# INLAND WATERWAY NAVIGATION REPORT

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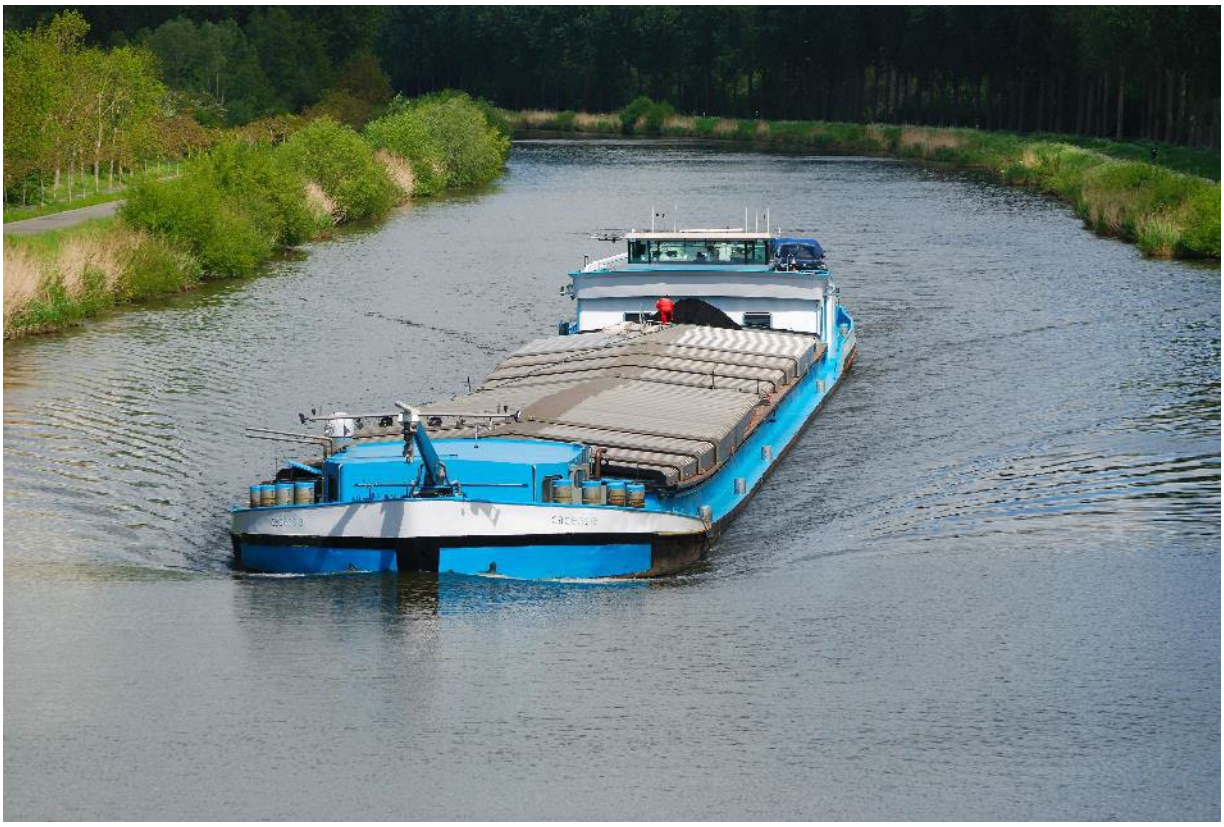

**Figure 1: Inland waterway vessel**

Port of Hamburg Marketing

# Content

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# LIST OF ABBREVIATIONS

| | |
|---|---|
| AND | European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways |
| AIS | Automatic Identification System |
| CCNR | Central Commission for the Navigation of the Rhine |
| CEF | Connecting Europe Facility |
| CESNI | Comité Européen pour l'Élaboration de Standards dans le Domaine de Navigation Intérieure |
| CNC | Core network corridor |
| DINA | Digital Inland Waterway Area |
| DTLF | Digital Transport & Logistics Forum |
| DSM | Junkers Commission's Digital Single Market |
| ECDIS | Electronic Chart and Display Information System |
| EDI | Electronic data interchange |
| eFTI | Electronic Freight Transport Information |
| ERI | Electronic Reporting of Voyage-, Cargo-, and Persons on Board |
| ERI | Electronic Reporting International |
| ETA | Estimated time of arrival |
| ETD | Energy Taxation Directive |
| ETS | Emissions Trading System |
| EU | European Union |
| GHG | Greenhouse gas |
| IENC | Inland Electronic Navigational Charts |
| IHO | International Hydrographic Organization |
| INE | Inland Navigation Europe |
| IWT | Inland waterway transport |
| MoS | Motorways of the Sea |
| NtS | Notices to Skippers |
| NSR | North Sea Region |

| | |
|---|---|
| NTC | Nautical & Technical Committee |
| RPG | Groupe de travail du règlement de police |
| RPR | Rhine Police Regulation |
| RSS | River-sea shipping |
| TCA | Rules for the track control assistant |
| SSMS | Sustainable and Smart Mobility Strategy |
| SME | Small and medium enterprise |
| TEN-T | Trans-European Network-Transport |
| VTM | Vessel Traffic Management |
| VTT | Vessel tracking and tracing |
| WP | Work Package |

# 1 BACKGROUND

The North Sea Region (NSR) is one of the logistics zones in Europe: The largest seaports, but also many intermodal transportation nodes are in the NSR. Those intermodal nodes are outstanding for the transportation of goods to and from the supply and demand markets. To increase attractiveness of a location along with its market potential i.e., the achievable market, efficient, smart, and ecological transportation networks are needed. The intermodality should enable a concentration of transnational traffic and long-distance flows, and as a result of their integration, provide for a highly resource efficient infrastructure use.

Currently, the Trans-European Network-Transport (TEN-T) policy is putting a strong focus on the development of the Core Network, the major transport axes across Europe. The whole trade and business network is not only depending on its major nodes but also on its hinterland.

The Interreg VB North Sea region project CONNECTing North Sea Region's TEN-T nodes - Support intermodality growth in the North Sea Region through smart efficiency enhancements (NSR CONNECT) aims at raising the efficiency of transport flows in a holistic approach. The project will thus include both major and remoter transporation nodes to establish learning opportunities.

The overall project objective is to support smart intermodality growth in the NSR through efficiency enhancements. The detailed project objectives are:

- Implementation of new smart processes and tools (smart intermodality),
- Developing of strategies for smart efficiency enhancements (smart involvement)

The perspective of transportation is transnational. New are the instruments for implementation and involvement.

The network of inland waterways in the EU connects 25 member states, numerous European cities, and significant industrial areas across a distance of over 41,000 kilometers. The trans-European transport network (TEN-T) of important EU transport connections includes over 15,000 kilometers of inland waterways. A network of connected waterways that connects all 13 EU nations is particularly extensive in Germany, the Netherlands, and France. Rotterdam, Antwerp, and Hamburg are the largest seaports and have excellent connections to their surrounding areas, terminals, and inland ports.

In 2020, Inland Waterway Transport (IWT) efficiency in the EU was 131.7 billion tons per kilometer. Market categories like steel, agriculture, food, and chemicals are important to this industry. The sector's current modal share in EU transportation has remained largely unchanged at 6%, with the Netherlands having the biggest share (43%), followed by Bulgaria (31%) and Romania (28%). However, the Covid-19 problem resulted in delays in freight movement of up to three days and a €2.2 billion revenue loss, primarily in the road transportation sector.

The majority of businesses and jobs in inland waterway freight transportation are located in these same three nations. A total of 48,000 people are working in inland navigation, the majority of them

work for small and medium enterprises (SMEs) and independently. However, the sector is understaffed and underqualified, and since 2014, fewer people are employed. High worker mobility from the east to the west, brought on by inequalities in social conditions, exacerbates this.

The paper on hand is an additional report in the framework of the NSR Connect activity. It focusses on the future development of IWT in the European Union, especially in the NSR. This paper as well as all project results will be published on the project's website.

NSR CONNECT

https://northsearegion.eu/north-sea-connect

#NorthSeaConnect

# 2 INTRODUCTION

For the Inland Navigation community as well as the larger world culture, economics, and business, climate change is a major topic of discussion. The fight to reduce greenhouse gas emissions is a struggle, a tremendous opportunity, and a threat all at once. It is consistent with the EU's aims of climate neutrality and zero emissions, which is why the Platform must devote a lot of resources to all associated areas.

The whole transport industry, including inland shipping, which is acknowledged for its unique role in the process, will have to put up substantial effort to achieve decarbonization, as was already stated in the European Green Deal and the Sustainable and Smart Mobility Strategy (SSMS). Inland waterway transport, along with rail, is one of the most CO2-efficient forms of transportation and is essential to these decarbonization initiatives. By 2030 and 2050, respectively, there should be a 25% and a 50% rise in inland waterway and short-sea shipping. The current multimodal transportation framework needs to be redesigned in order to accomplish these objectives.

The European Commission released its Fit for 55 package, which intends to implement the European Green Deal in July 2021. A variety of initiatives, including the Energy Taxation Directive (ETD), an expansion of the Emissions Trading System (ETS), a modification of the Renewable Energy Directive, and many others, are included in the package. The EU's goal of lowering net greenhouse gas emissions by at least 55% by 2030 and achieving climate neutrality by 2050 is known as "Fit for 55." The proposed package tries to align EU law with the 2030 objective. For instance, the ETD envisions an energy product tax structure that must both protect the internal market and promote the green transition by providing the appropriate incentives.

The European Commission also announced a follow-up to NAIADES II, with the primary goals of renewing the barge fleets and enhancing access to funding, in the Sustainable and Smart Mobility Strategy of 2020. In order to facilitate the modal shift to inland waterways, the NAIADES III "Boosting future-proof inland waterway transport" Communication, which was released in June 2021, focuses on two main topics: sustainability and digitalization. The Inland Waterway Transport Action Plan for 2021–2027 was established under the NAIADES initiative. Increased use of inland waterways for transportation is desired, as is a gradual transition to inland waterway transportation that emits no emissions.

