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## **Working Party on Inland Water Transport**

### **Sixty-third session**

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Item 3 (a) of the provisional agenda

**Current situation and trends in inland water transport: Revision of the White Paper on efficient and sustainable inland water transport in Europe**

## **Draft of the White Paper on efficient and sustainable inland water transport in Europe, revised**

### **Note by the secretariat**

The annex to this document contains the consolidated text of the draft of revised White Paper on efficient and sustainable inland water transport in Europe (2011). The text includes the chapters issued as documents ECE/TRANS/SC.3/2019/1–ECE/TRANS/SC.3/2019/3.

## Annex

# White Paper on efficient and sustainable inland water transport in Europe

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## Introduction

The “White Paper on Efficient and Sustainable Inland Water Transport in Europe” is the third edition of a policy paper on the current situation, trends and challenges in Inland Water

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\* See ECE/TRANS/SC.3/2019/4.

Transport (IWT) on European inland waterways of international importance in the region of the Economic Commission for Europe (ECE). Recommendations are made in key areas of pan-European cooperation to promote the development of the sector. Guidance was provided by the Working Party on Inland Water Transport (SC.3) for the draft.

In 1996, SC.3 had reviewed its work on developing a coherent navigable network of inland waterways in Europe. The first “White Paper on Trends in and Development of Inland Navigation and its Infrastructure” (TRANS/SC.3/138) discussed and described the situation on European rivers and canals. With the establishment of the European Agreement on Main Inland Waterways of International importance (AGN), the White Paper can be considered as one of the first steps towards developing a European network of waterways.

In 2006, Transport Ministers at the third pan-European Conference on Inland Water Transport (Bucharest) recognized the necessity to promote IWT as a commercially attractive and environmentally compatible mode of transport through coordinated action. In 2007, an action plan for implementing the decisions of the Bucharest Conference was adopted by the ECE Inland Transport Committee (ITC) (resolution No. 258). ITC commended a general policy document on the advantages of IWT and on its development that should be issued regularly to decrease market fragmentation of IWT in Europe and to establish the principle of free navigation on inland waterways at the pan-European level. ITC called on SC.3 to proceed with preparing the new White Paper in close cooperation with the European Commission, River Commissions and other major stakeholders.

In the second White Paper (ECE/TRANS/SC.3/189), IWT in the ECE region was assessed on the basis of first White Paper for progress or lack thereof in developing the sector. The Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3) finalized the draft of the main work in February 2011 at its thirty-eighth session and approved it on behalf of SC.3. The final version of the second White Paper was endorsed by the seventy-third session of ITC in March 2011.

This third edition follows from the International Conference on Inland Water Transport (18 and 19 April 2018, Wrocław, Poland) and particularly from the ministerial declaration “Inland Navigation in a Global Setting”, which was supported by ITC resolution No. 265 “Facilitating the Development of Inland Water Transport” of 22 February 2019. The overall objective is to assess the current situation of IWT in Europe, review progress since 2011, identify current trends and challenges, and propose recommendations to further promote the transport mode.

## **Chapter 1. The Role of Inland Water Transport in European Inland Transport**

### **A. Background**

Since the dawn of history, goods and persons were transported on inland waterways, and IWT remains an important and integral part of transport today. Most of the world’s population resides in the proximity of river deltas, coastal areas and river estuaries. As such, the use of waterways for the transport of all types of goods remains a desirable option. Even more so, globalization of the world’s economy multiplies the total amount of transported goods. The constantly growing share of products and raw materials transported daily to Europe are now delivered from countries all around the globe.

Shipping, in general, which includes the inland waterway sector, is an important pillar on which the world and the European economies rely.

The comparative advantages of IWT in transporting large quantities over longer distances include safety, sustainability, and cost-efficiency in terms of overall transport costs, the energy consumption per ton-kilometre, low rate of accidents and low congestion.

IWT has proven its reliability, and it is environmentally friendly. Emissions from barges per ton-kilometre are lower than that of trains or trucks. On inland vessels, new technologies such as a contemporary drive train and a “clean” and efficient engine could further reduce

pollutants. A standard 110 m-long vessel transports around 3,000 metric tons of cargo – more than 200 TEU – or over 100 journeys of a 40-ton truck.<sup>1</sup>

However, the sector lacks a strong advocate to focus the general public and the markets on IWT and its potential. To some extent, this is due to the historically fragmented and diverse structure of shipowners across Europe. Western Europe still lacks any significant domination in the domain of inland water transport and vessels are often individually owned. Entrepreneurs furthermore lack the time and the resources to consider wider policy implications. This is contrary to the situation in the most central and eastern European countries, where large shipping companies usually own the vessels and employ the operating crews.

On the waterway networks of western Europe, IWT is an open navigation market of vessels from numerous European States. Up until 1998, national markets were generally protected and ships that were registered under the flag of any country could only operate within national borders. Two important exceptions were:

- the river Rhine, on which international traffic dates to the signing of the “Convention of Mannheim” in 1868
- the Danube river, where the “Convention regarding the Regime of Navigation on the Danube” regulates free navigation from 1948.

In 1998, the Cabotage Agreement was implemented in the European Union and permits transport on the entire waterway system, irrespective of the member State of registration. At the time, this was not accompanied by a harmonization of the multitude of national rules and regulations. Thus, the flag under which a ship was registered could still have a significant impact on the operations of its owner. IWT was organized and regulated differently in different countries.

IWT remains a cost-effective, reliable and sustainable mode of transport and could improve the multinational trade-based economic area that is the ECE region.

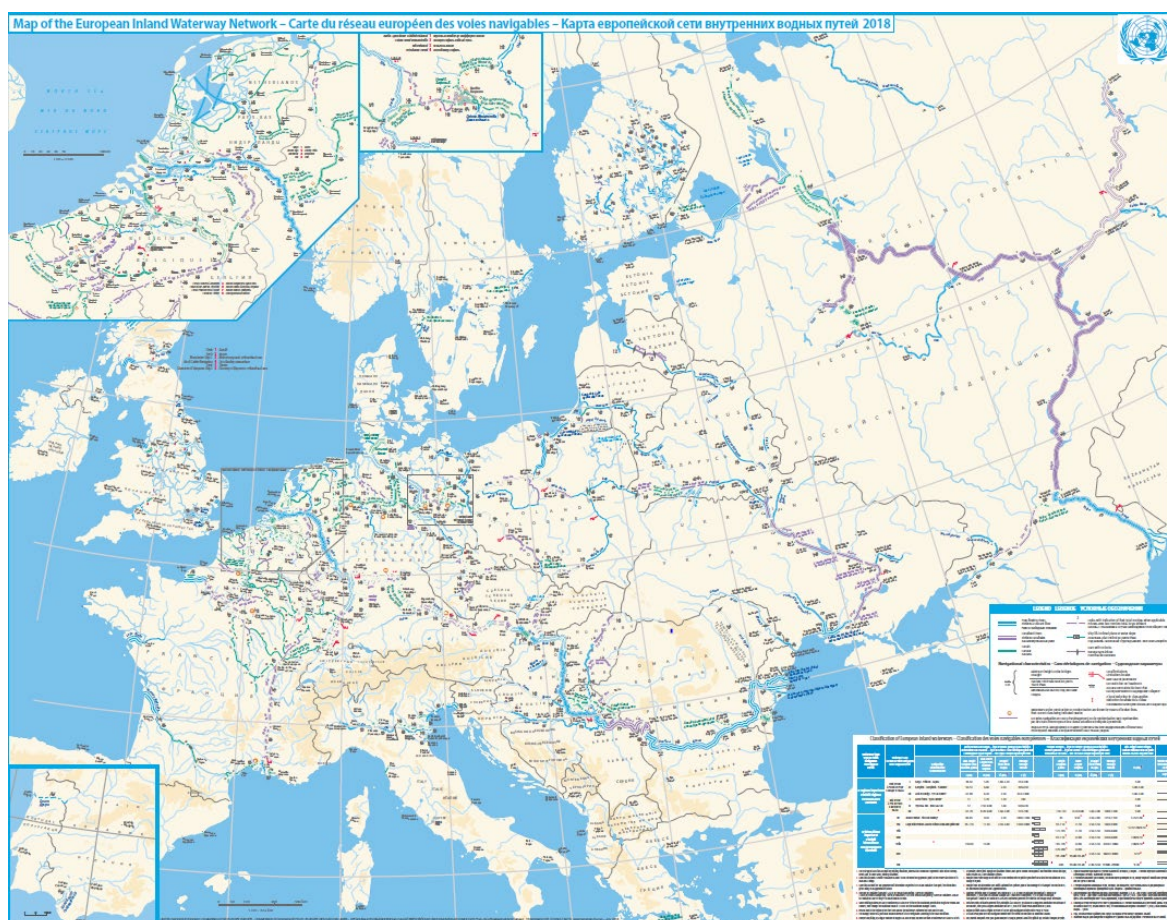
## **B. The Performance of Inland Water Transport in the region of the Economic Commission for Europe**

The map of E waterway network (2019) is given on figure I below.

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<sup>1</sup> Bureau Voorlichting Binnenvaart, Types of Vessels, [www.bureauvoorlichtingbinnenvaart.nl/assets/files/Scheepstypen%20Engels.pdf](http://www.bureauvoorlichtingbinnenvaart.nl/assets/files/Scheepstypen%20Engels.pdf).

Figure I  
**Map of the European Inland Waterway network (2018)** <sup>2</sup>



Source: UNECE.

In tables 1 and 2 below, it can be seen that the use of IWT in the inland transport logistics chains is highly dependent on a country's access to a waterway network:

- Some countries do not have access to any waterway network
- Some countries have extensive waterway networks, e.g. Belgium and the Netherlands
- Some countries have accessible waterway networks, but not in all the parts of the country, e.g. France and Germany.

Table 1  
**Carriage of goods in the ECE region by inland waterway, 2008–2016** <sup>3</sup>  
 (Million ton-kilometres)

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Austria	2 395	2 003	2 376	2 123	2 191	2 353	2 177	...	1 962
Belarus	132	83	110	143	134	84	49	21	21
Belgium	8 746	7 087	9 071	9 251	10 421	10 364	10 451	10 426	10 331
Bulgaria	2 890	5 436	6 048	4 310	5 349	5 366	5 074	5 596	5 477
Croatia	843	727	941	962	772	771	716	879	836
Czechia	28	33	43	42	38	25	27	33	36

<sup>2</sup> UNECE, 2018, [www.unece.org/fileadmin/DAM/trans/main/sc3/AGN\\_map\\_2018.pdf](http://www.unece.org/fileadmin/DAM/trans/main/sc3/AGN_map_2018.pdf).

<sup>3</sup> ECE Statistical Database, Carriage of goods by Inland Waterways by Type of Transport, Topic, Country and Year, [https://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT\\_40-TRTRANS\\_09-TRInlWater/01\\_en\\_TRInlWaterTonKm\\_r.px/table/tableViewLayout/](https://w3.unece.org/PXWeb2015/pxweb/en/STAT/STAT_40-TRTRANS_09-TRInlWater/01_en_TRInlWaterTonKm_r.px/table/tableViewLayout/).

Country	2008	2009	2010	2011	2012	2013	2014	2015	2016
Finland	80	61	76	90	124	121	135	128	103
France	8 557	8 410	9 115	8 704	8 622	8 849	8 524	8 314	8 135
Germany	64 057	55 497	62 278	55 027	58 488	60 070	5 093	55 315	54 347
Hungary	2 250	1 831	2 393	1 840	1 982	1 924	1 811	1 824	1 975
Italy	...	54	135	144	81	89	64	62	67
Luxembourg	367	279	359	305	290	313	285	235	...
Netherlands	...	35 639	40 285	46 410	47 535	48 600	49 413	48 535	49 399
Poland	1 274	1 020	...	...	127	87	104	83	105
Republic of Moldova	...	1	0	0	0	1	1	0	0
Romania	8 687	11 765	14 317	11 409	12 519	12 242	11 760	13 168	13 153
Russian Federation	62 015	51 835	52 880	58 174	76 274	72 547	69 207	60 259	...
Serbia	1 307	872	875	726	605	701	759	865	...
Slovakia	1 101	899	1 189	931	986	1 106	906	741	903
Switzerland	45	41	40	37	50	49	43	47	30
Ukraine	...	2 745	3 837	2 218	312	216	258	284	227
<b>Total</b>	<b>164 774</b>	<b>186 318</b>	<b>206 368</b>	<b>202 846</b>	<b>226 900</b>	<b>225 878</b>	<b>166 857</b>	<b>206 915</b>	<b>147 107</b>

Note: ... data not available.

Source: UNECE.

Table 2

**Cargo transportation by inland waterways in the ECE region, 2011–2015 <sup>4</sup>**

(Thousands of tons)

Country	2011	2012	2013	2014	2015
Austria	9 943	10 714	10 710	10 122	8 599
Belarus	6 711	4 023	4 486	3 758	2 960
Belgium	17 2906	190 288	187 404	190 303	188 258
Bulgaria	14 448	16 378	16 726	16 922	17 201
Croatia	5 184	5 934	5 823	5 377	6 642
Czechia	911	836	608	802	850
France	68 471	68 170	68 926	65 488	63 094
Germany	221 966	223 170	226 864	228 489	221 369
Hungary	7 175	8 135	7 857	7 825	8 163
Kazakhstan	1 082	1 291	1 107	1 321	1 218
Lithuania	95	89	36	47	68
Luxembourg	8 956	8 506	8 987	8 390	7 107
Republic of Moldova	149	144	...	...	...
Netherlands	345 469	350 069	356 062	366 637	359 898
Poland	3 143	2 574	3 185	5 899	5 036
Romania	29 396	27 946	26 858	27 834	30 020
Russian Federation	125 867	137 488	134 860	119 080	118 120
Serbia	2 146	1 998	...	...	...
Slovakia	8 211	8 242	8 107	7 010	5 721
Switzerland	5 678	7 211	6 830	...	...

<sup>4</sup> Ibid, p.5.

