of IWT in the full logistics chain covering multiple modalities.

Figure 5 DINA architecture (2). © TNO. DINA



- **A data platform for barge operators:** allowing them to control their own data and operations. This should allow barge operators to share data in a controlled way with other stakeholders such as public authorities (for reporting purposes), (inland) ports and terminals.

6.2.3 Specific requirements and logistics processes of the representatives of fleet operators

In order to have the digitalisation providing tangible benefits to the fleet operators and the crew, services (also based on River Information Services) of added value shall be provided. The following tables summarise the respective requirements of some representative fleet operators:

Figure 6 Use cases modelling (1)

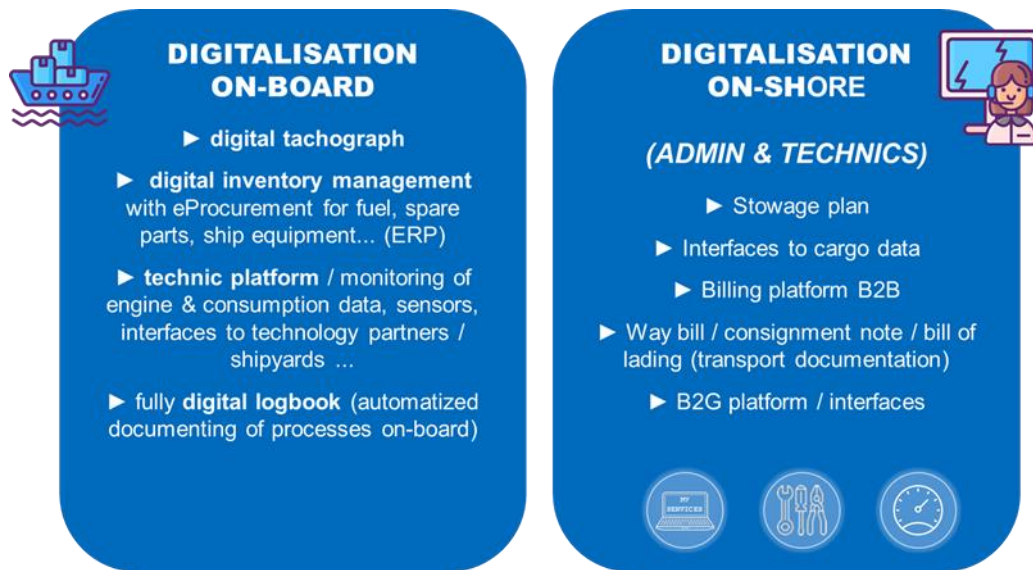
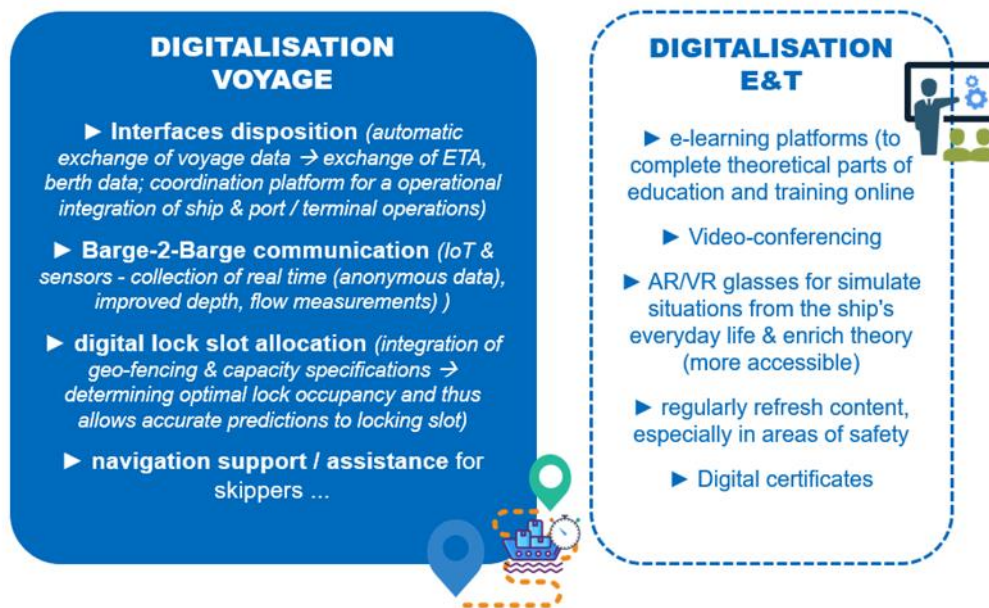


Figure 7 Use cases modelling (2)



An ideal data platform, containing the information about the crew, cargo, vessel and voyages, acts as a digital backbone for logistics processes involving IWT. It shall not only contain necessary data, but it shall also support the enterprise resource planning and fleet management processes in order to provide state of the art complex logistics solutions for the customers. Such a platform shall focus on the following aspects in line with the administrative and commercial requirements in international logistics:

- ▶ Commercial aspects covering
 - Order management,
 - Cargo management.