Another important issue that must not be left out is the nautical and technical part when it comes to the future topics of Inland Waterway Transport. According to the Inland Waterway Europe, the Nautical & Technical Committee (NTC) focused its work in 2021 mostly on the technical rules for inland vessels. Corresponding to NTC, the IWT should focus on both the laws that are essential for innovation and those that may have an influence on the fleet of ships that is currently in operation. In order to provide greater safety, it is important to also paying close attention to navigation police laws.

# 3 FUTURE PERSPECTIVES FOR SUSTAINABLE AND INNOVATIVE INLAND NAVIGATION

## 3.1 Innovative Digitalization

The fast transformation of our economy and society brought about by digitalization is a significant source of growth, innovation, and new business. The business operations of stakeholders in Inland Waterborne Transport must move to the digital world in order to support IWT.

The Digital Transport & Logistics Forum (DTLF) is the main location for discussion of digitization and its advantages for the IWT industry. The organization of production, transportation, the supply chain, and consumption is drastically changing as a result of digitalization. Since 2015, DTLF has given specialists and stakeholders from diverse transport modes and logistics a forum for productive conversation and collaboration.[1] Paperless Transport and Corridor Freight Information System, the two primary subgroups of DTLF, are made up of Teams devoted to certain subjects outlined in work programmes. Therefore, it is essential that the IWT sector participates actively in these talks. A project with Inland Navigation Europe (INE) to establish a *mini-DTLF* in 2020 was continued, but with a more focused goal: the installation of the Electronic Freight Transport Information (eFTI) was given greater consideration than the Corridor Freight Information Systems.[2]

The IWT Platform also continued to participate in meetings of the CESNI/TI (Working Group on Information Technology) and the ALICE European Technology Platform (Alliance for Logistics Innovation through Collaboration in Europe). Reaching the zero-emission integrated transport system is one of the areas of focus for the ALICE Platform, which supports and counsels the European Commission on the implementation of the EU Research Programmes. Using digital solutions will undoubtedly help achieve that goal.[3]

Due to the fact that digitization is experiencing a tremendous upswing in many areas of the transportation sector, in 2016 the European Commission – DG MOVE commissioned a research to look into the potential for digitalization in the IWT sector in order to create a concept for the Digital Inland Waterway Area (DINA).

The existence of digitalized Inland Waterways backed by the fairway authority is a crucial prerequisite for a successful digital transformation. The Inland Waterways digital infrastructure will aid in the digital transformation of business operations inside IWT and provide IWT stakeholders with the necessary standardized and harmonized digital services on the European network level. Five national fairway authorities from the Member States of Austria, Belgium, France, Germany, and the Netherlands are

[1] European Inland Waterway Transport Platform: IWT Annual Report 2021, p. 8
[2] Ibid.
[3] Ibid.

working together to produce a Masterplan for the Digitalization of Inland Waterways in order to face this problem.[4]

The goal of the action plan is to create the Masterplan Digitalization of Inland Waterways, which will serve as a coordinated, uniform, and comprehensive digitalization strategy for IWT under the supervision of the participating fairway authorities and be ready for implementation between 2022 and 2032. The Masterplan will take policy evolution into account and be based on (inter)national commercial developments related to the traffic and transportation on inland waterways as well as game-changing technical advancements in recent and upcoming years.[5]

The Masterplan will take into account the demands placed on this digital transition in terms of cybersecurity, standardization, rules and regulations, security, and privacy. A digital information infrastructure necessitates an increasing focus on data and information quality. In this context, the Masterplan will concentrate on procedures and processes for quality management during the implementation and operation of digital waterway infrastructure. It will include a set of implementation scenarios that cover the technical, organizational, financial, and operational implications that each Beneficiary will face during the digitalization process.[6]

These Masterplan borders will be associated with the necessary (future) facilitation of internal and external stakeholders, business models for inland waterborne traffic, transportation, and logistics, and also administrative and operational activities. Since it will be based on the implementation status of RIS and will build upon the outcomes of the most recent River Information Services (RIS) enabled Corridor Management projects CORISMa (*TEN-T project No. 2012-EU-70004-S - RIS Enabled European IWT Corridor Management*) and COMEX, it will have a solid foundation in RIS developments and national and European implementation projects (*CEF Action No 2015-EU-TM-0038-W – River Information Services Corridor Management Execution*). It is also anticipated that it will serve as a foundation for other fairway authorities' efforts to digitalize inland waterway transportation. Other fairway authorities' participation in the Action's execution through the Reference Groups will raise awareness of the Masterplan and make it easier to share outcomes.

## 3.2 Innovate Modal Shift

The transportation industry is incredibly dynamic, and as market competition rises, businesses must look for innovative solutions. This is especially the case in order to assist the supply chain, raise the bar for customer service (value-added service to the customer), and improve the likelihood of distinction. Along with technology advancement and the complexity of supply chains in a globalized society, customer needs (such as shipper requirements) are rising. Although sustainability has long been a priority, the announcement of the European Green Deal last year increased its importance. In

[4] DIWA: How it began. URL: https://www.masterplandiwa.eu/how-it-began/
[5] DIWA: Masterplan Digitalization of Inland Waterways. URL: https://www.masterplandiwa.eu/diwa/
[6] Ibid.

the upcoming years, regulations that force the transportation industry to meet these new goals will bring opportunities as well as problems for the logistics industry.

The idea of modal shift was increasing in popularity in 2021. The need to reduce greenhouse gas emissions by using more energy-efficient transportation options, the desire to ease traffic on overcrowded portions of the road network, and concerns about local pollution and truck noise in urban areas are some of the main factors driving this emphasis on the modal shift to water. One of the foundations of EU strategy is shifting transport, whether it be freight or passenger traffic, away from heavier and less ecologically friendly means like roads and aviation toward greener modes like railways and inland waterways. The European Green Deal states that by 2030 and 2050, respectively, inland waterway and short-sea shipping should rise by 25% and 50%. Rail and waterborne multimodal transportation should be able to compete with road-only transportation in the EU by 2030 on an equal footing. Expectations, or rather goals to reach, are thus extremely obvious; the means of doing so, however, are not. The IWT sector as a whole, starting with ports, terminals, and cargo owners, will need to be brave and imaginative. It will take a team effort to succeed.[7]

It becomes clear that modal shift is an important future aspect and furthermore a strategy prioritized by both the EU and many of its member states. However, the majority of member states still underutilize inland waterways, and even in the few nations where inland waterway transport is well-established, the industry confronts severe competition from road-based options.[8] Moreover, as evidenced by studies and public reports, the modal shift from services offered on frequently underdeveloped IWT transport markets to more adaptable road-focused transport solutions is particularly difficult because a number of parties must coordinate their operations.

Regarding the barriers to modal shift, one “major regulatory barrier, for example, is the complicated, time-consuming administrative paperwork associated with cross-border IWT along Europe’s rivers.”[9] Another is the often ambiguous regulatory environments, especially in developing markets like Sweden, in particular with regard to cabotage, crew requirements, piloting costs, and fairway dues.

In order for shipping companies to launch new, regular IWT services, they must overcome some financial challenges. Semi-fixed costs, such as port fees, fairway dues, and piloting fees, mode-specific variable costs, such transhipment prices, and higher variable costs, including pre- and post-haulage charges, are pertinent to IWT's ability to compete with all-road transportation. Additionally unpredictable, those charges raise the financial risk faced by business owners.

The modal preference of transport buyers is influenced by various aspects of transportation, such as cost, time, reliability, and certain aspects of transportation quality, such as on-time delivery and damaged goods. Long transport periods, especially as a result of transhipment, and poor reliability are

[7] IWT Annual Report 2021, p. 8
[8] Santén, V., Rogerson, S., Williamsson, J., & Woxenius, J. (2021). Modal shift to inland waterway transport: Five case studies in the North Sea Region. European Journal of Transport and Infrastructure Research, 21(4), p. 43
[9] Ibid. p. 46

obstacles to service quality, particularly for the extended use of IWT. Depending on the state of the waterway, IWT has different loading capacity and travel times.[10]

Contrarily, market characteristics-related barriers affect the possibility for economies of scale because of limitations on market size, competition among transportation modes, the state of inland waterway, needs for vessels and personnel, business models, and environmental concerns. The IWT fee structure, which deviates from other modes' norms, makes it more difficult to compete with other modes. Even though there are instances of a lower price as compared to the road, IWT has only had modest success with price competitiveness, for instance in Sweden. Physical impediments like bridge clearances and water levels prevent shipping businesses from deploying huge vessels, which would reduce costs and boost competitive pricing.[11]

However, to this day there are also some ways of overcoming barriers, but it differs significantly between countries with mature versus less-developed IWT markets. Modal shift is frequently a matter of improving market coordination, even by simply informing transport buyers about existing services, as in the Port of Rotterdam Authority's cooperative scheme with local authorities and IWT operators. In mature markets where IWT is the primary alternative to road transport. If so, the port will offer information and a platform to let customers access practical intermodal services between the hinterland and ports.[12] Implementing standardized information systems has helped remove the obstacle of time-consuming paperwork, at least in Europe's northern ports. The transformation of inland ports into freight villages is crucial in order to achieve better price competition with the road as well as the requisite bundling operations that are needed at terminals in order to achieve high-capacity utilization in large inland ships through, concentrating goods movements.[13]

The common European infrastructure policy, which supports all modes of transportation, should be viewed as having its foundation in the European infrastructure policy. As a result, the plan created at the European level should be built upon and strengthened by the transport and infrastructure policies of the Member States. Only then can a seamless, completely linked European transportation network be created. The same is true for rail transportation, inland navigation, and river-sea commerce, all of which can reach their full potential if the necessary prerequisites are established and put in place.

## 3.3 NAIADES III

EU-Commissioner for Transport, Adina Vălean said: „As one of the most $CO_2$-efficient transport modes available, inland waterways have the potential to play a central role in decarbonizing our transport systems. Yet today, our canals and rivers carry just 6% of EU freight. With an inland waterway network of 41,000km spanning 25 Member States, there is scope to do a lot more; both along our TEN-T corridors and in inner cities, where inland waterways can help to green the last mile of city logistics."