Country	2011	2012	2013	2014	2015
Ukraine	9 900	7 800	6 300	6 000	6 400
United Kingdom	3 478	3 693	5 252	5 689	5 594
European Union	526 420	531 452	524 781	552 405	544 712

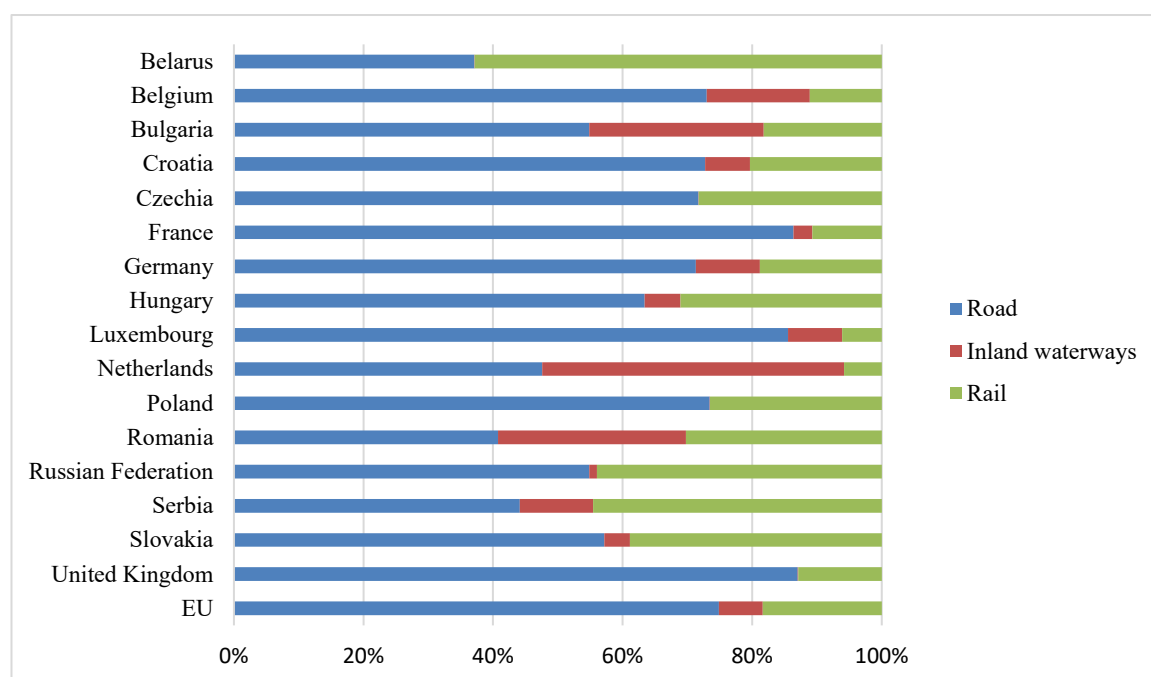
Note: ... data not available.

Source: UNECE.

The share of IWT compared to the other inland transport modes of road and rail is shown in figure 2. The average modal share of transport in many European countries is dominated by road. The countries with the highest share of IWT in their modal split are, in decreasing order, the Netherlands (46.6 %), Romania (29 %), Bulgaria (26 %), Belgium (15.9 %) and Serbia (11.3 %) (data of 2014).

Figure II

**Modal split of inland transport modes by cargo turnover in selected countries, 2014 <sup>5</sup>**



Source: UNECE.

IWT is a significant share of the modal split where transport has access to rivers and canals. While the total volume of goods transported on inland waterways in the European Union is only 6.2 per cent of the total volume, an average of 25 per cent of inland cargo transport is on the inland waterways of Belgium, Germany and the Netherlands. In the Netherlands where the share of IWT in the modal split is the highest, a total of 40 per cent of container transport national inland waterways. Furthermore, an agreement between the seaports of Antwerp in Belgium, Rotterdam and Amsterdam in the Netherlands (ARA range) aims to increase the role of inland water and railway transport for their container terminals by five to ten per cent while reducing the use of road transport.

In northern countries where winters are harsh, transport by water is the only feasible method in the winter months.

### C. Common trends and challenges for the IWT sector

As the most cost-efficient mode of transport, developing a more intensive use of IWT has led to a general trend of scaling up of ship size over the last decade. The result is that the total

<sup>5</sup> UNECE Transport Statistics Database, [www.eurostat.eu](http://www.eurostat.eu), [www.belstat.gov.by](http://www.belstat.gov.by), Information and statistics bulletin "Transport of Russia" of the Ministry of Transport of the Russian Federation, <https://stats.oecd.org>.

gross tonnage of the fleet navigating on the European inland waterways continues to increase, while the number of vessels has decreased.

The capacity of the inland waterway fleet has doubled over the last decade and, in some cases, tripled to meet new demands.

The largest vessels on the Rhine currently are 135 m long and 14, 15, 17 or 22 m wide. These are only operational on the Rhine and the Rhine delta. “Jowi” class are the largest barges on the Rhine today with a load capacity reaching 9,000 tons. Any further growth of these vessels is currently limited by the size of the locks on the upper Rhine in France and Germany, and by those in the Rhine estuary area in Belgium and the Netherlands.

Transportation of goods by water is very cost-effective. The transport of large quantities of goods on a waterway from a seaport factory directly to the customer, e.g. the transport of iron ore from Rotterdam to the steel mills on the lower Rhine, by IWT is unbeatable in terms of costs per ton-kilometre. Additional costs occur during transshipment operations, when the cargo is moved in and out of vessels. The cost of transport is directly related to the amount of transshipment necessary for a shipment from its place of origin to its final destination, as in other modes of transport.

A more active role of inland waterway transport and an increased share in modal split is nonetheless possible and desirable, due to the inherent advantages of IWT. Recognizing the significant advantages of IWT in a balanced transport system, particularly, its safety level, efficiency in terms of energy and costs, low emissions and lack of congestion, thus contributing to the Sustainable Development Goals and to significantly reducing transport and logistics costs, the ministerial declaration “Inland Navigation in a Global Setting” was signed in Wroclaw, Poland on 18 April 2019.<sup>6</sup>

Increasing interconnectivity of the European waterway systems and of the mobility of vessels and the IWT workforce requires a mutually recognized system of rules and regulations. In contrast to maritime transport, where IMO oversees binding safety and port security regimes, European IWT lacks a highly developed and internationally accepted regime. The main regulatory challenges are:

- Lack of European-wide mandatory standards and extensive national control of the implementation of any IWT-related regulation by the various European countries apart from the regulations of the River Commissions
- Lack of a common language for crews across European waterways
- Shortage of an influx of young personnel into the sector. Skippers normally average over 50 years of age.

Technological developments and a rising awareness of environmental impact has led to a number of technological challenges. In IWT, the average age of vessels remains high and the investment cycles are long. The hull of a barge will easily surpass 100 years and a properly maintained engine lasts decades. Innovations in ship propulsion and ship design, therefore, are slow to be widely implemented. The IWT industry today pursues several innovations. The main ones are greener and more sustainable propulsion systems, River Information Services (RIS) and automation and autonomous sailing:

- New and greener propulsion systems are a persistent and increasingly important subject in the sector. Most of the inland waterway fleet continues to use diesel engines. Liquefied Natural Gas (LNG), hydrogen fuel cells and battery-powered propulsion systems are currently being developed, tested and implemented as alternatives. The success of these systems in the future will highly depend on their reliability, availability, durability and cost. A single substitute for the diesel engine would not be available soon, though a combination of systems on future vessels is possible.
- RIS are increasingly integrated for use in the IWT community. RIS is a harmonized and interconnected information system, that provides real time data to users and authorities about the traffic and fairway conditions on a waterway, and about vessel

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<sup>6</sup> [www.unece.org/fileadmin/DAM/Poland\\_Ministerial\\_declaration\\_e\\_\\_002\\_.pdf](http://www.unece.org/fileadmin/DAM/Poland_Ministerial_declaration_e__002_.pdf)



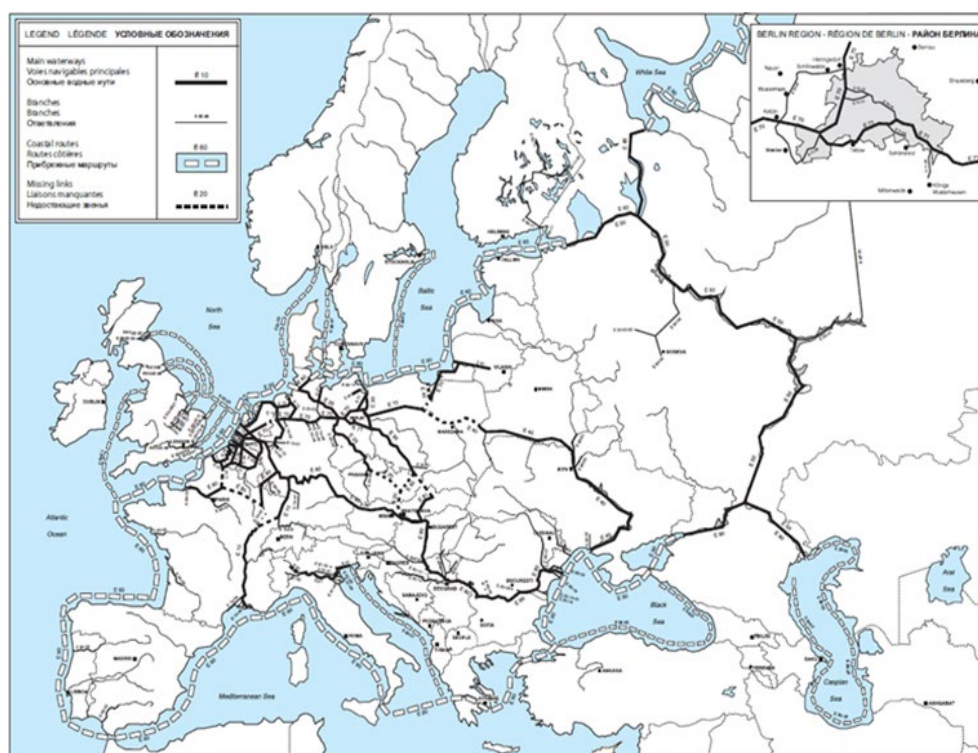
positions and directions. Streamlined planning of vessel movements are, in this way, facilitated on the waterways. RIS not only increases safety on the waterways, but also increases the efficiency of transport across rivers and canals by added functions like RIS corridor management.

- Automation and autonomous sailing are currently widely discussed topics. Different systems are being developed and tested which range from semi-autonomous assistance systems that are already on the market<sup>7</sup> to full autonomy. The degree of automation that will be seen in the near future will highly depend on the technical possibilities and on the demands of politics and insurance.

## Chapter II. Status of the E Waterway Network

The E waterway network is composed of European inland waterways of international importance, of coastal routes used by river-sea vessels (E 01–E 91) and of ports of international importance on these waterways. These are defined in the European Agreement on Main Inland Waterways of International Importance (AGN) of 19 January 1996 and the annex I. AGN has been ratified by 19 countries as of 2018 (Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czechia, Hungary, Italy, Lithuania, Luxembourg, Netherlands, Poland, Republic of Moldova, Romania, Russian Federation, Serbia, Slovakia, Switzerland and Ukraine).<sup>8</sup>

Figure III  
Map of the AGN network<sup>9</sup>



Source: UNECE.

From 1998 to 2016, the total length of the E waterway network grew from 27,711 km to 29,238 km and the share of E waterways that comply with the AGN standards increased from

<sup>7</sup> A real-life example is the “Bahnleitungssystem” of the company “Innovative Navigation” in Germany, which was installed in 2008 on the training vessel “Prinses Maxima” of the Maritieme Academie Harlingen.

<sup>8</sup> ECE/TRANS/SC.3/2015/1.

<sup>9</sup> ECE map of the E Waterway Network, 2019.

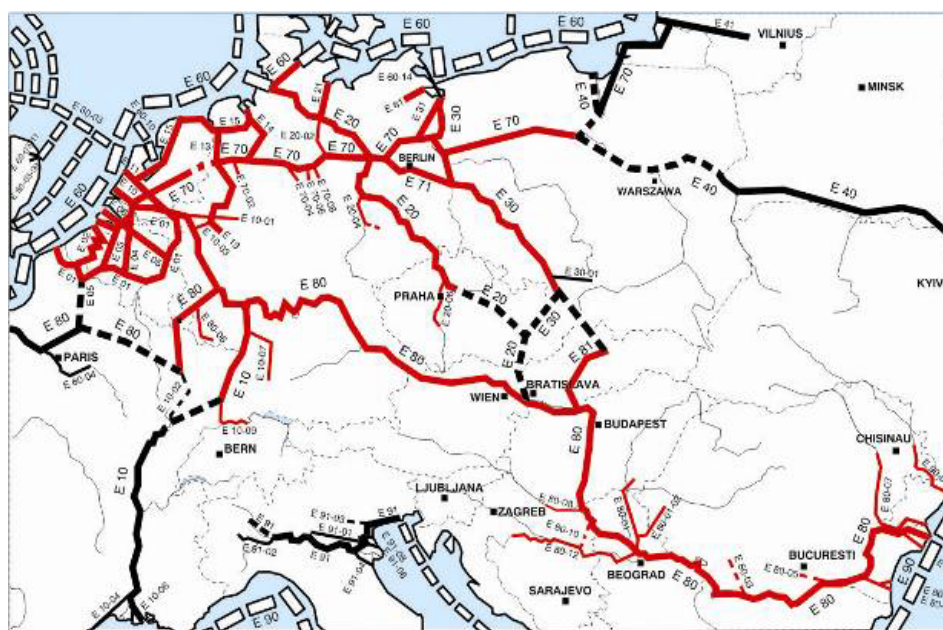
79 to 83 per cent.<sup>10</sup> Seventy-three per cent are the larger canals and rivers of classes IV to VII, and coastal routes. These waterways accommodate vessels of at least 80 m of length and 9.5 m of width with a loading capacity of around 1,500 metric tons.<sup>11</sup> Only 10 per cent of the AGN network comprises smaller waterways and only smaller vessels. Most of the network is interconnected. The 6.8 per cent of missing links will be discussed below under the separate segments of the E waterway network.

**A. The Rhine-Danube network and the central European canal and river network (including the Weser, Elbe and Oder rivers)**

The largest European waterway network by length and transport volume is the Rhine-Danube basins (figure 4) and consists of:

- E 10: Rhine, Saône and Rhone and tributaries from Rotterdam to Arles, and the connected canals;
- E 80: axis Le Havre – Koblenz – Mainz – Main-Danube Canal – Danube and tributaries;
- E 70: axis Rotterdam – Berlin – Gdansk, E 20 – Elbe, tributaries and connected canals;
- E 30: Oder River and tributaries.

Figure IV  
The Rhine-Danube network<sup>12</sup>



Source: UNECE.

The river basins were completely linked in 1992 with the inauguration of the Rhine-Main-Danube Canal after 30 years of construction. E 10 and E 80 were thus connected. The two river basins represent nearly half of the total length of AGN waterways – 14,360 km of the total 30,177 km – and can accommodate vessels of the larger CEMT classes.

<sup>10</sup> Inventory of Main Standards and Parameters of the E Waterway Network (“Blue Book”), revision 3 (ECE/TRANS/SC.3/144/Rev.3).

<sup>11</sup> European Conference of Ministers, Resolution No.92/2 on new classification of inland waterways, 1992, p. 3.

<sup>12</sup> ECE map of the E Waterway Network, 2019.

## The Rhine basin

### *Infrastructure*

The second edition of the White Paper had noted the Rhine basin as the most developed, best maintained and most utilized waterway of the AGN network. Traffic is dense due to the industrial centres along its banks and its advanced infrastructure development. The basin accommodates a significant number of large vessels that are adapted to the needs of the Rhine area industry, which in turn, depends on the flow of goods to and from the Belgian and Dutch ports on the North Sea mouth of the Rhine network.