- Technical aspects (vessel operation and maintenance) addressing technologies used onboard, vessel operation related activities and supply, service and maintenance.
- Operational aspects
 - Voyage planning and voyage execution/navigation.
- Administrative processes like human resources, accountancy
 - Crew/Human resource management,
 - Financial management/invoicing.

In an ideal case, when the sector is provided with such a package of services, most probably more cargo can be attracted to Danube IWT and processes can be made leaner, thus a major step can be done towards greening the Danube fleet and the overall logistics processes.

6.2.4 A new challenge: the COVID-19 pandemic and its opportunities

The IWT sector continues to report uncertainty about its future as the COVID-19 pandemic continues, currently with no end in sight, to spread across the world. Never before has Europe – since the end of World War II – seen governmental restrictions causing such profound impairments on economic operations and on societies. Aspiring to reduce the effects of the COVID-19 virus spread, governments have imposed a series of restrictions that had a direct impact on the transportation of goods and passenger.

Regarding the IWT sector, both passenger and cargo transportation were heavily affected, with cargo not having the time to fully recover after the draught of 2018. Limiting as far as possible the economic crisis of the sector is therefore crucial in order to secure its future. Providing widely harmonised legal certainty across border is crucial in securing a smooth transnational transport flow in times of restrictions imposed by the pandemic.

The aim of this subchapter of the strategy is to propose concrete actions and measures that take this specific economic environment caused by the aforementioned restrictions into consideration. With regard to IWT on the Danube and its navigable tributaries, 3 basic solutions that would provide more certainty for businesses operating on the Danube as well as for ports and industries that rely on this mode of transport, should be taken into consideration:

- **Uniform regulations for the exchange of crew members:** the specific character of the Danube as an international waterway that connects Western Europe with Central-East Europe culminating at the maritime Port of Constanta in Romania, should be regarded as a unique strength of IWT in the region. Therefore, the exchange of crewmembers on transnational voyages should not be hampered in any way. This should be performed as under normal conditions with a close eye on safety requirements as proposed by health management authorities.
- **Keep border control locations as in regular conditions:** it is more than ever important to continue the implementation process of the DAVID forms. This will considerably ease the international transport flow on the Danube and significantly reduce its transportation times. Moreover, based on the “**Same River, Same Rules**” concept developed by Pro Danube International, with the DANTE project having its core objective to facilitate its

implementation, administrative procedures should be enacted in a way to support and not to hamper the transportation process on the Danube.

- **Europe-wide harmonized approach for the cruising and shipping industry:** an Europe-wide accepted and implemented guideline that proposes concrete actions and measures to limit the harmful economic effects on Danube IWT business due to the COVID-19 pandemic as well as well-defined financial measures to support the recovery of the sector and its adaption capacity to the ambitious climate policy of the EU is of utmost importance.

With IWT having a crucial role to fulfil in the Danube Region in terms of social and economic welfare, the COVID-19 pandemic could also have, on the long-term, a beneficial impact on the sector: it might speed up technology uptake. This could result in a swift implementation of innovative financial instruments or – as currently debated on the EU-level – to provide the sector with dedicated funds to modernise vessel and to further develop the infrastructure.

In order to respond to the economic and social damage caused by the pandemic, the European Commission proposed a long-term EU budget, boosted by a recovery instrument, to overcome the immediate effects caused by the crisis. The proposal made by the Commission “(...) will power a fair socio-economic recovery, repair and revitalise the Single Market, guarantee a level playing field, and support the urgent investments – in particular in the green and digital transitions – which hold the key to Europe’s future prosperity and resilience.”⁴ This Recovery Fund was negotiated together with the new EU budget 2021-2027 (the Multiannual Financial Framework - MFF). The agreement reached between the EU Member States provides for a total of 750 billion, made up of €390 billion in grants and €360 billion in loans.