[10] Ibid.
[11] Ibid.
[12] Ibid. p. 47
[13] Ibid. p. 48

A 35-point action plan was presented by the European Commission in June 2021 to increase the importance of inland waterway transport in our logistics and mobility networks. The main goals are to increase the amount of cargo moved through Europe's rivers and canals and to speed up the switch to zero-emission barges by 2050. This is in line with the Sustainable and Smart Mobility StrategySearch for available translations of the preceding and the European Green Deal, which set the target of boosting inland waterway and short-sea shipping by 25% by 2030 and by 50% by 2050.[14]

The new action plan *Inland Waterway Transport Action Plan 2021–2027* will create the framework necessary for the inland waterway transportation industry to better capture the opportunities associated with the transition to a digital and zero-emission economy. One of the suggested actions is the revision of the Combined Transport Directive, which, along with support for investments in transshipment capacity and inland multimodal terminals, will make it possible for inland waterways to be more fully integrated into a contemporary, trans-European intermodal transport system. The action plan also outlines steps to quicken and encourage investments in the creation and implementation of cutting-edge, zero-emission and zero-waste technology for ships and inland ports, as well as assistance for the industry in keeping up with technological advancements.[15]

The action plan that goes in accordance with the new multiannual financial framework, focuses on two main goals: shifting more freight transportation to inland waterways and putting the sector on an irreversible path to become more energy efficient. This plan is intended to address the challenges faced by the inland waterway transport sector and deliver on the objectives of the European Green Deal and the Sustainable and Smart Mobility Strategy. Achieving these key goals will need an integrated strategy and a package of policies that incorporate transportation, environmental, digital, energy, and fiscal policies and are supported by financial incentives. The Commission is proposing actions in the following areas:[16]

**Shifting more freight to inland waterways**

By the end of December 2030, the Commission will work with inland waterway managers to guarantee a high level of service along EU inland waterway corridors. Inland waterways will be completely integrated as a crucial part of intermodal transportation in the impending amendment of the Combined Transport Directive. Additionally, the Commission will create an EU framework for tracking and reporting emissions from transportation and logistics. This might raise demand for greener choices, such inland rivers where practical.

[14] European Commission: Future-proofing European inland waterway transport - NAIADES III action plan. URL: https://transport.ec.europa.eu/transport-modes/inland-waterways/promotion-inland-waterway-transport/naiades-iii-action-plan_en.
[15] European Commission: NAIADES III: Boosting future-proof European inland waterway transport, p. 2 f. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0324&from=EN.
[16] European Commission: Future-proofing European inland waterway transport - NAIADES III action plan.

**Transition to zero-emission inland waterway transport**

Inland canal travel is quiet, safe, practically congestion-free, and energy-efficient when compared to other land-based means of transportation. In addition to supporting research and innovation, the Commission will propose policies to promote investment in zero-emission and zero-waste technology for inland ships and inland ports.

**Smart inland waterway transport**

The idea includes fresh initiatives to aid the inland waterway transportation industry in keeping up with technological advancements and enhancing competitiveness. Both will support the sector's active integration into larger multimodal chains. Inland waterway transport may be more effectively integrated into logistical processes and multimodal chains, and the administrative load and expenses associated with complying with and enforcing law can be significantly reduced with more digitalization.

**More attractive and sustainable jobs in inland waterway transport**

A qualified workforce is essential to the inland waterways industry. The suggested changes will guarantee sensible and adaptable EU crewing regulations and give inland vessel personnel the necessary training to deal with the shift to a greener and digital economy, cyber security, synchromodality, and infrastructure and vessel automation.

In order to achieve the EU's climate neutrality and zero pollution goals, the European Green Deal and the Sustainable and Smart Mobility Strategy explicitly state that their goals are to increase the contribution of inland waterway transportation and to make all modes of transportation more sustainable. In order to significantly raise the proportion of inland freight transported by inland waterways and to significantly improve their capacity in the next years, bold efforts must be taken that necessitate a fundamental restructuring of the industry.

## 3.4 European Green Deal

Climate change and environmental degradation are an existential threat to Europe and the world. To overcome these challenges, the European Commission presented the European Green Deal – a set of policies to make the EU economy more sustainable. As a new growth strategy, the European Green Deal aims to transform the EU into a fair and prosperous society, with a modern, resource-efficient, and competitive economy where there are no net emissions of greenhouse gases in 2050 and where economic growth is decoupled from resource use.[17]

The European Green Deal reaffirms the Commission's commitment to addressing the environmental and climate change-related issues that will define this generation. The Commission observes that the climate is changing, and the globe is warming.

[17] European Commission: The European Green Deal.

To address these issues, the European Green Deal was created. It is a new growth strategy that aspires to make the EU into a just and affluent society with a cutting-edge, competitive economy that uses resources efficiently and produces no net greenhouse gas emissions by 2050.[18]

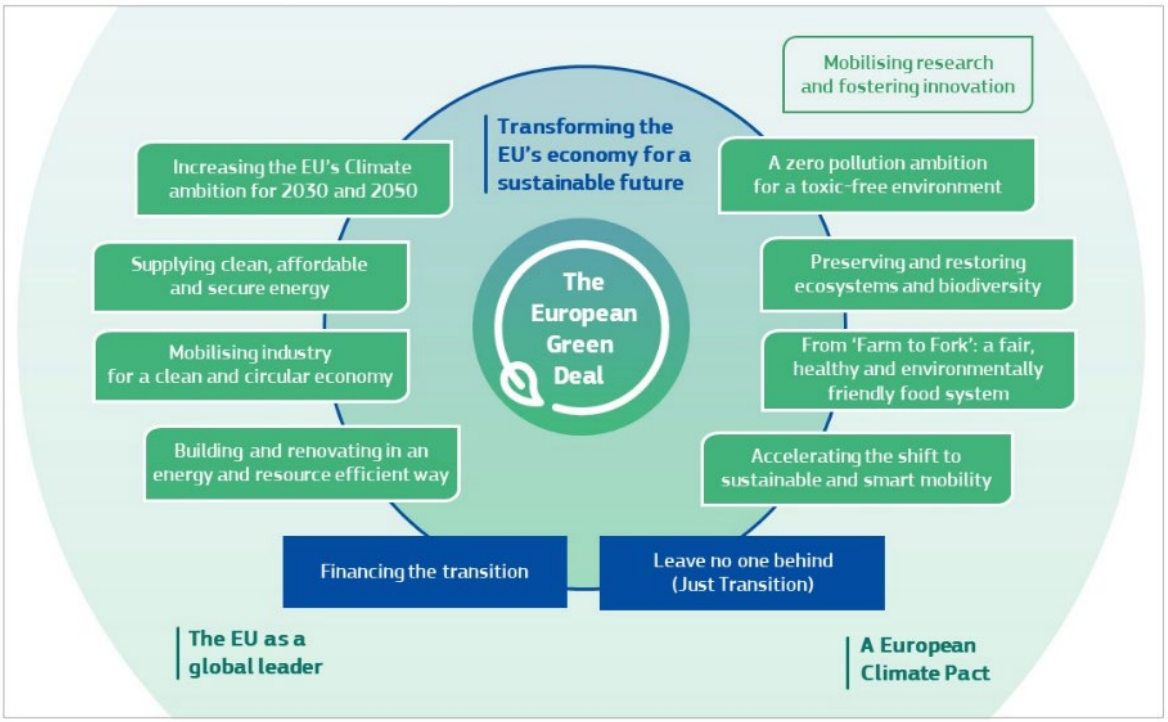


**Figure 2: Elements of the Green Deal[19]**

The main goal of the EU regarding the European Green Deal is to reduce emissions from all sectors by 80 % below levels until 2050. Between 1990 and 2018, greenhouse gas emissions were reduced by 23 %, while the economy grew by 61 %. However, current policies are projected to only reduce greenhouse gas emissions by 60 % by 2050.[20] The EU's overarching goal of climate neutrality is constantly being updated and modernized so that the European economy sets a good example in terms of climate protection worldwide.

The transport sector is currently the second largest producer of greenhouse gas emissions (GHG) in the EU. Freight transport continues to grow and specifically road freight is projected to increase by around 40 % by 2030 and by just over 80 % by 2050 (compared to 2005). Thus, in the coming years there is a need to develop measures to reduce GHG emissions from freight transport and at the same time handle the expected growth in transport volume to meet the targets set by the Green Deal.

The European Green is the latest, and most ambitious plan, of the Commission in greening the transport sector. Already in 2011, the **Transport White Paper** (COM/2011/144 final) stated examples of notable key elements and countermeasures regarding the climate neutrality. Here, the EU

[18] Inland Navigation Europe: The EU Green Deal and inland waterways transport. URL: https://www.inlandnavigation.eu/the-eu-green-deal-and-inland-waterways-transport/.
[19] European Commission: The European Green Deal, p. 3.
[20] Ibid. p. 4f.

formulated benchmarks for a competitive and resource-efficient transport system and for achieving the then 60 % GHG emission reduction target:

- Developing and deploying new and sustainable fuels and propulsion systems
- Optimizing the performance of multimodal logistic chains, including by making greater use of more energy-efficient modes
- Strengthening of rail and inland waterborne transport (30 % of road traffic to be shifted by 2030 and more than 50 % by 2050) facilitated by efficient and green freight corridors
- A fully functional and EU-wide multimodal TEN-T core network shall be attained by 2030, with a high-quality and capacity network[21]
- A European multimodal transport information, management, and payment system because of the increase in efficiency of transport and of infrastructure use with information systems and market-based incentives

The different Core network corridors (CNCs) are fundamental and guiding for the successful implementation of the TEN-T dimensions, which were written into the guidelines in 2013. The corridors act as a powerful tool not only to encourage investments but also to promote and demonstrate the achievement of the EU's wider transport policy objectives. All corridors offer numerous opportunities to promote overarching transport solutions. The overall aim of infrastructure development along the corridors and on the core network is to provide unhindered and uninterrupted connections in the common interest of efficient, future-oriented and high-quality transport services for citizens and economic operators. All CNCs have set themselves the common goal that emissions will be lowered by developing the corridors through harmonized TEN-T standards, increased share of a stable dominant position of inland waterway transport, modal shift from road to rail and further deployment of alternative fuels infrastructure. The implementation of the TEN-T core network is expected to reduce transport-related CO2 emissions significantly.[22] At the moment (10/2020), the Commission undertakes a review of the current guidelines for the TEN-T to revise the regulation by 2021. This revision aims to ensure cross-border infrastructure networks and the transport system are ready for the Green Deal objectives of carbon neutrality and climate resilience. The revision will also look at how to prepare the network for smart and connected mobility.