Ongoing infrastructure projects (see the White Paper, 2011) in the Rhine basin and the linked waterways such as the German canal network aim to increase waterway potential by adapting the existing infrastructure to the changing demands of industry. The renewed Niederfinow ship lift would upgrade the Oder-Havel canal, which is part of the E 40 waterway, to Class Va. Delays in construction prevented operation before 2019.<sup>13</sup>

Increases in traffic and the increased average dimension and weight of vessels have led to plans to replace the large locks and to build a bridge of clearance guaranteed at 5.25 m, on the western (from Marl to Friedrichsfeld) part of the Wesel-Datteln Canal (E 10-01) in northwest Germany. This is one of the two connections between the Rhine and the German canal network. The project should be completed in the 2030s.<sup>14</sup>

The Scharnebeck ship lift on the Elbe Seitenkanal (E 20-02) near Lunenburg, Germany should be replaced for the same reasons. At its inauguration in 1975, the ship lift was the largest in the world – the lock chambers are 100 x 12 m – and insufficient for modern inland vessels. Plans began in 2017 for new lock chambers of 225 × 12.50 m to replace the ship lift. Construction should be between the mid-2020s and the early 2030s.<sup>15</sup>

Upgrading the Mosel river became necessary in the 1990s when the significant traffic increase began. The fairway was first deepened from 2.7 m to 3 m (from 1992 to 1999). Second were several key bottlenecks: the nine single-chambered locks on the German part of the river were each extended with a second lock chamber, and the second, smaller lock chamber of the double locks in Koblenz, where Mosel meets the Rhine, was renewed as part of the German “Bundesverkehrswegeplan”.<sup>16</sup> The work on the locks in Zeltingen, Germany and Fankel, Luxembourg were the first of the projects to be completed on the Mosel. The effect is positive on the capacity at two key bottlenecks on the river. Severe delays in traffic also came from regular sightseeing vessels that have priority at these locks. In 2019, work on a second lock chamber in Trier began and second lock chamber in Lehmen was planned.<sup>17</sup>

The Seine-Schelde waterway project had major delays. Construction was scheduled to start in 2019 and end in 2027.<sup>18</sup> Other information is in the section on the Seine-Oise river network below.

The network of Poland spans 3,655 km of navigable waterways,<sup>19</sup> though the share of waterways of international importance (with a minimum of Class IV) is only 6 per cent. The remaining are designated as waterways of regional importance and are below Class IV

<sup>13</sup> Nordkurier, June 2018, [www.nordkurier.de/brandenburg/neues-schiffshebewerk-niederfinow-soll-2019-eroeffnet-werden-0632233306.html](http://www.nordkurier.de/brandenburg/neues-schiffshebewerk-niederfinow-soll-2019-eroeffnet-werden-0632233306.html).

<sup>14</sup> Projektinformationssystem (PRINS) zum Bundesverkehrswegeplan 2030, [www.bvwp-projekte.de/wasserstrasse/w23/w23.html](http://www.bvwp-projekte.de/wasserstrasse/w23/w23.html).

<sup>15</sup> Projektinformationssystem (PRINS) zum Bundesverkehrswegeplan 2030, [www.bvwp-projekte.de/wasserstrasse/w12/w12.html](http://www.bvwp-projekte.de/wasserstrasse/w12/w12.html).

<sup>16</sup> The development plan of Germany for government-operated infrastructure.

<sup>17</sup> Directorate General for Waterways and Shipping, [www.wsa-mosel-saar-lahn.wsv.de/Webs/WSA/Mosel-Saar/DE/Wasserstrassen/Projekte/01\\_Zweite\\_Moselschleusen/projekt\\_1\\_node.html](http://www.wsa-mosel-saar-lahn.wsv.de/Webs/WSA/Mosel-Saar/DE/Wasserstrassen/Projekte/01_Zweite_Moselschleusen/projekt_1_node.html).

<sup>18</sup> De Binnenvaartkrant, online edition, May 2018, <https://binnenvaartkrant.nl/seine-schelde-verbinding-pas-in-2027-klaar>.

<sup>19</sup> “Assumptions for the development plans of inland waterways in Poland for 2016–2020 with 2030 perspective”, 2014; [mgm.gov.pl/wp-content/uploads/2017/11/assumptions-for-the-development-plans-of-inland-waterways-in-poland-for-2016-2020-with-2030-perspective.pdf](http://mgm.gov.pl/wp-content/uploads/2017/11/assumptions-for-the-development-plans-of-inland-waterways-in-poland-for-2016-2020-with-2030-perspective.pdf).

standards. The major Polish international waterways are those that serve south–north traffic, such as the Oder and Vistula rivers that both discharge into the Baltic Sea.

The Oder-Vistula Lagoon link and the Warsaw-Brest link, which are planned in cooperation with Germany, should expand the E-70 and E-40 waterways. Work began in 2019 to create an east-west connection from the Oder basin to the Vistula basin and beyond. The Vistula is hampered by the general conditions of the waterway.

As already seen in the 2011 White Paper, the infrastructure on the main network interconnection through Poland, east of the river Oder, needs further maintenance.

The missing link in the E 70, from Twente to the Mittelland Canal was included in the AGN as a long-term project, but abandoned after feasibility study in 2012. The cost of the new canal was estimated to be approximately €1.3 billion though resulting in an economic advantage of 18 per cent of this sum until 2060.<sup>20</sup>

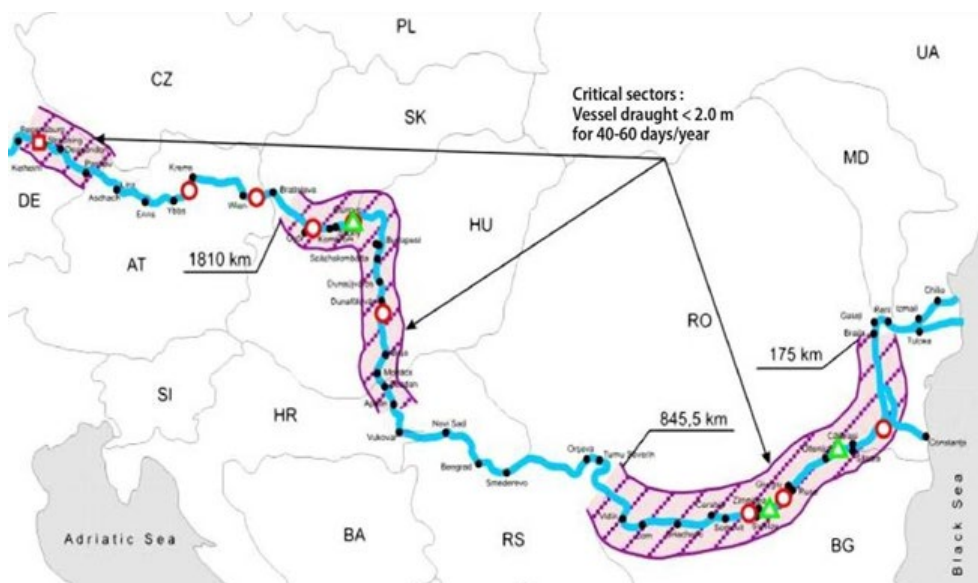
### The Danube basin

#### Infrastructure

The Danube basin (E 80) covers the Danube and the Sava rivers, and the Danube Canal which connects the Danube with the Black Sea in Constanta (Romania). There is, unlike in the Rhine area, no extensive complementary network of navigable rivers and canals. Navigation on this network is also somewhat more limited than its counterpart in the north due to its sharp river bends and broad sections that tend to create fords and sand bars in the riverbed.<sup>21</sup>

Figure V

**Critical sectors for carrying capacity on the Danube** <sup>22</sup>



Source: UNECE.

Critical sectors on the Danube are shown in figure 5. A major strategic bottleneck, which limits the loading capacity of larger vessels navigating between the Rhine and the Danube by restricted water depth and low bridge clearances, is the Straubing-Vilshofen stretch of the Danube, close to the confluence with the Main-Danube canal. On this stretch, the river averages two metres in depth for 40 to 60 days a year. Two bridges spanning the fairway a low clearance of five metres (railway-bridge Bogen) and 5.15 metres (Luitpold-bridge

<sup>20</sup> EUREGIO, press release 2013, [www.euregio.eu/de/pressemitteilungen/verbindung-zwischen-mittellandkanal-und-twentekanal-nicht-wirtschaftlich](http://www.euregio.eu/de/pressemitteilungen/verbindung-zwischen-mittellandkanal-und-twentekanal-nicht-wirtschaftlich).

<sup>21</sup> Danube Commission, [www.danubecommission.org/dc/de/die-donauschiffahrt/540-2/](http://www.danubecommission.org/dc/de/die-donauschiffahrt/540-2/).

<sup>22</sup> ECE White Paper, 2011, p. 13.

Passau),<sup>23</sup> and allows the passage of only single-stack containers. The fairway depth of the Danube is a recurring problem on the upper, middle and lower stretches of the river.

#### *Rhine and Danube fleets*

The imbalance in infrastructure is notable between the Rhine and the Danube, and in the composition of the fleets. Many of the vessels operating on the Danube river also operate on the Rhine.

In 2017, the Central Commission for the Navigation of the Rhine (CCNR) calculated that the Rhine fleet is composed of over 9,800 vessels.<sup>24</sup> Table 3 shows the CCNR fleet development.

Table 3  
**Development of the Rhine fleet, 2008–2017**<sup>25</sup>

Year	Dry cargo fleet		Tank cargo fleet		Pushers and tugs
	Number of vessels	Total carrying capacity, tons	Number of vessels	Total carrying capacity, tons	Number of vessels
2008	8 249	10 260 000	1 569	2 583 000	1 276
2009	8 203	10 669 000	1 643	2 824 000	1 286
2010	7 952	10 647 000	1 732	3 127 000	1 220
2011	7 980	10 769 000	1 706	3 203 000	1 265
2012	7 776	10 748 000	1 654	3 174 000	1 219
2013	7 618	10 681 000	1 623	3 152 000	1 267
2014	7 464	10 553 000	1 600	3 185 000	1 251
2015	7 323	10 496 000	1 551	3 185 000	1 246
2016	7 136	10 285 000	1 511	3 150 000	1 240
2017	7 092	10 432 000	1 501	3 112 000	1 241

*Source:* Central Commission for the Navigation of the Rhine.

The Danube Commission reported a total of 3,197 vessels in the Danube fleet in 2016. The development of the fleet is shown in table 4:

Table 4  
**Development of the Danube fleet, 2013–2016**<sup>26</sup>

Year	Self-propelled vessels		Pushed or Towed Barges		Pushers and tugs
	Number of vessels	Total carrying capacity (tons)	Number of vessels	Total carrying capacity (tons)	Number of vessels
2013	446	394 952	2 633	3 024 191	672
2014	439	392 894	2 511	2 887 511	649
2015	451	401 533	2 441	2 834 939	694
2016	418	397 130	2 171	2 578 415	576

*Source:* Danube Commission.

<sup>23</sup> via donau, List of bridges. [www.viadonau.org/fileadmin/content/viadonau/05Wirtschaft/Dokumente/2015-04-06\\_Brueckenliste\\_viadonau.pdf](http://www.viadonau.org/fileadmin/content/viadonau/05Wirtschaft/Dokumente/2015-04-06_Brueckenliste_viadonau.pdf).

<sup>24</sup> Central Commission for the Navigation of the Rhine, Annual Report 2018. Inland Navigation in Europe. Market Observation, [www.inland-navigation-market.org/en/rapports/2018/q2/5-fleet-2/](http://www.inland-navigation-market.org/en/rapports/2018/q2/5-fleet-2/).

<sup>25</sup> Ibid.

<sup>26</sup> Danube Commission, Danube Navigation Statistics in 2015-2016, Budapest 2017, and Danube Navigation Statistics in 2013–2014, Budapest 2015, [www.danubecommission.org/uploads/doc/STATISTIC/en\\_stat\\_2015\\_2016.pdf](http://www.danubecommission.org/uploads/doc/STATISTIC/en_stat_2015_2016.pdf).

### French waterways

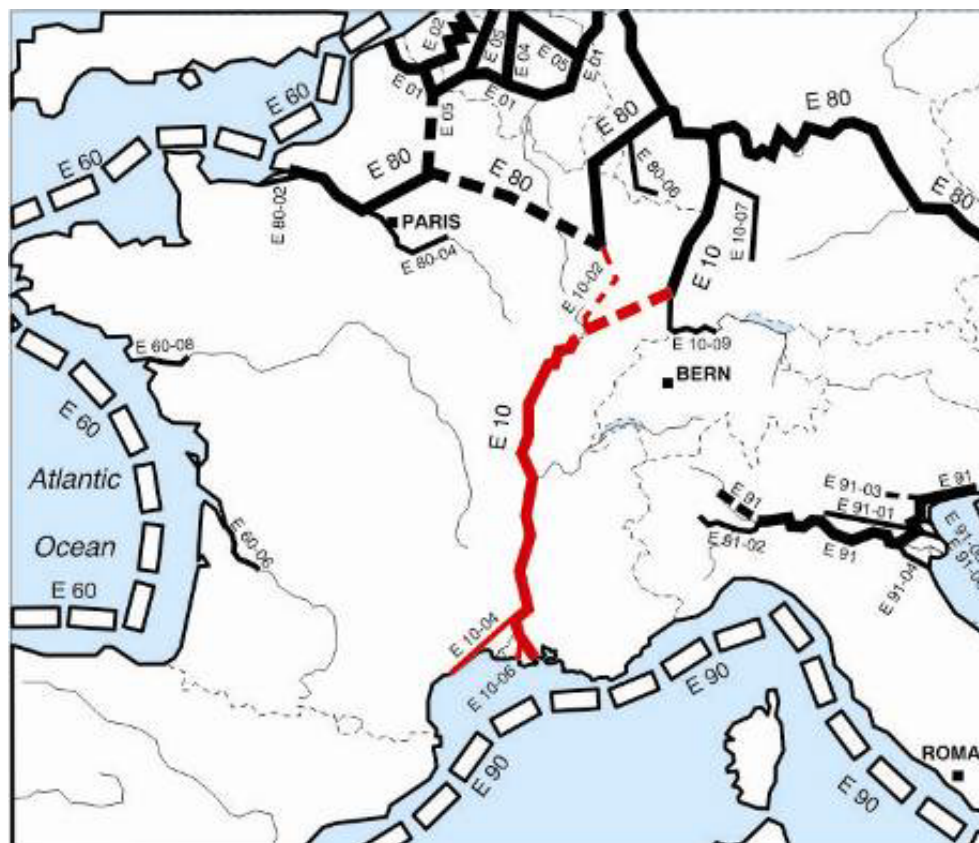
Two river basins, the Rhone-Saône and the Seine-Oise, are suitable for vessels of Class IV and above. These are technically connected to the rest of the western European waterway network, but the links from both basins to the Schelde or the Rhine are only accessible for vessels of Class I (Freychinet size). The Freychinet fleet is rather small and old since the last Freychinet types were built in the 1980s. Currently 332 are in active service.<sup>27</sup>

(a) *The Rhone-Saône network*

The Rhone-Saône network (the southern section of the E 10 waterway, see figure 6 below) is virtually isolated from the rest of the western European interconnected waterway system. The network is 679 km in length and comprises the river Saône, which is navigable for larger vessels from the Auxonne locks in the north to the confluence with the Rhone river in Lyon. The Rhone is navigable from Lyon down to the mouth where it meets the Mediterranean at Fos-sur-Mer (E 10-06) with a side branch, the Rhone-Sète Canal, to the city of Sète, also located on the Mediterranean Sea (E 10-04).