The European Commission, in its official Communication, recognizes the crucial role played by transport during these unprecedented times of crisis and the importance of uninterrupted transport and logistic chains across the Union. It therefore proposes that the future EU budget has dedicated funds – via CEF and Horizon – foreseen for the deployment of sustainable vehicles, vessels and alternative fuels.⁵ Even though the proposed budget has up until now (as of October 2020) not yet passed the ordinary legislative process at EU level as the European Parliament has a binding say over the deal reached by the EU’s heads of state and government - it nevertheless has to be regarded as a unique chance to attract adequate funds for the overall modernisation process of IWT. This process should not limit itself to vessel modernisation, but also take infrastructure and fairway maintenance issues into consideration.

The COVID-19 pandemic is furthermore expected to have a direct impact on the overall management of state aid schemes, with the European Commission prolonging and extending the scope of the **State Aid Temporary Framework**⁶ to support economic recovery. It is therefore highly recommended that IWT companies affected by the governmental restriction measures imposed to overcome the crisis, have a close eye on the developments in their EU member states.

⁴ https://ec.europa.eu/info/strategy/eu-budget/long-term-eu-budget/2021-2027_en, accessed on 12.10.2020

⁵ COM (220) 456/27.05.2020, page 7

⁶ https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1872, accessed on 19.10.2020

7 Recommendations

Based on the challenges presented in the framework of this strategy and based on the identified solutions to overcome them in a well-defined and coordinated manner, this chapter will provide a concise list of recommendations to enduringly improve the overall situation of IWT, with a special focus on fleet modernisation.

This strategy focused on two main challenges that lie ahead of an efficient integration of IWT in the transnational chains of transport and logistics. The first challenge that was described and analysed in detail and focused on the environmental quality of IWT. Based on the assumption that IWT is, compared to other modes of transport, by far the most environmental friendly mode of transport, this chapter analysed the current state-of-the-art **developments in matters of legislative acts** that pave the way – according to the “Green Deal” policy framework adopted by the European Commission – towards climate neutrality. The second challenge focused on the **efficient integration of IWT in the multimodal logistics chains**. This second part of the analysis provided an overview on digital solutions that boost the long-term efficiency of transport processes. The in-depth analysis gave a clear image on both challenges, identifying solutions to improve the overall situation of IWT and adapt it to the needs and requirements of potential new markets. Based on this inquiry, this chapter results in concrete recommendations, as follows:

- The legislative framework developed at the European level sets strict limits in terms of harmful emissions. As is the case for other modes of transport – IWT has to adapt to these requirements. However, in the case of IWT (especially in the Danube Region), adapting the fleet to the strict provisions set by the European Legislator is a problematic issue. In Central and East European countries, including the Danube Region, there are – apart from the Czech Republic – currently no financial incentives in place to boost fleet modernization. Furthermore, as was argued in the framework of this strategy, incorporating new technologies in IWT is, compared to other modes of transport, a slow process. Therefore, it is of utmost importance to:
 - have at the earliest opportunity all the necessary legislative acts passed the ordinary legislative process at EU level;
 - these acts have to reflect a harmonised technical and environmental legal framework on the **corridor level to ensure levelled playing field**;
 - incorporate them as soon as possible in the national legislative framework, preferably in the early stages of the new MFF 2021-2027;
 - after having passed these milestones, **use the Model State Aid Scheme** developed in the framework of GRENDEL as a basis for the development of national state aid schemes. While keeping the state aid scheme as harmonized as possible, it should nevertheless be adapted to the specific administrative prerequisites existing on the respective national level. The funding of the scheme should, at least in the lower parts of the Danube riparian countries, be provided by ERDF funds (Regional Operational Programs, Large Infrastructure Operational Programs etc.);