To meet the targets set by the Transport White Paper and the Green Deal, it is of enormous importance that the transport sector shifts to sustainable modes of transport such as railways, inland waterways, and river/sea shipping. This can ensure environmentally friendly, safe, and congestion-free transport and logistics, while at the same time upgrading the existing infrastructure and fleet. It is also essential for the transport sector to make efficient use of an integrated and intelligent multimodal network. Especially inland navigation and river-sea shipping (RSS) will hardly develop further without

[21] Moreover, all core network airports shall be connected to the rail network by 2050, preferably high-speed. This ensures that all core seaports are sufficiently connected to the rail freight and, where possible, inland waterway system.
[22] European Commission: The impact of TEN-T completion on growth, jobs and the environment, p. 19.

the political willingness and support to create same terms and conditions for all transport modes. At the same time they have a lot of potential to substantially contribute to greening transport chains.

## 3.5 Sustainable and Smart Mobility Strategy

Along with an Action Plan of 82 initiatives, the European Commission unveiled its "Sustainable and Smart Mobility Strategy," which will direct our activity for the ensuing four years. This plan establishes the groundwork for the EU transportation system's transition to a greener, more technologically advanced, and crisis-resistant state. According to the European Green Deal, which will be implemented by a smart, competitive, safe, accessible, and affordable transportation system, emissions will be reduced by 90% by 2050.[23]

Making the European transportation system resilient, smart, and sustainable is the focus of the Sustainable and Smart Mobility Strategy.

To achieve a 90% decrease in transport-related greenhouse gas emissions by 2050, a clear roadmap is required. According to the European Green Deal, this is the effort that transportation must make in order for the EU to become the first climate-neutral continent by 2050. The modernization of the entire system will be driven by digitalization in an effort to make it seamless, more effective, and further reduce emissions. The coronavirus pandemic has also highlighted the single market's weaknesses and the need to increase its resilience. Nobody should be left behind as we make the transition to a greener, smarter, and more resilient mobility system.[24]

All people must have access to inexpensive mobility, rural and distant areas must remain connected, and European transportation must provide its employees with a favorable working environment and appealing employment opportunities.

Although mobility has many advantages for its consumers, it has drawbacks for our society as well. Our health and wellbeing are impacted by harmful factors including greenhouse gas emissions, air and water pollution, but also accidents and traffic jams, traffic congestion, noise pollution, and biodiversity loss. Previous attempts haven't effectively addressed these costs yet.

Currently, transport contributes 25% of the EU's overall greenhouse gas emissions, and emissions have been rising recently. We need to be more ambitious in the transportation sector if we're going to meet our 2030 targets of cutting greenhouse gas emissions by -55% and becoming the first climate-neutral continent by 2050.[25]

In order to maintain the EU's leadership in the manufacture and provision of transportation equipment as well as to boost our level of international competitiveness, Europe must also use digitalization and automation to further raise standards of safety, security, efficiency, reliability, and comfort.

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[23] European Commission: Mobility Strategy. URL: https://transport.ec.europa.eu/transport-themes/mobility-strategy_en.
[24] European Commission: Questions and Answers: Sustainable and Smart Mobility Strategy.
[25] Ibid.

The coronavirus pandemic affected the transportation industry particularly hard, as the crisis cost healthy businesses both employees and income. The strategy outlines urgently need changes, strategies, and steps to aid the sector's revival.

Our goals of sustainable, intelligent, and resilient mobility are demonstrated by a number of significant key points, including:

**„By 2030:**

- at least 30 million zero-emission cars will be in operation on European roads
- 100 European cities will be climate neutral.
- high-speed rail traffic will double across Europe
- scheduled collective travel for journeys under 500 km should be carbon neutral
- automated mobility will be deployed at large scale
- zero-emission marine vessels will be market-ready

**By 2035:**

- zero-emission large aircraft will be market-ready

**By 2050:**

- nearly all cars, vans, buses as well as new heavy-duty vehicles will be zero-emission.
- rail freight traffic will double.
- a fully operational, multimodal Trans-European Transport Network for sustainable and smart transport with high speed connectivity."[26]

Therefore, although a number of action programs have contributed to largely maintaining the modal share of inland waterway transport, steps are needed to consolidate it and fully utilize the untapped potential, both along the TEN-T corridors and in those inner cities where inland waterways can provide the last mile of urban logistics with greater environmental benefits. Therefore, the Commission has started the NAIADES III program to take advantage of this potential by tackling major issues like updating inland waterway fleets and enhancing access to financing, while also ensuring complete compliance with environmental laws, particularly the Water Framework Directive and the Habitats Directive.

Moreover, thanks to TEN-T support for the Motorways of the Sea (MoS), it has been possible to transport more goods more sustainably in short sea shipping. The EU must now also lead by example and make Europe's maritime areas sustainable, smart, and resilient.

[26] European Commission: Mobility Strategy.

# 4 TECHNICAL AND NAUTICAL REGULATIONS IN INTERNATIONAL INLAND NAVIGATION

## 4.1 CESNI Work Programme 2022-2024

The Central Commission for the Navigation of the Rhine adopted a Resolution in June 2015 that established the Comité Européen pour l'Élaboration de Standards dans le Domaine de Navigation Intérieure (CESNI), a European committee for developing standards in the inland navigation sector. The Central Commission for Navigation of the Rhine (CCNR)[27] "Vision 2018" for the sustainable growth of inland navigation is taken into consideration in this resolution, which encourages the creation of consistent, contemporary, user-friendly regulations.[28]

The formation of the new committee reflects the shared desire of the Central Commission and the European Union to have political control threads run more closely together at the European level, particularly in the area of inland navigation legislation.

In order to maintain and guarantee the high level of safety of European inland navigation, CESNI has committed to the regular revision of existing standards and the adoption of new ones through this governance instrument, particularly with regard to technical requirements for inland vessels and professional qualifications. Other responsibilities of the committee under this agreement include supporting the digitalization of inland navigation and keeping up with technological advancements, including alternative fuels, automation, and current training and exam tools. Aside from offering guidance on uniform interpretation and publishing instructions, the CESNI also stipulates a number of other actions to encourage correct application of the standards.[29] Additionally, in light of potential future regulatory developments, CESNI is prepared to offer guidance and analysis on significant IWT safety and sustainability issues.

The work program, which is based on the strategic guidelines created by DG MOVE and the CCNR Secretariat, was the result of discussions between all CESNI participants who represent inland navigation (CCNR and European Union Member States, Observer States, European Commission, international organizations including river commissions, and non-governmental representative associations).

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[27] The Central Commission for Navigation of the Rhine (CCNR) is an international organization that bears the main responsibility for the regulatory activity with regard to navigation of the Rhine. It undertakes tasks in the technical, legal, economic, social and environmental fields.
In all areas of work, efficiency of transport on the Rhine, safety, social concerns and environmental protection are the guiding principles of the CCNR's activities. Many of the CCNR's activities today extend beyond the Rhine Rhine and relate in a broader sense to all European inland waterways. to all European inland waterways. The CCNR works closely with the European Commission and other river commissions and international organizations. URL: https://mcusercontent.com/b6f0a0c0fad1cef176da6e315/files/68f433f3-c3b2-b5eb-d060-b92e246faefd/cp21_07de.pdf

[28] CESNI. URL: https://www.cesni.eu/en/about-cesni/

[29] Ibid.

The CESNI work program is composed of three different parts. First, there is the part of technical regulations. CESNI ensures the elaboration and adoption of standards in the field of technical regulations for inland vessels, this with active consideration of - regular revisions of the ES-TRIN in order to maintain and ensure the high level of safety in inland navigation and to keep up with the technical development. In addition, CESNI takes into account new technologies and innovations, including the use of relevant alternative fuels, batteries and electric propulsion systems that support the transition to zero-emission fleet. Furthermore, the future elaboration and development of the digitalization of inland navigation, including automated vessels, digital documents and navigation and information equipment, electronic devices for recording and exchanging information about vessels, as well as the ongoing development of an international vessel identification system.[30]

In addition, CESNI promotes the proper implementation of standards in the field of technical regulations for inland vessels, including by maintaining quality standards and guidelines and writing explanatory notes on key standards or amendments. Furthermore. Furthermore, advice on the uniform interpretation and application of the standards, including guidance to the Commissions of Inquiry, - cooperation with international standardization bodies as well as facilitating innovation by reducing the administrative burden of implementation are promoted by CESNI.

The second part of the CESNI work program is composed of the professional qualifications part. The CESNI ensures the elaboration and adoption of standards in the field of professional competencies, this mainly with active consideration of regular revisions of the ES-QIN, in order to maintain and ensure the high level of safety in inland navigation and to keep pace with technical development.

In addition, the CESNI takes into account the development of competency-based standards for

- entrepreneurs, especially in the field of digitalization and greening,
- working with new and innovative technologies, including the use of relevant alternative fuels, batteries, and electric propulsion systems,
- working with increasingly digitized vessels, including automated vessels,
- environmentally conscious navigation,
- modern training tools, including for distance learning.[31]

In addition, CESNI promotes the proper implementation of standards in the field of professional qualifications, including by maintaining quality standards and guidelines, drafting explanatory notes on the main standards or amendments, and advising on the uniform interpretation and application of the standards.