Figure VI

**The Rhone-Saône network** <sup>28</sup>



Source: UNECE.

### Infrastructure

The Rhone-Saône waterway network is characterized by good navigability along the entire stretch from north to south. Five locks on the 218 km-long Saône stretch have a dimension of 180 × 12 m, which allow Class VI traffic, but with limited clearance under the bridges of 3.7 m. The 310 km-long section of the Rhone river from Lyon to Fos-sur-Mer has 12 locks with a dimension of 190 × 11.40 m, and also allows Class V vessels. The clearance under the bridges is six metres and, therefore, significantly more than on the river Saône. The last part

<sup>27</sup> Voies navigables de France, Les chiffres du transport fluvial en 2017, [www.vnf.fr/vnf/img/cms/Transport\\_fluvialhidden/LesChiffresDuTraficFluvial\\_2017\\_20180410150714.pdf](http://www.vnf.fr/vnf/img/cms/Transport_fluvialhidden/LesChiffresDuTraficFluvial_2017_20180410150714.pdf).

<sup>28</sup> ECE map of the E Waterway Network, 2019.

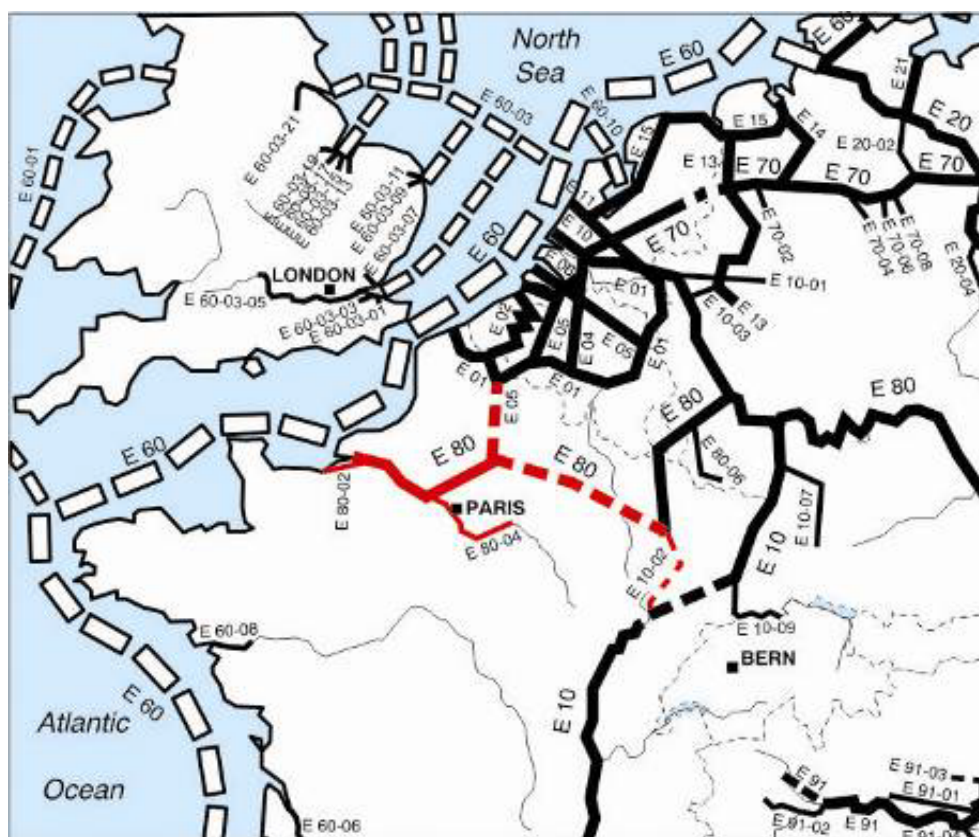
of the network is the Rhone-Sète Canal, which is 99 km long and has only one lock with the dimension of  $120 \times 8$  m, making this waterway only accessible for vessels smaller than Class III. Bridges provide a clearance of five metres and are not a problem for these vessels, if they do not transport more than one layer of containers.

The 2011 White Paper had mentioned plans to create a link to the Seine-Oise network, but these were abandoned some 30 years ago. From the early 1990s, France focused its efforts on creating the Seine-Nord link between the Seine and the Benelux basins, thus abandoning the other projected connections which were the Saône-Mosel and the Saône-Rhine links.

In 2017, 5.2 million tons were transported across the network, or an overall transport performance of 1.1 billion ton-kilometres.<sup>29</sup> The main transport commodities were construction materials and agribulk products.

The second notable waterway network in France is the Seine-Oise river network in the north-west of the country (see figure 7 below). The total length is 632 km. The main E 80 route includes the river Oise from the town of Compiègne to its confluence with the Haute Seine in the north of Paris and the Basse Seine from the north of Paris to its mouth on the Atlantic Ocean at the city of Le Havre.<sup>30</sup> The Oise itself has five locks of  $180 \times 11.5$  m on this stretch, and can accommodate vessels of Class Vb. The Haute Seine, the stretch of the river upstream from the north of Paris to Montereau, has nine locks with a gauge of  $180 \times 11.5$  m, and can also accommodate vessels of Class Vb. However, navigation on a short stretch of the river within the city of Paris is limited to vessels less than 125 metres.

Figure VII  
The Seine-Oise network <sup>31</sup>



Source: UNECE.

<sup>29</sup> Voies navigables de France, Le trafic fluvial sur l'année 2017, [www.vnf.fr/vnf/img/cms/Transport\\_fluvialhidden/Trafics\\_2017\\_12mois\\_Internet\\_20180410171126.pdf](http://www.vnf.fr/vnf/img/cms/Transport_fluvialhidden/Trafics_2017_12mois_Internet_20180410171126.pdf).

<sup>30</sup> Voies navigables de France, Carte\_bassin\_Seine, 2018, [www.vnf.fr/vnf/img/cms/Transport\\_fluvialhidden/ Carte\\_bassin\\_Seine\\_fevrier\\_2018\\_20180316150407.pdf](http://www.vnf.fr/vnf/img/cms/Transport_fluvialhidden/ Carte_bassin_Seine_fevrier_2018_20180316150407.pdf).

<sup>31</sup> ECE map of the E Waterway Network, 2019.

The connection between the Seine and the Schelde was in construction in 2019. The 107 km long canal will link the river Oise from the town of Compiègne with the Schelde at Cambrai. The canal is planned to accommodate vessels of Class Vb and be equipped with six locks along its route.<sup>32</sup> Initial planning was for project completion in 2016, however, due to various delays, construction work was scheduled to begin in 2019 and the opening is forecast at 2027.<sup>33</sup>

In 2017, 20.7 million tons of freight were transported on the network, making for an overall transport performance of 3.4 billion ton-kilometres.<sup>34</sup> The difference between the overall tons transported, and the ton-kilometre performance compared to the Rhone-Saône basin can be explained by the shorter distances travelled on the Seine-Oise network: due to its shorter overall length and its isolation from the rest of the European waterway network for larger vessels. The main commodities transported are construction materials and agribulk.

## **B. The Azov-Black-Caspian Seas basin**

### *Infrastructure*

The eastern European inland waterway networks are formed by the E 40 waterway, in the Dnipro river basin (including the river Pripyat and the Dnipro-Bug canal in Ukraine and Belarus) and the E 50 waterway in the Russian Federation (consists of the river basins of the Volga and Don rivers and the Belomorsko-Baltiysky canal) which connects the Black and Caspian Seas with the Baltic Sea (see figure 8). The E 40 is a vast waterway system with a total length of more than 9,000 km. Most of the network is suitable for vessels larger than Class V. While the route from the Black Sea to the Baltic sea via the E 50 is feasible, a direct inland waterway link is not available between the E 40 and the E 50. The E 50 waterway and connected waterways are an integral part of the “Big European Transport Ring” which includes the Main Danube axis (E 80), the Rhine (E 10), the coastal routes of the North Sea, the Kiel Canal and the Baltic Sea (E 60), the waterway system of the Russian Federation from St. Petersburg to the Sea of Azov (E 50) and the coastal routes of the Black Sea (E 90).

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<sup>32</sup> Société du canal Seine-Nord Europe, [www.canal-seine-nord-europe.fr/Projet](http://www.canal-seine-nord-europe.fr/Projet).

<sup>33</sup> [www.batiactu.com/edito/canal-seine-nord-europe-verra-jour-2027-53563.php](http://www.batiactu.com/edito/canal-seine-nord-europe-verra-jour-2027-53563.php).

<sup>34</sup> Voies navigables de France, Le trafic fluvial sur l'année 2017, [www.vnf.fr/vnf/img/cms/Transport\\_fluvialhidden/Trafics\\_2017\\_12mois\\_Internet\\_20180410171126.pdf](http://www.vnf.fr/vnf/img/cms/Transport_fluvialhidden/Trafics_2017_12mois_Internet_20180410171126.pdf).



Figure VIII  
**The Azov-Black-Caspian Seas Network, includes the Dnipro**<sup>35</sup>



Source: UNECE.

Connecting the E 40 with the rest of the AGN network requires the removal of several missing links, including one to the main waterway network of Poland that would create the Baltic-Black Sea waterway. The E 40 and E 41 would then connect to the E 70.

Currently, the E 40 is navigable for larger vessels via the Dnipro river up to the confluence with the river Pripyat. The lower parts of the River Dnipro are suitable for river-sea navigation due to the nature of the river, which is comprised of a series of lakes created by dams of hydroelectric plants up to Kiev. The waterway continues further upstream to the Ukrainian border near Chernobyl, through Belarus to the Dnipro-Bug canal, and to the River Mukhovets at the Polish border near Brest.

The locks and fairways along the E 40 waterway are in need of upgrading or renewal, particularly, the locks on the River Dnipro. Renovations on the locks and increased waterway maintenance works are ongoing. The waterway infrastructure further north, located on the river Pripyat and the Dnipro-Bug canal, also need renovation. Belarus is rebuilding the hydraulic complexes according to Class Va norms. To date, five have been rebuilt, allowing the passage of vessels of up to 110 m in length, 12 m in width and 2.2 m in draught. Three more locks should be renovated and operational in 2021.

If fully navigable, the E 40 waterway would allow freight to be transported from Belarus and Ukraine through Poland to western European countries, and particularly the Nordic countries. Once the main bottlenecks on the Oder-Vistula section are removed and Class Va requirements met, it will be possible to transport freight by river between Western and Eastern Europe, and South Eastern Europe via Poland. It is estimated that about 20 per cent of goods currently carried by rail and about 10 per cent of goods carried by road could be transferred to water transport on that route. With the support of the European Union, a project “Restoration of the E 40 waterway on the Dnieper-Vistula section: from strategy to planning” was initiated in 2013 and a cross-border standing commission was set up in 2014. A feasibility study in 2014 and 2015 determined the optimal technical solution and provided

<sup>35</sup> ECE map of the E Waterway Network, 2019.

general recommendations. The commission drafted road map till 2025, and the next major task is to study possible environmental impacts by means of appropriate environmental assessments.<sup>36</sup>

A new branch of the E 40-01, which will connect a newly built terminal on the Dnipro close to the town of Nizhnie Zhary at the Belarus-Ukrainian border and the mouth of the river Pripjat, was added to the AGN network in 2017.<sup>37</sup> Further work is ongoing, but the end date has not been set. A continuation of the river Bug as E 41 through Poland has not been projected. Vessels that travel north from Brest are restricted to a draft of 0.8 m, and exclude freight transport.<sup>38</sup>

#### *Fleet*

The inland fleet of the Azov-Black Sea region comprises the national fleet of the Russian Federation for the E 50, and the fleets of Belarus and the Ukraine for the E 40. In 2015, the inland fleet of the Russian Federation counted 1,520 self-propelled vessels with an average capacity of 1,660 tons, 4,902 pushed barges with an average capacity of 1,460 tons as well as 2,784 push and tow boats.<sup>39</sup>

As of 2014, the Belarusian inland fleet comprised of one self-propelled barge, 147 pushed barges with an average capacity of 769 tons and 72 push and tow boats.<sup>40</sup>

The inland fleet of the Ukraine counted 1,312 vessels in 2016<sup>41</sup>, of which 352 operate outside of the E 40 network on the Danube river.<sup>42</sup>

### **C. The Baltic Sea region network**

The Baltic Sea region inland waterway network consists of the yet to be fully developed northern part of the Vistula river (E 40), the Nogat River to the Vistula Lagoon as a part of the E 70, and the Neman River from its mouth into the Baltic Sea in Klaipeda, upstream to the town of Kaunas as the E 41 (figure 9).

Although the idea of connecting the E 40 with the E 70 to create a waterway connection between the Baltic and the Black Seas has been discussed for several years, there are no detailed plans.

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<sup>36</sup> ECE/TRANS/SC.3/WP.3/2016/13.

<sup>37</sup> AGN revision 4, [www.unece.org/fileadmin/DAM/trans/doc/2019/sc3/ECE-TRANS-120r4efr.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2019/sc3/ECE-TRANS-120r4efr.pdf).

<sup>38</sup> Inventory of Main Standards and Parameters of the E Waterway Network ("Blue Book"), revision 3 (ECE/TRANS/SC.3/144/Rev.3), p.17.