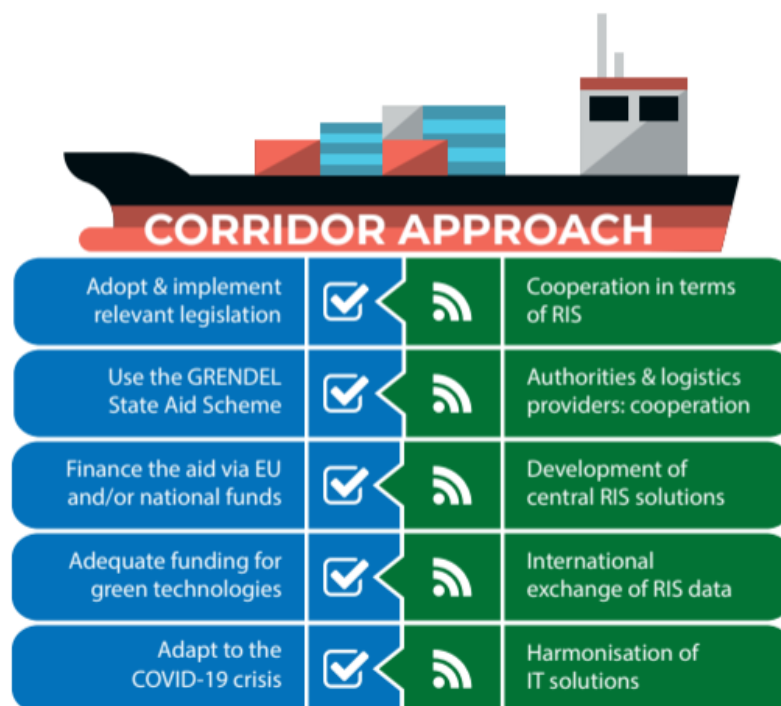
- with the general provisions governing state aid schemes due to the COVID-19 pandemic, it is strongly recommended that stakeholders keep a close eye on any kind of measures taken in their countries to ease compensation payments;
 - of similar importance is to ensure a continuous follow-up on the developments reached in the implementation process of the Recovery Fund.
 - The **NRMM Regulation** serves as a guideline to operators, designers and equipment manufacturers through the **transition stage**, having the end-goal of **zero-carbon emission transportation**, an issue clearly stipulated in the European Green Deal.
 - While fuels or new technologies are being developed, what needs to be done now is raising awareness towards modern fuels. This can be done by supporting first movers.
 - The retrofit solution for this transition stage is feasible, as proven by the SDG concepts and reports, and it is a lot cheaper than a new build. Although still a significant financial investment, this solution can help vessel operators **remain financially competitive** until infrastructure for modern fuels is developed and **investment opportunities** towards new builds are made available.
 - **Exhaust after-treatment systems and LNG new-builds** should clearly be stated as **transition-stage solutions** for vessel operators looking towards the modernisation of their fleet, with emphasis on the fact that concept designs are available and there is sufficient know-how from the designers' and engine manufacturers' side.
- As was argued in the framework of this strategy, efficient integration of IWT in the multimodal logistics chains is favored to a large extent by digitalization. Several initiatives have been promoted in this regard at the European level. Digitalization may furthermore be regarded as a way to reduce the impact of the COVID-19 pandemic on the sector by reducing, as far as possible, human contact on transnational voyages. Moreover, digitalisation makes IWT a more accessible mode of transport and provides the ground for the development of smart and sustainable jobs. Based on the findings of this strategy, the following recommendations are made:
- **Continuous cooperation** of the Danube riparian countries involved in RIS;
 - **Continuous cooperation** between relevant national authorities and logistics providers;
 - **Promotion** of national best practices promoted on the transnational level;
 - Development of central, standardized and harmonised **RIS solutions to ensure the corridor approach**;

- All Danube riparian countries should participate in the **international exchange of RIS data** with special focus on position and electronic reporting data;
- All Danube riparian countries should **connect to the European Hull Database**;
- **Harmonisation** of the available IT solutions at the transnational level.

Last, but not least, it is of utmost importance to facilitate the cooperation process between sector representatives, national and European political decision-makers as well as water management authorities at the national level.

The following figure provides an overview on the recommendations made in the framework of this strategy:

Figure 8 GRENDEL Recommendations



7.1 European context

The results of the GRENDEL project have to be positioned in the larger European scale in order to achieve Europe-wide harmonised solutions in the field of fleet modernisation and greening. Project partners during GRENDEL have already promoted the Danube needs on this level in the discussions on the strategic and policy level with DG MOVE (NAIADES 3 preparations), other branch organisations, private and public stakeholders.

The findings were aligned with the currently ongoing studies (e.g. the [CCNR studies on energy transition towards a zero-emission inland navigation sector](#)) and other initiatives & projects, such as [STEERER](#) in Horizon 2020. Continuous co-operation is established with the EUSDR PA1a in order to raise the uptake level of the GRENDEL results that is taking place in the [Strategy on fleet modernisation](#).