Another important aspect of the CESNI work program is to ensure the elaboration and adoption of standards in the field of information technology, this with active consideration of a regular revision of the ES-RIS in order to maintain and ensure the high level of safety in inland navigation, to keep pace with technological developments and to facilitate the integration of inland navigation into logistics

[30] CESNI: Work Programme. URL: https://www.cesni.eu/wp-content/uploads/2021/12/CESNI_work_prog_22_24_EN.pdf, p. 2f.
[31] Ibid. p. 7f.

chains and the digitalization of transport documents. In addition, topics related to the digitalization of inland navigation, including automated vessels, will be addressed, taking into account e.g. cybersecurity and data protection aspects.

Furthermore, another component of this work package is to promote the proper implementation of standards in the field of RIS and other areas of information technology, including by maintaining quality standards and guidelines, drafting explanatory notes on the most important standards or amendments, and advising on the uniform interpretation and application of the standards.[32]

CESNI also provides advice and analysis on important IWT safety and sustainability issues as well as other areas of IWT and in the field of information technology, in particular for the European Reference Data Management System (ERDMS), for initiatives on digital tools in IWT and gradual introduction of electronic documents as well as for updating the technical frameworks for RIS.[33]

## 4.2 Implementation of the RPG programme 2022-2024

The new work program for 2022–2024 was approved during the RPG (Groupe de travail du règlement de police) meeting in August 2021. In this report the focus lays on a few of the new and relevant ones for IWT.

The promotion of alternative fuel use in inland navigation is a significant factor. The RPG working group will draft new police regulations as a result of the need for new restrictions brought on by new fuels.

The modification of Rhine Police Regulation (RPR) Article 6.21 regarding pushed barges on the starboard side is another noteworthy change. The issue of modifying Article 6.21 has been explained by the European Inland Waterway Transport Platform. It is related to allowing the transportation of two pushed barges on the SB side. The CCNR is aware of the issue, and this item is on the work schedule.[34]

Another issue that needs to be addressed is the problem analysis related to navigability. Safety depends on the navigational condition of Automatic Identification System's (AIS) being visible. The sailing status can be changed manually or automatically in a number of ways. However, AIS defines a wide range of statuses. These should be whittled down to the top four by working group RPG: sailing, at anchor, moored, and aground.[35]

The potential RPR adaptation in light of automated navigation is another crucial topic that must be dealt with. The Rhine Police Regulation contains numerous regulations that are no longer appropriate

[32] Ibid. p.
[33] Ibid. p. 14
[34] European Inland Waterway Transport Platform: IWT Annual Report 2021, p. 26.
[35] Ibid.

for an autonomous watercraft. The Mannheim Act has a ministerial directive that the CCNR should support automated sailing. Police regulations ought to be prepared as a result.[36]

Additionally, the expansion of the electronic reporting requirement to everyone is being highlighted. The CCNR seeks to make the electronic reporting requirement applicable to ships and convoys that are not currently required to report. IWT suggested the CCNR that all nations should implement mandatory reporting on the same schedule.

## 4.3 Autonomous sailing

The next generation of ships, which are simply an expansion of remotely controlled vessels, are called autonomous ships. Through the use of detectors, sensors, cameras, satellite communication systems, and other devices, the navigation and performance of such vessels will be managed from an onshore operating center. People will still need to watch the vessel from the shore or work on it when it needs maintenance. Although it is anticipated that crew personnel won't completely vanish, their role and responsibilities will undoubtedly change. This strategy will, on the one hand, give the industry a chance to attract experts with new credentials and, on the other hand, help to deal with the personnel shortage.[37]

Clearly, a reduction in crew-related operational expenses and safety are advantages of autonomous shipping. The crew expenditures make about one-third of the total operating costs for an inland waterway vessel. Energy-intensive crew amenities, such heating and restrooms, may not be needed aboard autonomous vessels. Thus, reducing the crew can drastically lower a vessel's overall operating expenses.[38]

Due to the human aspect being reduced or eliminated, autonomous shipping may also lessen errors that are caused by people. Furthermore, since there is no crew to rest, an autonomous vessel can operate continuously. By doing this, the journey will be shorter and the shipment will reach its destination more quickly.

Member States such as Belgium, Finland, Germany, Netherlands, Sweden, Norway etc. are launching efforts and/or creating plans and future road maps for intelligent and autonomous shipping for inland waterways. Test regions emerge allowing operational test cases to establish best practices and detect legal and regulatory gaps. The objective is to provide a suitable, secure, and attractive environment for the advancement and use of smart shipping. For example, 22 partners from nine different nations collaborate on the NOVIMAR[39] project to investigate vessel platooning. The essential building element of the vessel train transport idea is a leader vessel with crew. Numerous lowly staffed or unmanned follower vessels of various class sizes follow this leading vessel. Although the follower vessels retain

[36] Ibid.
[37] Working Party on Inland Water Transport: Autonomous shipping and Inland Navigation, p. 1. URL https://unece.org/DAM/trans/doc/2018/sc3/ECE-TRANS-SC3-2018-inf_06e.pdf.
[38] Ibid. p. 2.
[39] NOVIMAR Vesseltrain. URL: https://novimar.eu/.

their own maneuverability, the crewed leader vessel will be in charge primarily. This makes it possible for individual vessels to operate with minimal or no crew. [40]

A second project that should be mentioned in this report is AUTOSHIP – Autonomous Shipping Initiative for European Waters[41]. The goal of AUTOSHIP is to hasten the transition in the EU to the next generation of autonomous ships. In order to demonstrate the project's operational capabilities in scenarios including short sea shipping and inland waterways, two separate autonomous vessels will be built and put into service, with a focus on the movement of commodities. By the end of 2023, commercial applications of the technology underlying the next generation of autonomous ships will be possible thanks to the use cases developed within the project, which will optimize efforts and investments in order to advance common standards and enable operations in a shorter timeframe than anticipated.[42]

Autonomous sailing is also a key topic for the RPG working group. Rules for the track control assistant (TCA) are being created inside the CCR working group RPG. This relates to "trackpilots" that continuously travel a predetermined path. These systems do not currently have any regulations, but the CCNR is creating them. Although the CCNR seeks more restrictions than are required, regulation is desirable.[43]

Inland Waterway Transport EU proposed different regulations in this regard. They first suggested a document that only outlines the essential technical standards and advises that the other information be included in a best practice guide. Second, they don't think any additional training is required in terms of preparation. In addition to a skipper's standard skills, an instruction from the supplier is sufficient.[44]

## 4.4 Electronic reporting

CCNR has gradually implemented electronic reporting requirements for vessels or convoys transporting containers on the Rhine since January 1st, 2010. The CCNR voted to extend the electronic reporting requirement to vessels with fixed tanks on board at its spring plenary session in 2017. This decision will take effect on December 1, 2018.[45]

The Central Commission authorized the extension of the electronic reporting requirement to the vessels mentioned in Article 12.01(1)(a) and (d) through (h) of the Rhine Police Regulations at its autumn plenary session in 2019. The expansion will take effect on December 1, 2021.

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[40] Inland Navigation Europe: Connected & automated shipping. URL: https://www.inlandnavigation.eu/connected-automated-shipping/

[41] AUTOSHIP – Autonomous Shipping Initiative for European Waters. URL: https://www.autoship-project.eu/.

[42] Ibid.

[43] European Inland Waterway Transport Platform: IWT Annual Report 2021, p. 26.

[44] Ibd.

[45] CCNR: Electronic reporting (ERI). URL: https://www.ccr-zkr.org/12040800-en.html.

With effect from December 1, 2021, the electronic reporting requirement contained in article 12.01 of the RPR, which is now performed through radiotelephony, in writing, or electronically, must be carried out electronically. The below-listed vessel categories will be subject to the electronic reporting obligation, which was previously restricted to convoys and ships with containers on board.

- "Vessels carrying goods covered by the AND [European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways] under article 12.01(1)(a) of the RPR;
- Vessels of a length exceeding 110m under article 12.01(1)(d) of the RPR;
- Cabin vessels under article 12.01(1)(e) of the RPR;
- Seagoing vessels under article 12.01(1)(f) of the RPR;
- Vessels with an LNG system aboard under article 12.01(1)(g) of the RPR;
- Special transport operations as construed by article 1.21 under article 12.01(1)(h) of the RPR."[46]

Compared to reporting by radio telephony or in paper, electronic reporting makes it easier for data to be sent between vessels and sector traffic centers. RIS depends on electronic reporting, which facilitates:

- „strategic traffic-related information,
- traffic management,
- the prevention of accidents,
- statistics,
- the implementation of requirements."[47]

Additionally, they lessen the administrative burden on inland waterway operators and boat captains. As a result, this is a step that supports the adoption of new technology and helps modernize inland navigation. It plays a significant role in the CCNR's RIS strategy.

## 4.5 River Information Services (RIS)

Like all other areas of transportation, inland navigation has a constant requirement for information sharing. The sharing of traffic and transportation-related information, which improves the security and effectiveness of inland waterway transportation, is particularly significant. Focal aspect is a swift demand oriented electronic data transfer between water and shore through real-time exchange of information.

[46] Ibid.
[47] Ibid.

The harmonized information services known as River Information Services serve inland navigation traffic and transport management, including interfaces to other forms of transportation. An intensive use of inland waterways is facilitated by RIS, which seek to ensure a safe and effective transportation procedure. RIS are open for connections to the commercial sector but do not engage with internal commercial transactions between carriers.[48]

The use of Notices to Skippers (NtS), Electronic Reporting of Voyage-, Cargo-, and Persons on Board (ERI), Inland Electronic Navigational Charts (IENC), and the AIS for vessel tracking and tracing are just a few of the services related to RIS that are currently maintained.

A EU framework directive has established basic standards for RIS implementation since 2005, enabling the cross-border compatibility of national systems. To unify the existing standards for specific river information systems and services within a common framework, comprehensive and international guidelines for RIS are regularly produced.[49]

Several EU policy papers, including the EC White Paper, TEN-T Guidelines, NAIADES, and Logistics Action Plan, illustrate the importance of RIS in terms of policy.