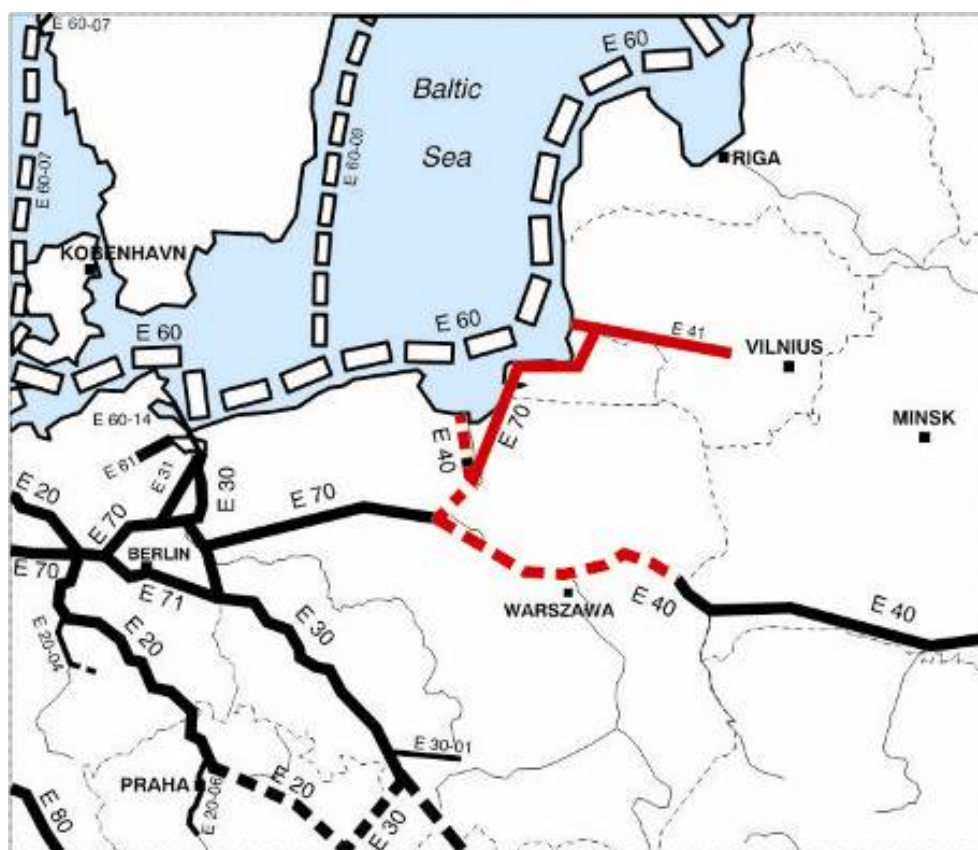
<sup>39</sup> ECE 2018 Inland Transport Statistics for Europe and North America, p. 149, [www.unece.org/fileadmin/DAM/trans/main/wp6/publications/2018\\_INLAND\\_TRANSPORT\\_STATISTICS.pdf](http://www.unece.org/fileadmin/DAM/trans/main/wp6/publications/2018_INLAND_TRANSPORT_STATISTICS.pdf).

<sup>40</sup> Ibid, p. 141.

<sup>41</sup> Ibid, p. 151.

<sup>42</sup> Danube Commission, Danube Navigation Statistics in 2015-2016, Budapest 2017, p.7, [www.danubecommission.org/uploads/doc/STATISTIC/en\\_stat\\_2015\\_2016.pdf](http://www.danubecommission.org/uploads/doc/STATISTIC/en_stat_2015_2016.pdf).

Figure IX  
The Baltic Area network<sup>43</sup>



Source: UNECE.

Planned improvements for navigating the network still focus mainly on the creating a deeper fairway for the Neman River from Klaipeda upstream to the Kaunas dam, which is not equipped with a lock and is therefore ends the navigation on this river. In 2019, the waterway accommodated vessels of 100 x 10 m, though the allowed draught on the lower part of the river from Klaipeda to Jurbarkas is at most 1.20 metres and is even lower on the upper stretch to Kaunas dam.<sup>44</sup>

#### Fleet

The Baltic area network does not have a dedicated fleet. Vessels registered in Poland usually arrive via the German network. As of 2016, the Polish fleet counted 91 self-propelled vessels with an average capacity of 747 tons, 516 pushed barges with an average capacity of 457 tons and 214 push and towboats.<sup>45</sup>

#### D. The Czech-Slovak network

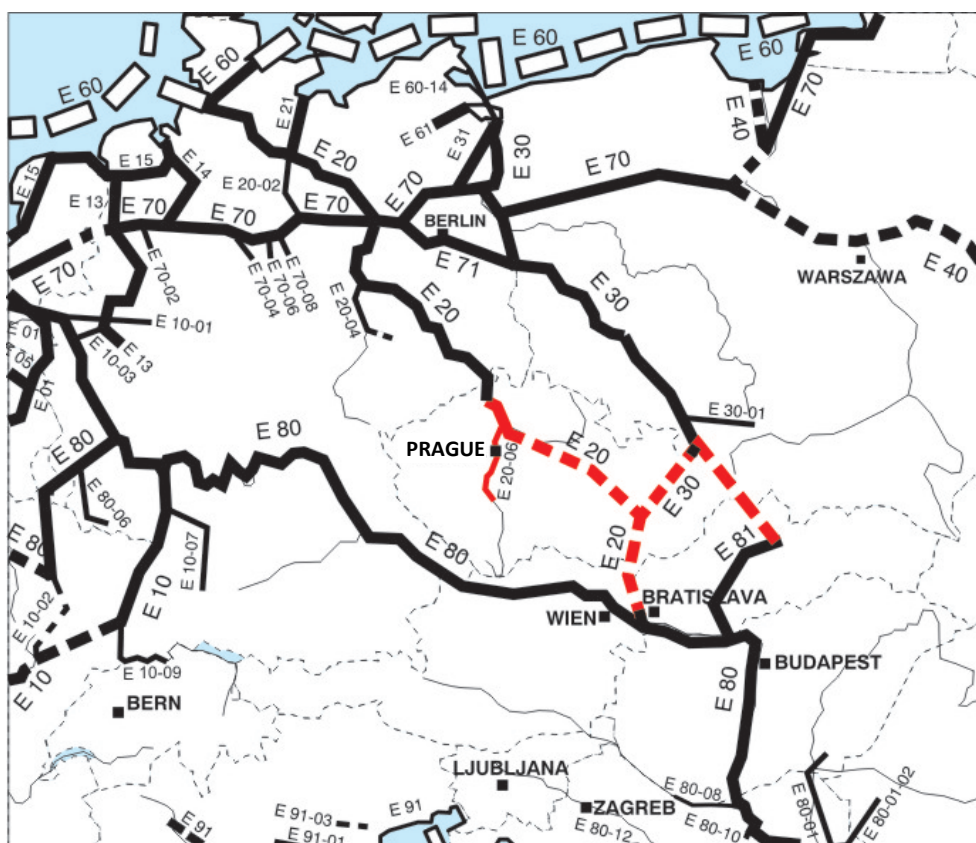
The network comprises the Elbe river (E 20) from the Czech-German Border north of Děčín up to the town of Pardubice and the Vltava River (E 20-06) from its confluence with the river Elbe close to the town of Mělník upstream via Prague to the town of Slapy and three missing links, which which would connect the Danube and the Elbe and Oder basin: the Elbe-Morava-Danube Link extends the E 20 waterway, the Oder-Váh-Danube Link connects the E 30 and E 81, and extends the E 30 waterway between the Morava and the Oder (figure 10).

<sup>43</sup> ECE map of the E Waterway Network, 2019.

<sup>44</sup> Inland waterways of national importance of the Republic of Lithuania, <http://vvd.lt/en/vidaus-vandenu-keliai/>.

<sup>45</sup> ECE 2018 Inland Transport Statistics for Europe and North America, p. 147, [www.unece.org/fileadmin/DAM/trans/main/wp6/publications/2018\\_INLAND\\_TRANSPORT\\_STATISTICS.pdf](http://www.unece.org/fileadmin/DAM/trans/main/wp6/publications/2018_INLAND_TRANSPORT_STATISTICS.pdf).

Figure X  
The Czech-Slovak network <sup>46</sup>



Source: UNECE.

None of the planned waterway links are in construction. However, the Ministry of Transport of Czechia launched a feasibility study on the Danube-Oder-Elbe water corridor in July 2016, and in January 2017, the Transport Ministers of Czechia, Poland and Slovakia signed a memorandum of understanding on the construction of the link.<sup>47</sup>

Both Czechia and Slovakia continue works on improving the existing waterways. For the river Elbe, construction works began on the lock and weir system in Děčín for operation in 2021. Restrictions from the low fairway depth between the German border and Ústí-nad-Labem need improvement. Two low-head dams (less than 6 m) and hydropower plants, with locks of 200 × 24 m, are foreseen to make the stretch commercially navigable during low water periods. Further improving the navigation on the Váh river is a priority for Slovakia. An upgrade to a minimum Class V waterway from the confluence with the Danube river in Komarno upstream to Žilina requires renewal of the existing locks and the construction of new locks.

#### Fleet

As of 2016, the Czech fleet counted 30 self-propelled vessels with an average capacity of 1,033 tons, 103 pushed barges, average capacity of 504 tons, and 74 push and towboats.<sup>48</sup> These vessels are used in domestic traffic, and on the river Elbe up to the seaport of Hamburg and via the German canal network – to the Rhine basin. The Slovak fleet focuses on the transport of goods on the Danube. In 2016, the Slovak fleet was composed of 10 self-propelled vessels with an average capacity of 1,000 tons, 101 pushed barges with an average

<sup>46</sup> ECE map of the E Waterway Network, 2019.

<sup>47</sup> Water Corridor Danube-Oder-Elbe, [www.d-o-l.cz/index.php/en/news](http://www.d-o-l.cz/index.php/en/news).

<sup>48</sup> ECE 2018 Inland Transport Statistics for Europe and North America, p. 143, [www.unece.org/fileadmin/DAM/trans/main/wp6/publications/2018\\_INLAND\\_TRANSPORT\\_STATISTICS.pdf](http://www.unece.org/fileadmin/DAM/trans/main/wp6/publications/2018_INLAND_TRANSPORT_STATISTICS.pdf).

capacity of 1,634 tons and 33 push and tow boats.<sup>49</sup>

#### E. Coastal routes and connected inland waterways

The main coastal routes are:

- the E 60 waterway
- the E 90 waterway which includes the coastal waterways and connected waterways of the Mediterranean, Black Sea and Caspian Seas
- the connected inland waterways on the Baltic and North Seas, and on the Atlantic Ocean to the Strait of Gibraltar.

The artificial infrastructure of the coastal routes incorporates ship canals into these routes:

- the Nord-Ostsee Canal (E 60) in the north of Germany
- the Corinth Canal (E 90) in Greece.

Isolated inland waterways interconnect by these maritime routes:

- the Guadalquivir estuary in Spain (E 60-02)
- the waterways of the United Kingdom of Great Britain and Northern Ireland are open to sea-going vessels, such as the Thames (E 60-03-05)
- the Humber (E 60-03-21) and the Tyne (E 60-03 and E 60-03-06)
- the Douro in Portugal (E 60-04)
- the Göta Alv in Sweden (E 60-07)
- the Saimaa Canal in Finland (E 60-11)
- the Po in Italy (E 91).

Coastal routes, except for the connected and connecting waterways, are maritime waterways, which precludes system-wide investments on these routes. It is nevertheless significant that investments continue or are planned in order to increase the efficiency or the potential economic benefits of these combined river-sea routes. Some investments appear to concern only maritime traffic, but in reality, may serve shipping throughout the AGN river-sea network. For example, the German Government invested more than €800 million on the Kiel Canal in the next decade on optimization of the fairway of the eastern part of the Kiel from Königsförde to the Kiel locks, deepening of the fairway on the entire length of the waterway, and on constructing a new small lock chamber in Kiel and a new, fifth, lock chamber in Brunsbüttel. The lock chamber was scheduled to be completed in 2021 but has been delayed due to technical problems.<sup>50</sup> Capacity on the waterway should improve and ease navigation.

Other ongoing projects on the coastal network, especially in the Baltic Sea region, include plans to develop inland and river-sea navigation, as provided for in the policy paper “Strengthening Inland Navigation and River-Sea Shipping in Europe and the Baltic Sea Region” that is the outcome of EMMA project.<sup>51</sup> An example is opening the navigation on the Göta Alv river and on the Trollhätte canal specifically to inland barges, and more specifically for a container feeder service from the port of Gothenburg to Trollhätten where, for the moment, freight transport is handled exclusively by short sea navigation vessels.

<sup>49</sup> Ibid., p. 180

<sup>50</sup> Wasserstraßen- und Schifffahrtsamt Brunsbüttel, Neubau der 5. Schleusenammer Brunsbüttel und Anpassung des Vorhafens, [www.wsv.de/wsa-bb/Investitionsmassnahmen/5\\_schleuse/5\\_Schleusenammer/Allgemeine\\_Informationen/index.html](http://www.wsv.de/wsa-bb/Investitionsmassnahmen/5_schleuse/5_Schleusenammer/Allgemeine_Informationen/index.html).

<sup>51</sup> ECE/TRANS/SC.3/WP.3/2019/25.

## **Chapter III. Institutional and regulatory framework for inland navigation in Europe**

### **A. Institutional framework for inland navigation: evolution since 2011**

As in 2011, inland navigation in the European part of the ECE region continues to be regulated by a variety of intergovernmental institutions and bodies, including river commissions, the United Nations Economic Commission for Europe (UNECE), the European Union, the four River Commissions: the Central Commission for the Navigation on the Rhine (CCNR), the Danube Commission (DC), the Mosel Commission (MC) and the International Sava River Basin Commission (Sava Commission). Furthermore, in 2015, a new institution in the inland water transport (IWT) sector was established jointly by the European Commission and CCNR: the European committee for drawing up standards in the field of inland navigation (CESNI).

UNECE addresses the pan-European inland navigation issues both at technical and policy levels. A recognized centre for international land transport agreements, UNECE maintains 58 international transport conventions which provide a legal framework and technical regulations for the development of international road, rail, inland navigation and intermodal transport as well as for the transport of dangerous goods and the construction of road vehicles.

The UNECE Working Parties on Inland Water Transport (SC.3) and on the Standardization of Technical Safety Requirements in Inland Navigation (SC.3/WP.3) address numerous issues related to navigational, technical and safety standards in inland navigation. The activities of the Working Party are focused on a pan-European network of inland waterways of international importance with a sustainable and resilient infrastructure and services as an integrated part of inland transport networks and markets. The goal of a new strategy of SC.3 to 2021 is aimed to support economic development with a focus on affordable and equitable access for all UNECE member States possessing navigable inland waterways. The activities encourage cost-efficient and safe services with a minimal impact on the environment, integrated with other transportation modes and focusing on the development of quality infrastructure that is resilient to climate change. It is important that national transport strategies support these aims and capitalize on the comparative advantages of inland water transport (IWT).<sup>52</sup>

The main building blocks of the new strategy are:

- (a) Consolidating efforts and involving all UNECE member States when addressing modern challenges and assisting the implementation of the Sustainable Development Goals where this is pertinent for the sector;
- (b) Supporting the development of IWT related statistics and analytical capacity aimed at providing much needed data for the sector;
- (c) Coordinating measures for further integration of IWT in multimodal transport chains;
- (d) Developing and maintaining efficient legal mechanisms aimed at ensuring equal and transparent conditions for all players;
- (e) Cooperation with new players on the European market as well as players from other regions of the world where they can benefit from the technical harmonization being developed by the Working Party;
- (f) Fostering innovations in the IWT sector;
- (g) Facilitate the development of synergic capabilities with maritime and land transport, on the one side, and water-related activities, on the other side;

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<sup>52</sup> UNECE, Draft proposal for a new strategy of the Working Party on Inland Water Transport for 2016-2021, Geneva, pp.3, 2016, <https://www.unece.org/fileadmin/DAM/trans/doc/2016/sc3wp3/ECE-TRANS-SC3-2016-03e.pdf>.

(h) Fostering RIS and other Information and Communication Technologies (ICT) in inland navigation in all UNECE member States;

(i) Developing partnerships and increasing the visibility of IWT.