In order to respond to the Green Deal and Digital Europe initiatives of the European Commission, the sector formulated two focus areas in the above document:

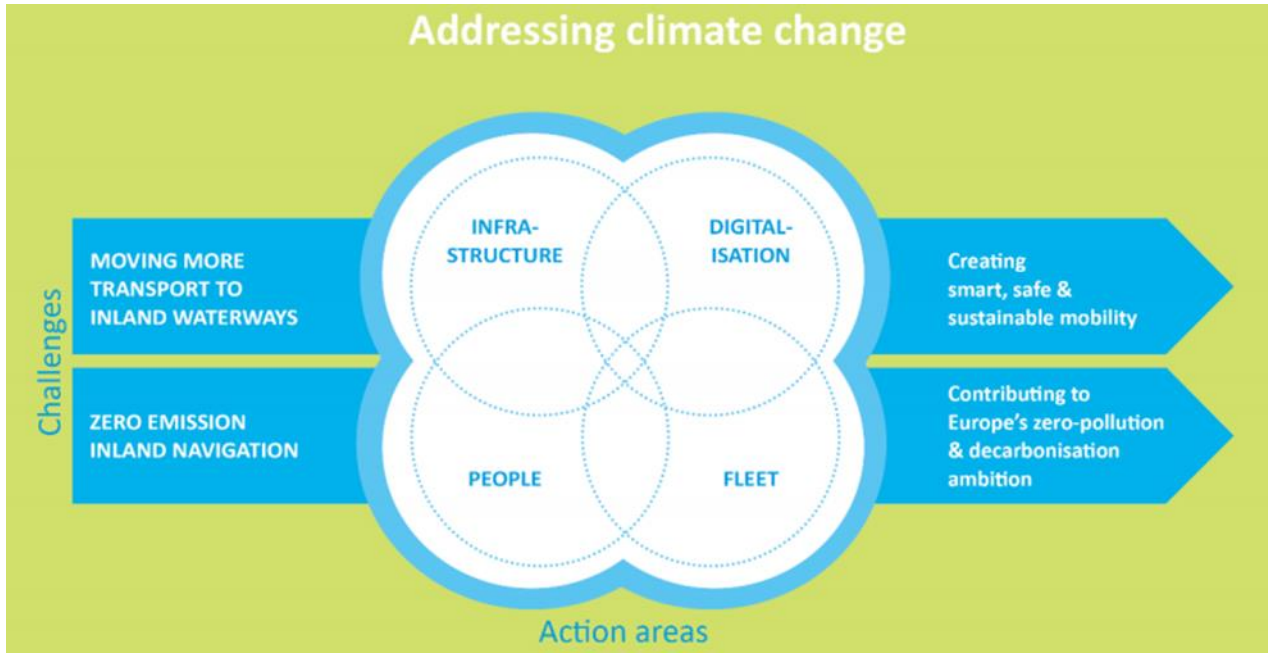
1. **MOVING MORE TRANSPORT TO INLAND WATERWAYS** – Creating smart, safe and sustainable mobility by making inland waterway infrastructure and shipping fit-for-future and by integrating inland navigation into multimodal mobility of people and freight so inland waterway transport unfolds its full potential. This shall ultimately lead to an increase in the modal share of inland waterway transport, a reduction of road congestion, safer and more reliable transport, quality jobs and a more sustainable transport system as a whole;
2. **ZERO-EMISSION INLAND NAVIGATION** - Contributing to Europe's zero-emission and decarbonisation ambition embedded in a coordinated transport and energy policy to pool resources among energy and transport actors to operate on renewables and supply clean fuel to transport, households and industries. Inland navigation is ideally placed to do so, as it is most energy-efficient, a pre-requisite for decarbonised and zero-emission systems.

The main action areas in which to tackle the two core challenges mentioned above were identified during the brainstorm session of the Naiades II Implementation Expert Group on 9 September 2019 (where PDI has also inputted the sector needs identified in the Danube Region towards all perspective, including digitalisation / RIS):

1. People: create an attractive workplace with high social, qualification, safety and security standards;
2. **Fleet: enable the transition towards zero-emissions and decarbonisation of the fleet while safeguarding competitiveness and safety;**
3. Infrastructure: achieve the continuous and reliable navigability of the trans-European inland waterway network and ensure swift links to other modes while assuring sustainability of infrastructure, protecting the environment and adapting to climate change;
4. Digitalisation: develop and use digitalisation as an instrument to support the developments towards smart and sustainable jobs, fleet and infrastructure connected to other transport modes and sectors.