As part of the Junkers Commission's Digital Single Market (DSM) policy, the EC introduced the Digital Inland Waterways Activity (DINA) program in 2015. The DINA program aims to digitalize IWT information flows in order to facilitate IWT's smooth integration into multimodal logistical networks.

### 4.5.1 Inland ECDIS

In maritime transport, it is obligatory to be equipped with up-to-date paper nautical charts. This obligation can also be achieved with an Electronic Chart and Display Information System (ECDIS). This ECDIS is internationally standardized in the International Hydrographic Organization (IHO). These standards define the design of the electronic chart and the standards for the equipment.[50]

On this basis, the Inland ECDIS Standard was created for the inland waterway sector. Thus, the internationally already defined standards were supplemented to the inland waterways. Thus, the Inland ECDIS is "sea ECDIS" compatible, which has a great importance for the inland skipper in the sea/coastal area. By lessening the effort of the skipper who is piloting the vessel and enhancing situational awareness, inland ECDIS systems aim to improve the safety and effectiveness of inland navigation. RIS data is combined by Inland ECDIS systems from various sources, such as Inland AIS equipment, to create a single display system (on multiple screens if available).

[48] EUR-Lex: Inland waterways - river information services (RIS). URL: https://eur-lex.europa.eu/EN/legal-content/summary/inland-waterways-river-information-services-ris.html.
[49] EuRIS: What is RIS. URL: https://www.eurisportal.eu/RIS?KL=en.
[50] Wasserstraßen- und Schifffahrtsverwaltung des Bundes: Inland ECDIS Standard. URL: https://www.elwis.de/DE/Service/Telematikanwendungen/Inland-ECDIS/Inland-ECDIS-Standard/Inland-ECDIS-Standard-node.html.

The primary objectives of the interim Working Group for Electronic Chart Display and Information System for Inland Navigation (CESNI/TI/Inland ECDIS) shall be in accordance with Resolution 2019-II-6:

- "to prepare proposals for the revision of the technical specifications for the Standard Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS Standard), as referred to in CESNI's multi-annual work programme for 2019-2021;
- to provide advice regarding the proper implementation of the standards in the field of RIS, in particular regarding Inland ECDIS;
- to provide advice and analysis on standards in the field of RIS, in particular regarding Inland ECDIS."[51]

The current edition of the Inland ECDIS Standard contains the text in English, German, French and Dutch and is published by the Central Commission for the Navigation of the Rhine.[52]

While Edition 1.02 of the Inland ECDIS Standard was a purely European standard, Edition 2.0 and higher are an international standard. The data standard is also used in North and South America as well as in the Russian Federation and is also available to other regions of the world.[53]

### 4.5.2 Electronic Ship Reporting (ERI)

The standard for electronic reporting in inland navigation aims to allow electronic data exchange between partners in inland navigation as well as with partners in the multi-modal transport chain that includes inland navigation. It also enables electronic data interchange (EDI) for reporting purposes to and between competent authorities.

Internationally recognized trade and transportation standards and recommendations serve as the foundation for the requirements for electronic reporting in inland navigation. These are enhanced by it for inland navigation. The guidelines take into account lessons learned through applications of reporting systems in various nations as well as from European research and development projects. Included are innovative initiatives that the Expert Group "Electronic Reporting International (ERI)" has established.[54]

The transition to a paperless environment in inland transportation will be made possible by electronic messaging and ship reporting. The appropriate information is accessible when and when it is needed. The communications are directed at the right parties in order to guarantee prompt dispatch, transparent processes, suitable controls, and streamlined water transport operations.

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[51] CESNI: Inland ECDIS. URL: https://ris.cesni.eu/31-en.html.
[52] CCNR: Electronic Chart Display and Information System for Inland Navigation (Inland ECDIS) https://www.ccr-zkr.org/files/documents/ris/ies23_e.pdf#search=%22ECDIS%22.
[53] CCNR: Leaflet Inland ECDIS. URL: https://www.ccr-zkr.org/files/documents/workshops/wrshp181011/Leaflet_Inland_ECDIS_de.pdf.
[54] CCNR: Leaflet Electronic Ship Reporting in Inland Navigation. URL: https://www.nweurope.eu/media/15847/eri-guidelines_e.pdf.

All parties involved in transport operations, including authorities, lock operators, emergency services, port operators, and fleet operators, need information on vessel and cargo data over a wide area. These are the rationales behind the implementation of electronic ship reporting systems.[55]

The temporary Working Group for Electronic Reporting International (CESNI/TI/ERI) should have the following primary missions in accordance with Resolution 2019-II-7:

- "to prepare proposals for the revision of the technical specifications for the Standard Electronic Reporting International (ERI Standard), as referred to in CESNI's multi-annual work programme for 2019-2021;
- to provide advice regarding the proper implementation of the standards in the field of RIS, in particular regarding ERI;
- to provide advice and analysis on standards in the field of RIS, in particular regarding ERI."[56]

Supporting documentation for the implementation and use of the relevant electronic reporting standards, such as explanations and definitions of the messages' and reporting processes' usage, can be accessed on the ERI Expert Group's website.[57]

### 4.5.3 Notices To Skippers (NtS)

One of the most popular forms of information in inland navigation is notices to skippers. They have typically been disseminated verbally over VHF radio, in writing, on notice boards, or by fax. In the recent years, web services have been set up in the majority of nations. However, these services only offer information in the native tongue. On a river like the Rhine, where there are just three languages, this would be okay, but it poses a lot of issues on a European scale. For instance, a skipper on the Danube would need to be proficient in reading notices written in German, Slovak, Hungarian, Croatian, Serbian, Bulgarian, Romanian, and Russian. Therefore, there was an urgent need for a standard that offers automatic translation of the most crucial safety-related information.[58]

In this regard, authorities on the waterway, both national and regional, are required to alert users to any problems that might affect accessibility and safety. The Notices to Skippers are used to communicate information such as the condition of inland waterway infrastructure (such as bridges and locks), failures of navigational aids, temporary closures of waterway sections or other types of infrastructure, works, information about water level and water depth, ice information, and weather alerts. The international standard for Notices to Skippers offers a standardized data format that can be used to distribute notices via email or the Internet (pull services) (push services).[59]

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[55] CESNI: Electronic Ship Reporting. URL: https://ris.cesni.eu/32-en.html.
[56] Ibd.
[57] CESNI. URL: https://ris.cesni.eu/.
[58] CCNR: Leaflet Notice to Skippers. URL: https://www.ccr-zkr.org/files/documents/workshops/wrshp181011/Leaflet_NtS_en.pdf.
[59] CCNR: Notice to Skippers. URL: https://ris.cesni.eu/33-en.html.

The employment of contemporary information technology on board inland navigation vessels, and in particular the sending of alerts to skippers via River Information Services, will be encouraged by the worldwide Standard for Notices to Skippers. The growth in economic efficiency and safety in inland navigation is being facilitated by the dissemination of alerts to skippers across international boundaries and linguistic boundaries. To guarantee River Information Services' efficient and secure sending of notices to skippers, a global standard is required.[60]

The term "Notices to Skippers" refers to the international standard for the distribution of notices to skippers on inland waterways as established by CCNR and by Commission Regulation (EC) 416/2007 of March 22, 2007, regarding the technical specifications for Notices to Skippers as referred to in Article 5 of Directive 2005/44/EC of the European Parliament and of the Council on harmonized river information services.[61]

Among the fundamental functions of NtS are:

- “Fairway and traffic related messages with information about waterway sections or objects (e.g. locks, bridges) such as suspension of navigation, reduced passage heights, widths or depth
- Water level related information with information about water levels, lowest fairway depths according to riverbed surveying, vertical clearance under bridges and overhead cables, discharge, flow regime or water level forecasts
- Ice messages containing information about obstructions and suspension of navigation caused by ice.”[62]

Pursuant to Resolution 2019-II-9 the principal missions of the temporary Working group for Notices to Skippers (CESNI/TI/NtS) shall be:

- “to prepare proposals for the revision of technical specifications for the Standard Notices to Skippers (NtS Standard), as referred to in CESNI’s multi-annual work programme for 2019-2021;
- to provide advice regarding the proper implementation of the standards in the field of River Information Services (RIS), in particular regarding NtS;
- to provide advice and analysis on standards in the field of RIS, in particular regarding NtS.”[63]

[60] CCNR: Leaflet Notice to Skippers.
[61] Ibid.
[62] Donau River Information Services: Notices to Skippers (NtS). URL: https://www.doris.bmk.gv.at/en/services/river-information-services/ris-standards/notices-to-skippers-nts.
[63] CCNR: Notice to Skippers.

### 4.5.4 Vessel Tracking and Tracing Inland AIS

The Automatic Identification System (AIS) is a ship-borne radio data system that allows equipped ships to communicate with shore stations and exchange static, dynamic, and voyage-related vessel data. The identification, position, and other information of the vessel are broadcast periodically by ship-borne AIS stations. Ship-borne or land-based AIS stations within radio range can automatically find, identify, and monitor AIS-equipped vessels on a suitable display like radar or Inland ECDIS by receiving these messages.

The usage of AIS is common in marine navigation. There are many AIS devices, including base stations for use on land and Class A mobile stations with limited capability for use by, for example, pleasure craft. Class A mobile stations are required for seagoing vessels covered by the International Maritime Organization IMO[64] SOLAS, and Class B mobile stations have limited functionality.

In this context, Inland AIS is a standardized process for the automatic transmission of nautical data between ships and between ships and shore facilities. As a tool for tracking and tracing inland navigation vessels, it is one of four important technologies for RIS for inland navigation, with the goal of improving safety and efficiency in the sector.

Furthermore, IWT is made safer and more efficient by the RIS, which includes also Vessel tracking and tracing (VTT) of inland navigation vessels. VTT supports on-board navigation, Vessel Traffic Management (VTM) from shore, calamity abatement, transport management, enforcement, and waterway dues and port infrastructure fees. Inland AIS works as a broadcast system that relies on the transmission of very high frequency radio signals between shipborne AIS stations (mobile stations) and shore AIS stations, supports this information exchange. Each sort of transmission has been standardized so that Inland AIS equipment may communicate and receive it.