In the European Union, since 2011, the basis for the transport policy is the White Paper “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system”, published by the European Commission in 2011.<sup>53</sup> The White Paper included 40 concrete initiatives for the next decade to build a competitive transport system to increase mobility, remove major barriers in key areas and fuel growth and employment, as well as reduce the dependence on imported oil and cut carbon emissions in transport by 60% by 2050.

In 2016, the European Commission published a Commission Staff Working Document on the implementation of the White Paper, which highlighted the progress in the implementation of the initiatives under the ten-year programme and presented changes in the context against which the policy objectives, achievements and challenges.

The NAIADES II Communication (2013) sets out the European Union programme for policy action in the field of inland waterway transport for 2014–2020.<sup>54</sup> Actions are taken in six key areas of intervention: (i) Infrastructure; (ii) Innovation; (iii) Functioning of the Single Market; (iv) Environmental performance; (v) Human factor, and (vi) Integration into multimodal logistics chains. In the first key area, Infrastructure, the most important development is the adoption of an integrated approach for planning and implementation of inland waterway projects in the TEN-T Core Network Corridors, introduced by Regulation (EU) No. 1315/2013 of the European Parliament and of the Council of 11 December 2013 and Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility (CEF).<sup>55</sup> The NAIADES II mid-term progress report on the implementation of the NAIADES Action Programme for the promotion of inland waterway transport report published in 2017<sup>56</sup> presented progress achieved up to 2017 and the on-going actions for implementing NAIADES II until 2020.

In 2017, the European Commission launched an initiative on the Digital Inland Waterway Area (DINA) on the future digitalization of IWT based on the study “Towards a Digital Inland Waterway Area and Digital Multimodal Nodes”,<sup>57</sup> which proposed a number of short, medium and long-term building blocks. A short-term focus was made on the continued implementation and extension of RIS, standardization and the implementation of the shared European databases: the European Reference Data Management System (ERDMS), the European Hull Database and, most recent, the European Crew Qualifications Database. The medium-term focus is on initiating joint public-private initiatives for developing the future e-IWT onboard tools, the data platform for barge operators and the integration with other stakeholders, and the long-term will focus on further integration with other modalities and the usage of DINA as a platform for new applications. In 2018, the Commission Staff Working Document on Digital Inland Navigation was issued which described existing initiatives and tools in the area of digitalisation of inland navigation in an integrated way and presented the findings of the DINA study and ongoing Commission initiatives and tools in the area of digitalisation of inland navigation.<sup>58</sup>

The EC DG MOVE Digital Transport and Logistics Forum<sup>59</sup> studies the acceptance of e-transport documents and data exchange in corridors. There is a specific focus on the use of standards and on the introduction and use of digital platforms for e-freight with the purpose to improve digital interoperability in logistics and freight transport across Europe.

<sup>53</sup> <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52011SC0359>.

<sup>54</sup> <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:52013DC0623>.

<sup>55</sup> ECE/TRANS/SC.3/WP.3/2017/3.

<sup>56</sup> [https://ec.europa.eu/transport/sites/transport/files/modes/inland/promotion/doc/sec\\_2011\\_453.pdf](https://ec.europa.eu/transport/sites/transport/files/modes/inland/promotion/doc/sec_2011_453.pdf).

<sup>57</sup> <https://ec.europa.eu/transport/sites/transport/files/studies/2017-10-dina.pdf>.

<sup>58</sup> <https://ec.europa.eu/transport/sites/transport/files/legislation/swd20180427-digital-inland-navigation.pdf>.

<sup>59</sup> <http://www.dtlf.eu/>.

Since 2014, continuous monitoring of IWT in the European Union, on the Rhine and Danube is performed by market observatory prepared by CCNR in collaboration with European inland navigation organizations.<sup>60</sup> This market observatory supports further promotion of the sector and provides: analysis of the demand for inland waterway transport, of the offer on the inland waterway market, an overview of navigation conditions on Europe's inland waterways, a microeconomic analysis of the sector and related issues.

A recent development has been the creation of CESNI (European committee for drawing up common standards in the field of inland navigation) by the European Union and the Central Commission for the Navigation on the Rhine (CCNR) in 2015. This committee was set up in order to create common standards in the field of inland navigation.<sup>61</sup> CESNI aims at a deeper harmonization in this field by implementing a commonly acknowledged regime of technical standards for inland vessels and the respective equipment, the implementation of information technology, such as RIS, AIS and the creation of common standards in the field of the education, training and certification of crews. The main areas of work of CESNI include: (a) harmonized technical standards for inland vessels; (b) (a) the European Standard laying down Technical Requirements for Inland Navigation Vessels (ES-TRIN), which defines harmonized technical standards for inland vessels; (b) the European Standard for Qualification in Inland Navigation (ES-QIN), which was recently introduced in 2018. This work is supported by CESNI working groups on technical requirements for vessels (CESNI/PT), on professional qualifications for navigation personnel (CESNI/QP) and on inland navigation information technologies (CESNI/IT).<sup>62</sup>

The European Union addresses the main technical, economic and legal issues of inland navigation, such as access to the market and the profession, state aid, competition, pricing, technical prescriptions applicable to inland vessels and the boatmasters' licences, through a number of specialized directives. Potential uncertainties as to the applicability of the European Union legislation to navigation on the Rhine, governed by the Mannheim Convention, which precedes the European Union legislation and involves a third State (Switzerland),<sup>63</sup> are being resolved by progressive harmonization between the two regimes and close cooperation between the European Commission and CCNR.<sup>64</sup>

In 2018, CCNR adopted a number of ambitious objectives for the next five years which would contribute to the sustainable development of inland navigation in ecological, social and economic terms called "Vision 2018" in support of "NAIADES II" action programme of the European Commission in the key areas.<sup>65</sup>

In order to encourage joint and co-operative initiatives and promote cooperation between intergovernmental institutions and bodies in Europe, a number of agreements have been concluded: (a) the Memorandum of understanding on cooperation between the Sava Commission and DC in January 2009; (b) the Administrative Arrangement concerning a framework for cooperation between the DC secretariat and the Directorate-General for Mobility and Transport of the European Commission in July 2015; (c) the Cooperation Arrangement between DC and MC in June 2018.

At the pan-European level, there have been no pan-European Ministerial Conferences on Inland Water Transport since the Bucharest conference in September 2006.<sup>66</sup> On 18 and 19 April 2018, UNECE jointly with by the Ministry of Maritime Economy and Inland

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<sup>60</sup> <https://inland-navigation-market.org>.

<sup>61</sup> CESNI, <https://cesni.eu/en/about-cesni>.

<sup>62</sup> <https://www.cesni.eu/en/activities-2>.

<sup>63</sup> R. Bieber, F. Maiani, M. Delaloye, *Droit Européen des transports*, Helbing and Lichtenhahn, *Dossiers de droit européen*, 2006, «Les transports par voie navigable», paras. 138–143.

<sup>64</sup> ECE/TRANS/SC.3/2017/17.

<sup>65</sup> [www.ccr-zkr.org/files/documents/vision/Vision2018\\_en.pdf](http://www.ccr-zkr.org/files/documents/vision/Vision2018_en.pdf).

<sup>66</sup> These conferences include Ministerial Conference on Timely Issues of European Inland Waterway Transportation (Budapest, September 1991); Pan European Conference on Accelerating Pan European Co-operation towards a Free and Strong Inland waterway transport (Rotterdam, 5–6 September 2001) and Bucharest conference on Inland Navigation: a Key Element of the Future Pan European Transport System (Bucharest, 13–14 September 2006). The most recent Ministerial Declarations are available at: [www.unece.org/trans/cd.html](http://www.unece.org/trans/cd.html).



Navigation of Poland organized the first International Ministerial Conference “Connecting by Inland Navigation” in Wrocław, Poland. The conference was aimed at increasing the focus of policy on fostering the role of inland water transport and addressing the challenges of sustainable development of mobility in inland water transport. The Conference continued the practice of Pan-European high-level conferences on inland water transport held in 1991, 2001 and 2006.

On 18 April 2019, the Ministers and Heads of Governmental delegations were invited to sign the Ministerial Declaration “Inland Navigation in a Global Setting” which established main objectives and actions required for the sector for the years to come and invited countries and all parties concerned to develop action plans for their implementation.

In 2018, two ministerial conferences dedicated to the milestone dates for the development of river navigation in Europe were held:

- On 29 June 2018, the Ministerial Conference was held in Belgrade on the occasion of the 70<sup>th</sup> anniversary of the signing of the Convention regarding the Regime of Navigation on the Danube (the Belgrade Convention). The participants adopted the Communiqué “Danube Commission – Strengthening the partnership in free navigation on the Danube”.<sup>67</sup> The conference followed by the 90<sup>th</sup> jubilee meeting of DC.
- On 17 October 2018, the sixth congress of CCNR took place on the occasion of the 150<sup>th</sup> jubilee of the Mannheim Declaration. CCNR member States adopted the Ministerial Declaration “150 years of the Mannheim Act – the driving force behind dynamic Rhine and inland navigation”.<sup>68</sup>

The table below provides an overview of membership in the above-mentioned international organizations and bodies.

#### Membership in inland navigation organizations

(Only full membership)

	<i>UNECE</i>	<i>EU</i>	<i>CESNI</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>
Austria	X	X	X		X		
Belarus	X						
Belgium	X	X	X	X			
Bosnia and Herzegovina	X		X			X	
Bulgaria	X	X	X		X		
Croatia	X		X		X	X	
Czech Republic	X	X	X				
Finland	X	X	X				
France	X	X	X	X			X
Germany	X	X	X	X	X		X
Hungary	X	X	X		X		
Ireland	X	X					
Italy	X	X	X				
Lithuania	X	X	X				
Luxembourg	X	X	X				X
Republic of Moldova	X				X		

<sup>67</sup> [http://www.danubecommission.org/uploads/doc/press/2018/DC\\_90\\_Session\\_Belgrade\\_20180629.pdf](http://www.danubecommission.org/uploads/doc/press/2018/DC_90_Session_Belgrade_20180629.pdf).

<sup>68</sup> [https://www.ccr-zkr.org/files/documents/dmannheim/Mannheimer\\_Erklaerung\\_en.pdf](https://www.ccr-zkr.org/files/documents/dmannheim/Mannheimer_Erklaerung_en.pdf).

	<i>UNECE</i>	<i>EU</i>	<i>CESNI</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>
Netherlands	X	X	X	X			
Poland	X	X	X				
Romania	X	X	X		X		
Russian Federation	X				X		
Serbia	X				X	X	
Slovakia	X	X	X		X		
Slovenia	X	X	X			X	
Switzerland	X		X	X			
Ukraine	X				X		
United Kingdom	X	X	X				
United States of America	X						

In addition to member States, International Organizations and NGOs, the most notable stakeholders' organizations in the field of IWT in Europe are:

- European Barge Union (EBU), which represents the shipping companies and barge operators;
- European Skippers Organization, which represents the owner-operators, who are boat masters that own the vessel they operate;
- International Association for the representation of the mutual interests of the inland shipping and the insurance and for keeping the register of inland vessels in Europe (IVR);
- Association for European Inland Navigation and Waterways (VBW), which promotes multimodal transport system water road/ship/port with interdisciplinary orientation through discussion and editing scientific, technical, legal and practical issues relating to the construction, the operation and the use of inland waterways and ports;
- European River-Sea Transport Union (ERSTU), which represents the interest of the river-sea transport sector;
- European Federation of Inland Ports (EFIP), which promotes the role of European inland ports as intermodal nodes in the transport and logistic chain;
- Education in Inland Navigation (EDINNA), which represents the educational institutes that are involved in the education and training of IWT crews;
- Inland Navigation Europe (INE), which represents the waterway authorities;
- AQUAPOL, the association of the European water police;
- The International Transport Workers Federation ETF, which represents the workers unions in the transport industry;
- Conference of Directors of Danube Shipping Companies – participants of the Bratislava Agreements (CDDSC), which promotes the cooperation between shipping companies engaged in international navigation on the Danube;
- European Boating Association (EBA), which promotes recreational navigation throughout Europe.

## B. The regulatory environment in European IWT

The landscape of rules and regulations in European IWT is a diverse one, as laid out in the White Paper 2011. The key players in this field are UNECE, the European Union, river

commissions and CESNI, as well as various non-governmental organizations (NGOs), which represent the stakeholders in the industry.

UNECE has the widest geographical coverage, since all European countries involved in inland navigation are a member. In its work on inland navigation, UNECE has prepared and maintains international agreements and conventions: the European Agreement on Main Inland Waterways of International Importance (AGN), the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN), The most important conventions are, the 1973 Convention relating to the Limitation of the Liability of Owners of Inland Navigation Vessels (CLN), the 1976 Convention on the Contract for the International Carriage of Passengers and Luggage by Inland Waterway (CVN) and the 2001 Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI).

In the field of inland navigation, UNECE has prepared and maintains international conventions: the European Agreement on Main Inland Waterways of International Importance (AGN), the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) and a number of international conventions relevant to IWT. The most important are: the Convention relating to the Unification of Certain Rules concerning Collisions in Inland Navigation, the Convention on the Registration of Inland Navigation Vessels, the Convention on the measurement of inland navigation vessels which was adopted in 1966.<sup>69</sup> Pan-European rules for the carriage of goods by inland waterways are established by the Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI), prepared jointly by UNECE, CCNR and DC.

The UNECE Working Party on Inland Water Transport (SC.3) addresses a large number of issues related to technical and safety standards in inland navigation and ensures their harmonized application by means of resolutions. The acceptance and implementation of these resolutions by UNECE member States is monitored regularly by the Working Party.<sup>70</sup>

Most important UNECE resolutions are:

(a) resolutions related to the status and Parameters of European network of Inland Waterways: resolution No. 30, "Classification of European Inland Waterways"; resolution No. 49 "Inventory of most important bottlenecks and missing links in the E Waterway Network", revision 2;

(b) resolutions that establish the rules and signs on inland waterways: resolution No. 24, "European Code for Inland Waterways (CEVNI)", revision 5; resolution No. 90, "European Code for Signs and Signals on Inland Waterways (SIGNI)";

(c) resolutions that establish the technical requirements for inland vessels: resolution No. 15, "Ship-Borne Barges", resolution No. 61, revision 2, "Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels" and resolution No. 69, "Guidelines for Passenger Vessels also suited for carrying Persons with Reduced Mobility";

(d) resolution No. 31 "Recommendations on Minimum Requirements for the Issuance of Boatmaster's certificates in Inland Navigation with a view to their Reciprocal Recognition for International Traffic";

(e) resolutions on RIS: resolution No. 48 "Recommendation on electronic chart display and information system for inland navigation (Inland ECDIS)", resolution No. 57 "Guidelines and Recommendations for River Information Services", resolution No. 58 "Guidelines and Criteria for Vessel Traffic Services on Inland Waterways", resolution No. 63 "International Standard for Tracking and Tracing on Inland Waterways (VTT)", resolution No. 79 "International Standard for Electronic Ship Reporting in Inland Navigation" and resolution No. 80 "International Standard for Notices to Skippers";

<sup>69</sup> The complete list of UNECE IWT conventions is available on the "Legal Instruments" webpage: [www.unece.org/trans/main/sc3/sc3\\_legalinst.html](http://www.unece.org/trans/main/sc3/sc3_legalinst.html).