The action areas are intertwined, hence an integrated approach is required in order to reach results. This approach can be illustrated via the following scheme:

Figure 9 Addressing climate change. © Naiades II implementation expert group



For each of the challenges, ambitions towards 2050 and activities in priority action areas for the period 2020-2027 have been outlined. For fleet modernisation the following is recommended:

A modern, cost efficient fleet forms part of a climate resilient inland waterway transport. Vessel design reflects changed climatic circumstances and their impact on the waterways and increases the reliability and usability of inland waterway transport. If new constructive developments are to be tested, lean administrative practices provide for real world test beds if necessary. Fast and simple procedures are in place for innovative vessels and new approaches to technical regulation have been evaluated so that data and statistics – contrary to a descriptive approach – find their way in technical regulation.

7.2 GRENDEL – uptake of the results

The following table displays an overview on the current status of supported measures in Danube countries as proposed by the pillars of the GRENDEL Model State Aid Scheme for Fleet Modernisation. The status of these measures varies from country to country. Whereas in Germany some measures are already supported by existing schemes, other countries are currently in the phase of conducting discussions, consulting the sector or making internal preparations in terms of fleet modernisation aspects. The collected information is based on the input provided by members of the project’s Consortium.

Figure 10 Overview of supported measures

General overview of the supported measures as proposed by the GRENDEL State Aid Scheme for Fleet Modernisation	
Priority 1. Improving environmental performance	
1.1 Acquisition (purchase or replacement) of lower emission engines	D, SK, HR
1.2 Measures to reduce air pollutant emissions (other than through low emission engines)	D, SK, HR
1.3 Measures to improve energy efficiency and optimise energy management on board	D, SK, HR
1.4 Measures to reduce noise emissions	D, SK, HR
1.5 Measures to reduce and treat releases to water or waste	HR
1.6 Adapt vessels to improve their energy/fuel consumption performance through improved hydrodynamics	D, HR
1.7 Promotion of education and training in inland navigation	HR
Priority 2. Better integration of inland water transport into logistic chains to increase multimodality of freight transport	
2.1. Adaptation of vessels to attract new traffic or freight or perpetuate existing traffic or freight	HR
2.2. Construction or acquisition of vessels to attract new traffic or freight	HR
2.3. Construction or adaptation of vessels to serve maritime ports	
2.4. Acquisition of instruments and software to help the navigation or operation of vessels / fleet	D,HR
Priority 3. Modernisation of vessels leading to increased safety of inland water transport	
3.1. Measures to adapt equipment used for manoeuvring of inland vessel and related indicating and monitoring devices	D
3.2. Measures addressing vessel's safety equipment and fire protection systems	D
3.3. Measures addressing safety at work stations and crew safety	
3.4 Measures addressing other safety related issues	D
Priority 4. Renewal of actors in the sector	
4.1 Acquisition of first vessel for new inland waterborne transport companies and new entrants	HR
Priority 5. Promote the emergence of innovative solutions	
5.1 Development of innovative solution and experimentation with innovations	D

Out of the Danube riparian countries, Germany is the most advanced one in terms of financial instruments to support various aspects of fleet modernisation. There are already concrete instruments in force that provide financial support for the overall **improvement of the environmental performance** of the IWT fleet. Furthermore, measures to support the **development of innovative solutions** are as well in force. Preparations to support a wide range of other fleet modernisation aspects such as issues covering the **modernisation of vessels in terms of increased safety and their better integration into logistics chains**, are currently under preparation.

Positive developments regarding Danube fleet modernisation are noticeable in Slovakia as well. High on the agenda are fleet modernisation aspects covering the environmental performance of the fleet. The same is valid for Croatia as well, with the latter also addressing issues covering the **efficient integration into logistics chains and the renewal of actors of the sector**.

Even though not listed in the figure above, according to the input received in the framework of the GRENDEL events, Austria is currently at an early stage of preparing a state aid scheme for fleet modernisation. With the experience already gained in the framework of a previous aid as well as based on the **Model State Aid Scheme** as proposed by GRENDEL, the ground is set for a successful program.

Further noticeable is the fact that the Bulgarian partner (BRCCI) has prepared a model state aid scheme that is adapted to the specific needs of Bulgaria. The information received so far is that there might be funding available for issues covering human resources and safety issues.

As a conclusion, the uptake of the GRENDEL results is envisaged as follows:

Figure 11 GRENDEL uptake of results