Pursuant to Resolution 2019-II-8 the principal missions of the temporary Working group for Vessel Tracking and Tracing (CESNI/TI/VTT) shall be:

- “to prepare proposals for the revision of the technical specifications for the Standard Vessel Tracking and Tracing (VTT Standard), as referred in CESNI’s multi-annual work programme for 2019-2021;
- to provide advice regarding the proper implementation of the standards in the field of RIS, in particular as regards VTT;
- to provide advice and analysis on standards in the field of RIS in particular as regards VTT.”[65]

The information transmitted by Inland and maritime AIS is identical bar the data specific to inland navigation. The type of information to be transmitted by Inland AIS can be divided into the following categories:

[64] The International Maritime Organization is the United Nations specialized agency with responsibility for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships. IMO's work supports the UN SDGs.
[65] CESNI: Vessel Tracking and Tracing (VTT). URL: https://ris.cesni.eu/34-en.html.

- "Static information, such as vessel number, call-sign, vessel name, vessel type,
- Dynamic information, such as position of the ship with data on accuracy and integrity status,
- Voyage-related information, such as length and beam of combinations, dangerous cargo,
- Information specific to inland navigation such as Standard European Vessel Number, type of combination, number of blue cones/lights as per ADN, estimated time of arrival (ETA) at locks, bridges, terminals, borders and presence of "blue signs",
- AIS has the capability for interaction by ship or shore personnel for short safety related text messaging."[66]

# 5 MAINTENANCE AND IMPROVEMENT OF INLAND WATERWAY TRANSPORT INFRASTRUCTURE

## 5.1 TEN-T Revision

Building an efficient, multimodal, EU-wide transportation network is the goal of the TEN-T program. It includes roads, inland and marine ports, airports, and terminals that are connected via railways, inland waterways, short sea shipping routes, and roadways. The TEN-T policy does this by selecting the transport infrastructure in Member States that should be a component of the TEN-T network and has a high added value at the European level. The TEN-T strategy also establishes standards that this infrastructure must meet, including those for environmental sustainability, high performance transportation, and safety.

The policy is a key tool for creating high-quality, connected, and coordinated transport infrastructure across the EU. It ensures access to jobs and services, encourages efficient and environmentally friendly transportation of people and commodities, and promotes commerce and economic expansion. Additionally, it improves the economic, social, and territorial cohesion of the EU by establishing cross-border transportation networks free of gaps and congestion.[67]

An excellent opportunity to revise the TEN-T Regulation is to make it appropriate for the future while also coordinating the growth of the TEN-T network with the goals of the European Green Deal and the climate targets of the EU Climate Law. The transportation sector must reduce greenhouse gas emissions by 90% from 1990 levels by 2050 in order to become climate neutral by that time.

In order to achieve such significant emission reductions, we require a modern, fully-fledged European transport network that: (1) makes all modes of transportation more sustainable by establishing strict incentives and requirements for the development of transportation infrastructure and by better integrating the various modes into a multimodal transport system; (2) makes sure that new

[66] CCNR: Leaflet Inland AIS. URL: https://www.ccr-zkr.org/files/documents/workshops/wrshp181011/Leaflet_Inland_AIS_en.pdf.
[67] European Commission: Questions and Answers: The revision of the TEN-T Regulation. URL: https://ec.europa.eu/commission/presscorner/detail/en/qanda_21_6725.

infrastructure projects on the network are climate-proof and in line with environmental goals; and (3) provides the infrastructural support necessary to support these projects.[68]

The TEN-T revision will also strengthen the governance and monitoring mechanisms already in place to guarantee network completion on schedule and take advantage of synergies between infrastructure development and transportation operations. This includes legally required work schedules to remove additional barriers to more rapid and effective rail freight and passenger services.

The TEN-T Regulation encourages the creation of a dependable and seamless trans-European transportation system that provides sustainable connection across the European Union, free from physical gaps, traffic jams, and missing links.

Three phases will be used to gradually finish this high-quality network: the core network in 2030, the extended core network in 2040, and the comprehensive network in 2050. The European Transport Corridors, which are the most strategically important section of the network and have the greatest EU added value, are made up of the core and extended core networks.

The following aspects are the main novelties compared to the 2013 Regulation:

- “High infrastructure standards for all modes applied throughout the entire network.
- Nine ‘European Transport Corridors', representing the main arteries of EU transport, that integrate the former Core Network Corridors with the Rail Freight Corridors.
- Stronger synergies between infrastructure planning and the operation of transport services. Examples include higher speeds for train services across the TEN-T network (160 kilometres per hour for passenger services and 100 kilometres per hour for freight), maximum waiting times at borders of 15 minutes for rail freight. Another example is guaranteed good navigation status per river basin on the inland waterways on the TEN-T network.
- Requirements for the deployment, across the TEN-T network, of the charging and refuelling infrastructure needed for alternative transport fuels in line with the Alternative Fuels Infrastructure Regulation. This would mean sufficient charging capacity for cars, vans and trucks at 60 kilometres distance in each direction by 2025 on the core network and by 2030 for the extended core and comprehensive networks.
- Providing safe and secure parking areas for commercial drivers, equipped with alternative fuels infrastructure.
- Use of innovative technologies like 5G to further advance the digitalisation of transport infrastructure, further increasing efficiency, and improving the safety, security and resilience of the network.
- Increased resilience of the TEN-T network to natural and human-made disasters via climate-proofing requirements and environmental impact assessments for new projects, and to the

[68] Ibid.

implications of an accident or breakdown (e.g. by enabling alternative route alignments to the main network).

- The requirement for 424 major cities ("cities") on the TEN-T network to have sustainable urban mobility plans by 2025, in order to align their mobility developments on the TEN-T network. The SUMPs will contain measures such as the promotion of zero-emission mobility and the greening of the urban fleet.
- More transhipment hubs and multimodal passenger terminals in cities to facilitate multimodality, in particular for the last mile of a passenger or freight journey.
- Connect large airports to rail, where possible high-speed rail.
- Making it possible network-wide for lorries to be transported by trains."[69]

Furthermore, the EU set different milestones for the completion of the TEN-T network.

The TEN-T network will be completed in three steps:

1. "By 2030 – completion of the core TEN-T network at existing TEN-T standards such as the electrification of the entire rail network and the possibility to run 740 m trains.
2. By 2040 – completion of the extended core network according to the new standards such as the 160 km/h minimum line speed for passenger rail. * The new standards proposed in the revision, in particular on green transport and enhanced digitalisation, will apply by this date for both the core and extended core network. ERTMS shall also be deployed by 2040 on the entire TEN-T network and national systems being removed. The 2040 milestone has been added to accelerate network completion in view of reaching the EUs climate ambitions by 2050.
3. By 2050 – completion of the entire Trans-European Transport Network, including the sections within the comprehensive network."[70]

According to the impact assessment, the TEN-T Regulation revision will have a large positive economic impact.

By 2050, relative to the existing state of affairs, we can anticipate a GDP gain of 2.4% after accounting for all the additional measures. This results in an increase of the GDP of €467 billion in 2050.

New jobs will also be created by the several projects that must be carried out in order to finish the TEN-T. The increased investment prompted by the updated TEN-T is anticipated to boost employment by about 0.5% by 2050, or 840 000 more jobs.

Overall CO2 emissions are anticipated to be reduced under the revised TEN-T Regulation by 0.3% along the comprehensive network and 0.4% along the core network by 2050.

[69] Ibid.
[70] Ibid.

Over the period of 2021–2050, it is predicted that CO2 emissions will reduce external expenses by around €387 million, while air pollution will do so by about €420 million. This is done mostly through the anticipated move toward environmentally friendly modes of transportation including rail and inland waterways. This will supplement the reductions in greenhouse gas emissions and air pollution brought about by earlier proposals, such as the CO2 performance standards for cars and vans and the rollout of the necessary charging stations and alternative refueling points as contemplated by the Alternative Fuels Infrastructure Regulation.[71]

According to the inland waterway transport sector, represented by EBU, ESO and the IWT Platform, the strengthening of inland waterways and the support of sustainable modes in the TEN-R revision is very welcome.

Inland waterway transportation now transports around 550 million tonnes of goods annually and is becoming more and more significant in the area of cruising and passenger transport. It has over 40,000 km of navigable waterways and 250 inland ports.

Europe's societies and major industries rely on a continuous flow of goods transported by rivers. European waterways, which have unencumbered capacity as opposed to clogged roadways, have a large potential for modal shift in line with the EU Green Deal.

As a result, the Commission's chosen strategy, which places a strong emphasis on the "Good Navigation Status," is warmly welcomed. This strategy should make it possible to address the problems with the current TEN-T guidelines' implementation and incorporate climate resilience into a river basin approach. The inland waterway industry is also happy that the Commission recognized the need of "mooring and rest areas" as an essential part of our infrastructure.[72]

Additionally, the revision is concentrating on the establishment of a network of alternative fuels throughout the European waterways. IWT is heavily reliant on the availability of adequate alternative fuels and energy supplies in both inland and coastal ports, as well as throughout the entire network of navigable waterways, in order to complete its energy transition.[73]

The European Commission also acknowledged the shortcomings in the sea ports regarding the handling capacity of the entire hinterland chain, which since many years causes huge congestion problems and costs to the IWT sector. By imposing the need for “dedicated handling capacity for inland waterway vessels” in the seaports, this is considered to contribute to shift more freight towards inland waterways.

The European Commission also recognized the deficiencies in the sea ports' handling of the entire hinterland chain, which has been costing the IWT sector greatly in terms of congestion for many years.

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[71] Ibid.
[72] Inland Waterway Transport Platform: The Inland Waterway Transport sector welcomes the strengthening of Inland Waterways and the support of sustainable modes in the TEN-T revision. URL: https://www.inlandwaterwaytransport.eu/wp-content/uploads/Press-release-IWT-sector-on-the-TEN-T-revision.pdf.
[73] Ibid.