<sup>70</sup> The full inventory of UNECE resolutions on Inland Water Transport and the secretariat's report on their acceptance are available at: [www.unece.org/trans/main/sc3/sc3res.html](http://www.unece.org/trans/main/sc3/sc3res.html).

(f) resolution No. 21 “Prevention of Pollution of inland Waterways by vessels”;

(g) resolutions promoting recreational navigation, the most important are resolution No. 40, “International Certificate for Operators of Pleasure Craft” and resolution No. 52, “European Recreational Inland Navigation Network”.

On 27 September 2012, the new Strasbourg Convention of 2012 on the Limitation of Liability in Inland Navigation (CLNI 2012) was concluded at the Diplomatic Conference convened by CCNR. The purpose of the revision was to improve the legal security of international river transport and to ensure adequate compensation for parties suffering some prejudice. CLNI 2012 has extended the scope of application of the limitations on liability to IWT on other major waterways, including the Danube, the Elbe, the Oder and the Sava, and has increased the limits of liability, also thereby increasing the protection afforded to passengers carried by IWT. CLNI 2012 entered into force on 1 July 2019 in Germany, Hungary, Luxembourg, the Netherlands and Serbia. Belgium and France have announced a short-termed ratification after which these countries will apply the convention as well. At the same time the CLNI 1988 convention that was in force in Germany, Luxembourg, the Netherlands and Switzerland, ceased.

The updated regulatory framework of the European Union for IWT includes Directive (EU) 2016/1629 of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels,<sup>71</sup> Regulation (EU) 2016/1628 of the European Parliament and of the Council of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery<sup>72</sup> and Directive (EU) 2017/2397 of the European Parliament and of the Council of 12 December 2017 on the recognition of professional qualifications in inland navigation<sup>73</sup> which are supported by CESNI standards: (a) the European Standard laying down Technical Requirements for Inland Navigation Vessels (ES-TRIN) which defines harmonized technical standards for inland vessels; (b) the European Standard for Qualification in Inland Navigation (ES-QIN) which was adopted in 2018.

The Convention on the collection, deposit and reception of waste generated during navigation on the Rhine and other inland waterways (CDNI)<sup>74</sup> entered into force on 1 November 2009. For the Danube and Sava basins, the following regulations apply: (a) chapter 10 of DFND and the DC Recommendation on waste management from vessels navigating on the Danube, which will come into force by the end of 2019, and (b) the Protocol on the Prevention of the Water Pollution Caused by Navigation to the Framework Agreement on the Sava River Basin, which is in force since December 2017.

The navigation rules maintained by the River Commissions, include (a) the Police Regulations for the Navigation of the Rhine by CCNR, (b) the Basic Rules of Navigation on the Danube (DFND) by DC, (c) the Police Regulations for the Navigation of the Mosel by MC and (d) the Navigation Rules on the Sava River Basin by the Sava Commission, which apply on the Sava River and its tributaries. DFND and the Navigation Rules on the Sava River Basin are fully in line with CEVNI revision 5. CCNR and MC are currently working on aligning their regulatory framework with CESNI standards.

### C. Examples of current international IWT-related projects in the ECE region

- Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries and FAIRway Danube: The Connecting Europe Facility (CEF) project FAIRway Danube is a Connecting Europe Facilities (CEF) co-funded project aiming on the implementation of the “Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries”, which is part of the TEN-T Corridor Work Plan for the Rhine Danube Core Network Corridor. This Master Plan maps several harmonized initiatives for the removal of infrastructure bottlenecks along the

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<sup>71</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016L1629>.

<sup>72</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32016R1628>.

<sup>73</sup> <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32017L2397>.

<sup>74</sup> [www.cdni-iwt.org/wp-content/uploads/2015/06/cdni\\_2014\\_EN.pdf](http://www.cdni-iwt.org/wp-content/uploads/2015/06/cdni_2014_EN.pdf).

Rhine-Danube Corridor and has been elaborated in close cooperation with all Danube riparian states. The project is led by the Austrian waterway authority via donau.

- RIS COMEX (River Information Services – Corridor RIS Management Execution): This project, is a Connecting Europe Facility (CEF) funded project under the management of the Austrian Waterway authority VIADONAU, which focuses on the definition, implementation and operation of reliable corridor RIS services. The programme started in 2016 and will conclude in 2020. The aim of RIS COMEX is the evolution of River Information services from a safety management tool to an integrated system, that also serves as a facilitator in the whole logistics chain.
- PROMINENT (Promoting Innovation in the Inland Waterways Transport Sector) – Is a Horizon 2020 funded programme that is addressing the key needs for technological development, as well as the barriers to innovation and greening in the European inland navigation sector. The project aims on lowering the energy consumption of the IWT fleet and with it its carbon footprint. The project consisted out of 17 partners from the Rhine and Danube region. It started in 2015 and concluded in 2018. The total budget of PROMINENT was 6.25 million Euro.
- Examples of projects in the framework of the European Union Strategy for the Danube Region (EUSDR) are: (a) Innovative Danube Vessel;<sup>75</sup> (b) PROMINENT (Promoting Innovation in the Inland Waterways Transport Sector);<sup>76</sup> (c) Danube Transnational Programme (INTERREG): GREEN DANUBE – Integrated transnational policies and practical solutions for an environmentally-friendly Inland Water Transport system in the Danube region <sup>77</sup> and GRENDDEL (Green and efficient Danube fleet).<sup>78</sup>
- EMMA – A project aimed at enhancing freight mobility and logistics in the Baltic Sea Region by strengthening inland waterway and river sea transport and promoting new international shipping services – is a transnational project focusing on the further development of inland waterway and river-sea logistics in the Baltic Sea region.<sup>79</sup> The project period spans from 2016 to 2019. The main objective of EMMA is an enhanced integration of inland waterway transport and river-sea transport into the logistics chain of the Baltic Sea region and hence an improved use of the of the huge yet underused potential of the sector in the region. In 2019, the extension of EMMA was approved by the European Commission.
- #IWTS 2.0 is an innovation project focusing on a better use of the waterways in Europe.<sup>80</sup> Where EMMA focusses on the Baltic Sea Region, #IWTS 2.0 is based around the North Sea. The project period spans from 2017 and 2021 and tackles the issue of the revitalization of underused waterways with three distinct approaches:
  - The minimal adaption of smaller waterways in order to make them suitable for a given CEMT standard vessel;
  - The development of new, or the adaption of existing vessels in order to give them access to a designating waterway which is not easily adaptable;
  - A general enhancement of the knowledge of the potential of IWT as a mode of land transport and is therefore somewhat broader.

<sup>75</sup> [www.danube-navigation.eu/uploads/files/Conferences/2014-01-30\\_IDV\\_full\\_report.pdf](http://www.danube-navigation.eu/uploads/files/Conferences/2014-01-30_IDV_full_report.pdf).

<sup>76</sup> <http://www.prominent-iwt.eu>.

<sup>77</sup> [www.interreg-danube.eu/approved-projects/green-danube](http://www.interreg-danube.eu/approved-projects/green-danube).

<sup>78</sup> [www.interreg-danube.eu/approved-projects/grendel](http://www.interreg-danube.eu/approved-projects/grendel).

<sup>79</sup> <http://project-emma.eu>.

<sup>80</sup> <https://northsearegion.eu/iwts20>.

## **Chapter IV. Developments and Challenges in European IWT and the way forward**

### **A. Developments and Challenges in European IWT**

The European IWT sector is currently facing numerous challenges. The ongoing climate change demands a greener industry, which emits less or no more greenhouse gasses and handles its wastes properly. There is furthermore a growing shortage of available staff and the current workers in the industry are aging. Moreover, there is no common standard yet for the education and training of future IWT crews, although there is an instrument in development for the EU states at this moment.

#### *1. Fleet modernization and greening*

Many the vessels currently operating on the European waterways were built more than 30 years ago. In fact, the average construction year of a dry cargo vessel in the Rhine area is 1965 and for a tanker vessel 1979.<sup>81</sup> It is a common situation when a vessel of this age still runs with the engine that was installed during its original construction. Almost the entire fleet is equipped with diesel combustion engines and diesel-powered electrical generators to provide electrical power on board. Environmental performance can be improved by using alternative propulsion systems, alternative fuels and by the aftertreatment of the emissions from engines.

The readiness of the sector to proactively invest into new and enhanced power supply systems is rather low, since most owners will not replace an engine that is still functional. And even if an engine needs replacement it might be hard to find a suitable replacement, since engine manufacturers are just beginning to provide engine, that meet the requirements of the new European regulations for Non-Road Mobile Machinery (NRMM) (stage V requirements in Regulation (EU) 2016/1628).

Alternative propulsion systems are at the moment a widely discussed topic in the IWT sector, which already has implemented low sulphur diesel as an industry standard, thus significantly lowering the emission of sulphur oxides. The most common alternatives for diesel are Liquefied Natural Gas (LNG), Gas to Liquid (GTL) and hydrogen. The success of these systems in the future will be highly dependent on their reliability, their availability, their durability and probably very importantly, their price. Ultimately, there might be no single substitute for the Diesel engine. It is highly likely, that we will see a combination of different systems coexisting, each fit for a designated purpose. Even the diesel engine might still be around for quite some time.

#### *2. Building a resilient IWT infrastructure*

The past years showed the impact of the climate change on the water levels on some of Europe's main waterways such the Rhine and the Danube. Long lasting low-water periods hindered navigation to a point where the vessels could only transport fractions of their usual loading capacity. On the other side, high water periods, and even flooding events also appear regularly. This causes, beside the damage done by the water to the infrastructure itself and neighbouring structures, the water bound traffic to stop until the water level dropped to a safe level again.

A resilient and well-maintained waterway infrastructure is crucial for the IWT sector. The flawless functioning of the waterways and the waterway infrastructure are paramount for green, safe and efficient shipping. Some ECE countries already have started with initiatives aiming on the re-naturalization of rivers in order to give the water more space in the case of high-water periods. At the Wrocław International Ministerial Conference, the ministers agreed, that the effects of the climate change should have an impact on the infrastructure planning, and that the impact of modifications of infrastructure should be considered for longer periods in order to cope with the effects of the climate change.

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<sup>81</sup> CCNR, Annual Report 2017, Inland navigation in Europe, Market Observation, p. 94.

### 3. *Waste management*

The and proper disposal of IWT related waste is another important factor for the improvement of the environmental performance of IWT. There are typically three types of waste, that occur during vessel operations. Oily and greasy wastes from the engine rooms, cargo residues left in the holds after unloading operations, household wastes and wastewater. Each of these wastes must be treated in a different fashion, and the vessel operators need a reliable system, in which they can dispose of these substances in a safe and reliable manner. There are currently two systems in place that deal with the collection of wastes and residues in European IWT at the moment. For the Rhine states, the Convention on Collection, Deposit and Reception of Waste Produced during Navigation on the Rhine and Inland Waterways (CDNI) is in effect since 1996. For the Danube Region, the project on the Convention on Waste Management for Inland Navigation on the Danube (CO-WANDA)<sup>82</sup> has developed a concept for on an International Danube Ship Waste Convention (IDSWC) which is not yet in effect. It is very important to the sector to have sufficient access to these waste disposal facilities throughout the entirety of the waterway network. The most pressing issue in this regard seems to be the access to waste water disposal sites for passenger vessels, which are not allowed to pump this water overboard.

### 4. *Smart and autonomous shipping, digitalization*

Automated and autonomous sailing is a key focus of the sector for several years now. It is highly desired by shipping companies, not only because it potentially beneficial for the navigational safety and reliability, but also because automated vessels require less or even no crew, depending on a semi- or fully automated vessel. In the light of a growing shortage of IWT staff, this is of particular interest for shipping companies.

Currently there are various systems, that are being developed and tested ranging from semi-autonomous assistance systems that are already available on the market which offer the crew of a vessel the opportunity of assisted navigation by setting waypoints along the desired route the vessel should travel. The vessel will then constantly follow these markings but is unaware of what is happening around the vessel like dense traffic or moving sandbars. The crew can therefore not leave the helm unattended. Another step in the evolution of (semi) autonomy is the remote steering of a vessel from a land-based station. In combination with automated mooring facilities, these vessels have the potential to travel unmanned. The last stage of the evolution would be a fully autonomous system, for which there is no real-life application available at this moment, but experiments with smaller water-based drones on inland waterways are already underway.

The degree of automation that will be seen in the foreseeable future will be highly dependent, not only on the technical possibilities, but also on political and insurance requirements. The question of the ultimate liability for the actions of fully autonomous vessels is not yet solved and autonomous vessels will need different safety management and assessment rules than manned vessels. Another issue not yet solved is the secure data communication, which is not only required in order to operate autonomous vessels, but also for the enhanced functionalities of the RIS system or the implementation of electronic transport documents. However, the governments of the Flemish region in Belgium and the Netherlands are currently allowing real live tests with autonomous vessels to assess their impact and interaction with other inland navigation vessels.

### 5. *Education and training*

The education and training of future IWT crews will be one of the more pressing issues for the sector in the upcoming years also because there is a fragmented landscape of education and training offered to future crew members of inland navigation vessels. The main challenges for the education and training of future IWT professionals are plentiful and include the fact that some crew members do not undertake homogenous training. They may have undergone a dual education consisting of practical and theoretical training on a regular

<sup>82</sup> [www.danube-navigation.eu/projects/co-wanda-convention-for-waste-management-for-inlandnavigation-on-the-danube](http://www.danube-navigation.eu/projects/co-wanda-convention-for-waste-management-for-inlandnavigation-on-the-danube).

training institute in the best case. Other professionals received theoretical training before entering the sector. In addition, numerous workers have not received any formal education at all.

It is furthermore necessary to assess the current content of training and education in the light of the ongoing digitalization of the sector. It is to be expected, that the operation of (semi)-autonomous vessels will require a different, more digitally, oriented skill set than the operation of a conventional vessel.

At the moment there is a system of mutual recognition of certificates in place, but there is neither a unified educational landscape throughout Europe, nor are there common standard regarding the mode in which the competences were obtained and assessed.

Since 2008, the key stakeholders in the sector started to work together towards a more harmonized and modernized regime of professional qualifications in inland navigation. One immediate result of these efforts is the foundation network of the European Inland Navigation educational institutions, EDINNA (Education in Inland Navigation), an educational network of European inland waterway navigation schools and training institutes. It was founded in 2009 as a reaction to the growing urge of the Directorate-General for Mobility and Transport of the European Commission for a modernization of the current certification and education regime as laid down in directives 96/50/EC and 91/672/EEC from 1995 and 1991 respectively, which only addressed the qualifications of the boat masters and did not tackle any other professional qualification onboard IWT vessels, such as deckhands. This has now been replaced by a new directive 2017/2397/EU, formally adopted in 2017. The directive implements a mutually recognized regime for IWT crews on the EU waterways for the first time. It defines professional qualifications and competences in inland navigation according to defined competence-tables and sets standards for qualification and certification on management and operational level that should guarantee a high and comparable standard of qualification and hence improve the safety, labour mobility and attractiveness of the job on all European waterways.