It is thought that requiring specific processing capacity for inland waterway vessels in seaports will encourage more freight to travel by inland waterways.[74]

## 5.2 Fit-for-future Infrastructure

To meet the increasing demand for public transportation and municipal logistics, it is difficult and expensive to expand the existing land infrastructure. Since ancient times, rivers and canals have been the main routes for commerce and trade, linking ports with inland centers of production and consumption. Investment in transshipment facilities and waterway infrastructure helps to reduce expensive traffic in and around cities. Waterways are much more than just transportation routes, yet, at the same time. The waterfront is a shared, climate-resilient area where it is advantageous to live, work, pleasure, and engage in a flurry of concurrent activities.[75]

One important aspect of the vision on fit-for-future waterways is the quality of the infrastructure which includes a life cycle approach and performance upgrades of the infra structure ensure the quality of the network, reliable navigation conditions guarantee punctual arrivals and swift transfers to other modalities as well as free capacity on waterways relieve clogged land routes.

Furthermore, referring to the modal shift aspect, inland ports serve as smart multimodal hubs leading to the most climate friendly freight transport solutions. In addition, clean waterbuses, watertaxis and cruises enhance sustainable mobility for people and inland shipping swiftly connects to other modes of transport.

Regarding the green fleet and clean energy aspect, the vision for future waterways is about to be that all ships, from large to small and for freight and passengers sail on zero-emission sources/carriers. Furthermore, clean energy and refueling infrastructure should be available and well accessible at berths along waterways, in ports and port facilities. Also, new locks are standardly equipped with hydropower turbines ensuring zero-emission lock operations and inland ports produce, store and supply clean fuels to all modes of transport. The waterway network links up with energy grids and vessels contribute to equalize the energy grid.

On 22. December, the Council of the EU presented several conclusions on the ongoing development of inland waterway transport. This relates very much to the NAIADES III programme.

The key aspects are as follows:

- “Recognizes the importance of inland waterway transport on the path towards zero-emission mobility as a sustainable and less congested mode of transport, and underlines the need to fully develop its potential in a sustainable manner, in concrete steps and through appropriate measures at both Union and Member-State level, while ensuring its competitiveness.

[74] Ibid.
[75] Inland Navigation Europe: Our vision on fit-for-future waterways. URL https://www.inlandnavigation.eu/wp-content/uploads/2021/02/INE_Vision_fit_for_future_waterways.pdf.

- Recognizes the need to take into account the different circumstances in the Member States with regard to the potential of inland waterways.
- Stresses the importance of developing strategies for tackling the impact of inland waterway transport on climate change and the environment and vice versa by means of dedicated research and connected investments.
- Recognises the strong impact of climate change on inland waterway transport, in particular on navigability, operations and water management, as evidenced by ground-water level changes but also by the severe droughts and periods of heavy rainfall in recent years, and underlines the need to improve navigability by implementing the Good Navigation Status in line with the TEN-T guidelines.
- Recognizes the key role of inland waterway transport in the decongestion of urban agglomerations and in the shipment of heavy goods and large volumes of important construction materials, agricultural, steel, chemical and energy products, including the export of Ukrainian goods through the Solidarity Lanes, in particular via the Danube.
- Underlines the need to tackle all the remaining administrative and infrastructure bottlenecks in the short, medium and long term, while respecting environmental law, in order to increase the efficiency and the capacity of inland waterway transport and ensure safe navigation in general. […]
- Focuses on the cornerstones of effective inland waterway transport and the need for further development and coordination in the following areas:
    - fleet renewal, where appropriate, to achieve greater transport efficiency, economic operation of smaller vessels and where possible zero-emission mobility, adaptation to shallow waters while taking into account the need to decarbonise transport and enhance climate resilience, safety of navigation by respecting and protecting the local environmental conditions of each particular inland waterway;
    - reliable, sustainable and continuously well-maintained infrastructure with adequate, economically feasible navigability, in particular, during low-water periods, ensuring swift links to other transport modes;
    - safe and secure workplaces for workers, even in unforeseen situations such as the COVID-19 pandemic;
    - digitalisation to support the development of all the above as well as automation, while considering energy efficiency and easy-to-recycle equipment.
- Supports the preparation and adoption of standards for technical requirements, qualification of crew members and information technology by CESNI, and further recommends the development of technical standards for the use of alternative fuels, sustainable and zero emission technologies and automation as well as professional qualification standards, as part of the abovementioned CESNI standards.
- Welcomes plans for smart and sustainable improvements to inland waterway transport and ports. Invites the Commission to present its proposal for the revision of current Union legislation in the field of River Information Services, while taking into account the work done by CESNI in this field and envisaging a permanent operational structure for a single point of access, with a view to improving harmonization and interoperability, where geographically

possible, and also supporting research on climate resilience and smart shipping. Considers that inland waterways and ports are an essential component of multimodal transport and thus should be integrated in the revision of the Combined Transport Directive. The aim should be to establish the Directive as an effective tool, supporting multimodal freight operations, with a particular focus on seamless cross-border connections and interoperability, where geographically possible, which would be further strengthened through digitalisation of the inland waterway transport sector."[76]

# 6 CONCLUSIONS

Climate change is a pressing issue for the Inland Navigation industry and society as a whole. The challenge of reducing greenhouse gas emissions presents a difficult but significant opportunity for the EU to meet its goals of climate neutrality and zero emissions. As a result, the Inland Navigation community must prioritize and invest resources in related areas.

Decarbonization is a crucial goal for the transport industry, and inland shipping plays a vital role in achieving this. The European Green Deal and the Sustainable and Smart Mobility Strategy have outlined the need for substantial effort in this area. Inland waterway transport, as well as rail, is recognized as one of the most environmentally friendly forms of transportation and is essential for reaching decarbonization targets. By 2030 and 2050, there should be a significant increase of 25% and 50% in inland waterway and short-sea shipping. To meet these objectives, the current transportation framework must be re-evaluated and redesigned.

In 2020, the European Commission announced a follow-up to NAIADES II, with the primary objectives of renewing the barge fleets and improving access to funding, in its Sustainable and Smart Mobility Strategy. In June 2021, the NAIADES III "Boosting future-proof inland waterway transport" Communication was released to facilitate the shift towards using inland waterways for transportation. The Communication focuses on two main areas: sustainability and digitalization. The Inland Waterway Transport Action Plan for 2021–2027 was established under the NAIADES initiative, with the goal of increasing the use of inland waterways for transportation and transitioning to emission-free inland waterway transportation.

In July 2021, the European Commission introduced the Fit for 55 package as part of its plan to implement the European Green Deal. The package includes a range of initiatives such as revising the Energy Taxation Directive (ETD) to align EU law with the 2030 objective, expanding the Emissions Trading System (ETS), updating the Renewable Energy Directive, among others. The goal of the package is to reduce net greenhouse gas emissions by at least 55% by 2030 and achieve climate neutrality by 2050, which is known as the "Fit for 55" objective. The ETD, for instance, aims to create a

[76] European Council: Council conclusions on the "Ongoing development of inland waterway transport (NAIADES III)". URL: https://www.consilium.europa.eu/en/press/press-releases/2022/12/05/council-conclusions-on-the-ongoing-development-of-inland-waterway-transport-naiades-iii/.

tax structure for energy products that both supports the internal market and encourages the transition to clean energy by providing incentives.

In addition to the broader topics, the technical and nautical aspects of Inland Waterway Transport must also be considered. According to Inland Waterway Europe, the Nautical & Technical Committee in 2021 has been focusing on the technical regulations for inland vessels. The NTC believes that the IWT should focus on laws that are necessary for innovation as well as laws that may affect the existing fleet of ships. Additionally, it is important to pay close attention to navigation (police) laws in order to increase safety. In this regard, the CESNI committee is responsible for developing standards in the inland navigation sector. This resolution takes into account CCNR's "Vision 2018" for sustainable growth in inland navigation and aims to establish consistent, up-to-date, and user-friendly regulations.

In terms of the maintenance and improvement of IWT infrastructure, the EU's TEN-T program aims to create an efficient, multimodal transportation network throughout the EU. The network includes various modes of transportation such as roads, ports, airports, and terminals that are connected through railways, inland waterways, short sea shipping routes, and roadways. The TEN-T policy achieves this by identifying transport infrastructure in Member States that have high added value at the European level and should be a part of the TEN-T network. The TEN-T strategy also sets standards for this infrastructure, such as environmental sustainability, high performance transportation and safety. Revising the TEN-T Regulation presents a valuable opportunity to align it with the future and coordinate the growth of the TEN-T network with the goals of the European Green Deal and the EU Climate Law's climate targets. In order to achieve climate neutrality by 2050, the transportation sector must significantly reduce greenhouse gas emissions, aiming for a reduction of 90% from 1990 levels. To significantly reduce emissions, we need a modern European transport network that integrates all modes of transportation, establishes strict incentives and requirements for sustainable infrastructure development, ensures new infrastructure projects align with environmental goals, and provides necessary support for these projects.

Regarding the Fit-for-future infrastructure, it is important to say that investing in transshipment facilities and waterway infrastructure can help reduce traffic and costs in cities, meet demand for public transportation, and support municipal logistics. Waterways have been key routes for commerce and trade for centuries and can serve multiple purposes, such as providing a shared, climate-resilient area for living, working, and leisure activities.

In conclusion, the future of inland waterway transport in Europe is promising, with a focus on sustainable and smart growth. The EU's TEN-T program aims to build an efficient, multimodal transportation network that is in line with the goals of the European Green Deal and the EU Climate Law's climate targets. The use of alternative fuels, the modification of regulations, and the integration of automated navigation are important steps to achieving these goals. Additionally, the CCNR's work program for 2022-2024 includes drafting new police regulations for alternative fuels, modifying the Rhine Police Regulation, and expanding the electronic reporting requirement. The goal is to increase the use of inland waterways for transportation and transition to emission-free inland waterway transportation. To achieve this, it is important to continue to focus on sustainability, digitalization, and nautical and technical aspects of the sector.

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