Another pressing issue with regard to training and education, as well as navigational safety is the fact that there is no common communication language when sailing an inland vessel. As a possible solution to this issue, The INTERREG project LE SINCP developed an online tool available as downloadable app, based on the EDINNA “Standard communication phrases”, a simplified glossary of phrases in simple English which closely resemble the IMO “Sea speak”. English was selected as the language of choice as most students in secondary education learn this language in school and it is the most popular second language in the world.

## 6. *Working and wages*

The average age of workers on an IWT vessel is greater than 50, the boat masters are even older on average. This means that a growing number of IWT professionals are about to leave the sector due to their age and cannot be sufficiently replaced by newly recruited staff. European educational institutions report dwindling numbers of new students.

The job market within the European IWT sector is currently characterized by a large number of vacancies and an insufficient influx of newcomers. There are insufficient crew available, even if the jobs are, at least in western Europe, relatively well paid (compared to the wages paid in short sea shipping) and offer predictable free time, since most crews enjoy several work free weeks after their usually two- or four-week shifts.<sup>83</sup> The IWT job market is most likely so tense at the moment, because the sector is still existing as a niche and is little known in the general public. It has furthermore the image of a rather rough and hard trade. Finally, it is technical profession, which is not the first choice for many youngsters when they choose a career path.

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<sup>83</sup> For example, the average captain on a Dutch IWT vessel will earn a gross salary between €2,500 and € 3,500 per month, a senior deckhand or helmsman between €1,800 and €2,500 per month, depending on the level qualification, experience and type of vessel.



The working environment in the European IWT sector has been in flux over the past decades and is still in a transformation process. While in the past, the job market was characterized by an abundance of relatively low-skilled workforce, the current trend towards an ongoing automation and modernization of the fleet demands a larger and differently skilled workforce. In addition, the number of female workers professionals, both on the operational level and management level is very low. This also applies to the number of new apprentices, who start their career. In 2009, less than ten percent of the workforce was female.<sup>84</sup> The numbers of female IWT personnel is currently rising but IWT remains a predominantly male profession.

## **B. IWT and the United Nations Sustainable Development Goals**

Sustainable transport is safe, high-quality, and accessible to all, ecologically sound, economically viable, and a positive contributor to local, national and international sustainable development. Economic, social and environmental sustainability can only be achieved through an integrated inland transport system, which comprises water, road and rail transport. This issue has been addressed in the joint publication “Transport for Sustainable Development. The case of Inland Transport” prepared under the leadership of the United Nations Economic Commission for Europe (UNECE).<sup>85</sup>

On 25 September 2015, the General Assembly of the United Nations adopted resolution A/RES/70/1 “Transforming our World: the 2030 Agenda for Sustainable Development”. Paragraph 54 of the resolution sets 169 targets in 17 interconnected Sustainable Development Goals,<sup>86</sup> which address the major challenges lying ahead. Each of these Sustainable Development Goals contains several indicators that are designed to measure the headway towards the specific goal to its set end date in 2030.

The Inland Transport Committee (ITC), supported by the UNECE Sustainable Transport Division, carries out a number of activities which have a direct impact on the achievement of the Sustainable Development Goals, as indicated on figure XI below.<sup>87</sup>

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<sup>84</sup> CCNR, Marktbeobachtung 1/2009, p.44, [www.ccr-zkr.org/files/documents/om/om09I\\_de.pdf](http://www.ccr-zkr.org/files/documents/om/om09I_de.pdf).

<sup>85</sup> [www.unece.org/fileadmin/DAM/trans/publications/Transport\\_for\\_Sustainable\\_Development\\_UNECE\\_2015.pdf](http://www.unece.org/fileadmin/DAM/trans/publications/Transport_for_Sustainable_Development_UNECE_2015.pdf).

<sup>86</sup> [www.un.org/sustainabledevelopment/sustainable-development-goals](http://www.un.org/sustainabledevelopment/sustainable-development-goals).

<sup>87</sup> [www.unece.org/trans/transport-and-the-sustainable-development-goals.html](http://www.unece.org/trans/transport-and-the-sustainable-development-goals.html).

Figure XI  
**Contribution of the UNECE Sustainable Transport Division to the achievement of the Sustainable Development Goals**



Continued and strengthened international cooperation with other transport modes at the pan-European and global level is therefore important to secure a future transport sector that strongly contributes to achieving the sustainable development goals. The overview given in this chapter relates mainly to the inland water transport (IWT) sector, but should be considered in conjunction with other transport modes and, in the framework of UNECE, other relevant working parties under the ITC purview.

1. *Sustainable Development Goal 6: Ensure availability and sustainable management of water and sanitation for all*

*Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development*



**Target 6.3**  
 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally



**Target 14.1**  
 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution

UNECE develops mechanisms addressing the identification of chemicals hazardous to the aquatic environment as well as the conditions to ensure their safe transport and handling. These are: the Model Regulations for the Transport of Dangerous Goods, GHS and the European Agreements concerning the International Carriage of Dangerous Goods by Road (ADR) and by Inland Waterways (ADN). Their implementation contributes to minimize the risks of release into the environment thus preventing water contamination.

Conventions and resolutions relevant to maintained by ITC:

- The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN)
- CEVNI, chapter 10 “Prevention of pollution of water and disposal of waste generated on board vessels”
- Annex to resolution No. 61 “Recommendations on harmonized Europe-wide technical requirements for inland navigation vessels”, revision 2, Chapter 8B “Prevention of water pollution and abatement of noise produced by vessels” and annexes 8 and 9
- Resolution No. 21, “Prevention of pollution of inland waterways by vessels”, revision 2.

The following conventions and documents address the prevention of water pollution from inland vessels on European inland waterways:

- The Convention on the collection, deposit and reception of waste generated during navigation on the Rhine and other inland waterways (CDNI)<sup>88</sup> that entered into force on 1 November 2009. The electronic payment system for oily and greasy waste produced during operation of vessels came into force on 1 January 2011. It is supported by the software SPE-CDNI which, since the end of 2018, enables payments of a disposal charge by vessel operators during the bunkering of gasoil using ECO-accounts with the associated ECO-cards.
- The European Standard laying down technical requirements for Inland Navigation vessels (ES-TRIN) by the European committee for drawing up standards in the field of inland navigation (CESNI), Chapter 18 “On-board sewage treatment plants” and annex 7.
- The Basic Rules of Navigation on the Danube (DFND), revision 5, chapter 10 “Prevention of water pollution and disposal of waste resulted from vessels”, which is harmonized with the European Code for Inland Waterways (CEVNI), revision 5, and the Recommendation on waste management from vessels navigating on the Danube, which will come into force by the end of 2019.
- The Protocol on the Prevention of the Water Pollution Caused by Navigation to the Framework Agreement on the Sava River Basin,<sup>89</sup> which is in force since December 2017.
- The Navigation Rules on the Sava River Basin, which apply on the Sava River and its tributaries and are fully in line with CEVNI revision 5.

It can be seen that there is no legal instrument to manage waste generated on board inland vessels at the pan-European level and, in particular, for the Danube region. The creation of a legal regime regulating this issue on the Danube has been investigated in the following projects:

- WANDA<sup>90</sup> (Waste management for inland Navigation on the DANube) (2009–2012) aimed at concerted development and implementation of preventive measures to ensure

<sup>88</sup> [www.cdni-iwt.org/wp-content/uploads/2015/06/cdni\\_2014\\_EN.pdf](http://www.cdni-iwt.org/wp-content/uploads/2015/06/cdni_2014_EN.pdf).

<sup>89</sup> [www.savacommission.org/dms/docs/dokumenti/sastanci\\_strana/2.\\_sastanak\\_strana\\_fasrb/protocol\\_on\\_prevention\\_of\\_water\\_pollution\\_caused\\_by\\_navigation\\_signed.pdf](http://www.savacommission.org/dms/docs/dokumenti/sastanci_strana/2._sastanak_strana_fasrb/protocol_on_prevention_of_water_pollution_caused_by_navigation_signed.pdf).

<sup>90</sup> [www.danube-navigation.eu/projects/wanda-waste-management-for-inland-navigation-on-the-danube-project-example-in-eusdr-action-plan](http://www.danube-navigation.eu/projects/wanda-waste-management-for-inland-navigation-on-the-danube-project-example-in-eusdr-action-plan).

a sustainable, environmentally sound and transnationally coordinated approach in ship waste management along the Danube;

- CO-WANDA<sup>91</sup> (2012–2014) focused on initial work for an international ship waste convention for ship waste management along the Danube which will allow a financing system using vignettes for vessels to pay to use the waste services;
- CODENAV<sup>92</sup> (System for ship-generated waste collection and processing in the maritime Danube ports) (2010-2014) aimed to increase the quality of the ship generated waste collection and processing services and the response in cases of pollution.

The joint meeting of the contracting parties to CDNI and the Danube Commission, held on 31 October 2018 in Vienna,<sup>93</sup> focused on CDNI and possible modernization of the Danube recommendations towards developing a binding regulatory framework to ensure better waste management and disposal and contribute to environmental protection. To be able to carry on cross-border inland navigation in Europe, both sides advocated the greatest possible harmonization of provisions and discussed possible collaboration.

2. *Sustainable Development Goal 7: Ensure access to affordable, reliable, sustainable and modern energy for all*

*Sustainable Development Goal 13: Take urgent action to combat climate change and its impacts*



*Target 7.A*  
*By 2030, enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology, and promote investment in energy infrastructure and clean energy technology*



*Target 13.1*  
*Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries*

Sustainable Development Goals 7 and 13 are aimed at reducing energy consumption and emissions as well as understanding their role in climate change. This has a major impact on transport industry as a large consumer of fossil fuel-based energy and it will affect the IWT sector which is highly dependent on diesel fuel.

Climate change, its impact on the sector and energy efficiency have been widely discussed by the industry in the past years. Recent reports have emphasized the need to improve the environmental performance of IWT.<sup>94</sup> In the European Union, new European regulations for Non-Road Mobile Machinery (NRMM) are in force, which introduce non-road mobile emissions stage V requirements in Regulation (EU) 2016/1628 and its supplementary regulations, applicable to engines in inland navigation these provisions have been introduced

<sup>91</sup> [www.danube-navigation.eu/projects/co-wanda-convention-for-waste-management-for-inlandnavigation-on-the-danube](http://www.danube-navigation.eu/projects/co-wanda-convention-for-waste-management-for-inlandnavigation-on-the-danube).

<sup>92</sup> [https://www.danube-navigation.eu/uploads/files/PA1A064\\_CODENAV\(3\).pdf](https://www.danube-navigation.eu/uploads/files/PA1A064_CODENAV(3).pdf).

<sup>93</sup> [www.cdni-iwt.org/wp-content/uploads/2018/08/cpcpp18\\_01en.pdf](http://www.cdni-iwt.org/wp-content/uploads/2018/08/cpcpp18_01en.pdf).

<sup>94</sup> Example: [www.welt.de/wirtschaft/article188614625/Stickoxid-Debatte-Alt-und-kaum-nachruestbar-So-dreckig-sind-Binnenschiffe.html](http://www.welt.de/wirtschaft/article188614625/Stickoxid-Debatte-Alt-und-kaum-nachruestbar-So-dreckig-sind-Binnenschiffe.html).

in ES-TRIN.<sup>95</sup> EUROMOT and CESNI have developed the guidance on understanding and interpreting the applicable requirements to engines.<sup>96</sup>

This issue was addressed at the International Ministerial Conference “Connecting by Inland Navigation”, held in Wrocław (Poland) on 18 and 19 April 2018. Ministers acknowledged that “a modern inland water fleet is of major importance for the navigation safety, efficiency and environmental protection. (...) Ministers call upon the sector to create, where necessary, new types of vessels and the introduction of innovations and modern technologies to ensure safety, reducing the risk of accidents minimizing environmental impact and combatting climate change”.<sup>97</sup>

The Mannheim Declaration “150 years of the Mannheim Act – the driving force behind dynamic Rhine and inland navigation” tasked CCNR “to develop a roadmap in order to reduce greenhouse gas emissions by 35% compared with 2015 by 2035, reduce pollutant emissions by at least 35% compared with 2015 by 2035, and largely eliminate greenhouse gases and other pollutants by 2050”.<sup>98</sup> For this purpose, CCNR has launched a study on financing energy transition for a zero emissions European inland navigation sector. This is supported by the ongoing work by CESNI on the requirements for fuel cells, lithium-ion batteries, collection of data on pilot projects on alternative fuels and automation.

The workshop “Encouraging the realization of a modern fleet, enhancing navigation safety and fostering innovations”, held on 19 June 2019 at the fifty-fifth session of the Working Party on the Standardization of Technical and Safety Requirements in Inland Navigation (SC.3/WP.3),<sup>99</sup> addressed also engine aftertreatment systems, cold ironing and the ongoing projects on the Danube such as GRENDEL,<sup>100</sup> PROMINENT<sup>101</sup> and GREEN DANUBE<sup>102</sup> in terms of alternative fuels, reducing air pollutant emissions and the energy consumption, and new concepts of cargo flows, logistics and vessels.

This trend is also facilitated by a number of restrictions aiming at emission standards imposed by harbours and municipalities that ban vessels with older and more polluting propulsion systems. The port of Rotterdam, for instance, will not allow vessels that do not comply with the new standard entering the port from the year 2025 and onwards and is planning on being a zero-emission port by 2050.<sup>103</sup>

The recommendations for potential adaptation measures to climate change impacts for inland transport, including IWT, have been proposed by the UNECE Group of Experts on Climate change impacts and adaptation for international transport networks in the final report “The report of Climate Change Impacts and Adaptation for International Transport Networks” (2014).<sup>104</sup>

<sup>95</sup> Commission Delegated Regulation (EU) 2017/654 of 19 December 2016; Commission Delegated Regulation (EU) 2018/236 of 20 December 2017; Commission Delegated Regulation (EU) 2017/655 of 19 December 2016; Commission Implementing Regulation (EU) 2017/656 of 19 December 2016; Commission Delegated Regulation (EU) 2018/987 of 27 April 2018; Commission Implementing Regulation (EU) 2018/988 of 27 April 2018 and Commission Delegated Regulation (EU) 2018/989 of 18 May 2018.

<sup>96</sup> [www.euromot.eu/publication-and-events/publications](http://www.euromot.eu/publication-and-events/publications).

<sup>97</sup> [www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration\\_e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration_e.pdf).

<sup>98</sup> [www.ccr-zkr.org/files/documents/dmannheim/Mannheimer\\_Erklaerung\\_en.pdf](http://www.ccr-zkr.org/files/documents/dmannheim/Mannheimer_Erklaerung_en.pdf).

<sup>99</sup> ECE/TRANS/SC.3/110, paras. 8–39.

<sup>100</sup> [www.prominent-iwt.eu](http://www.prominent-iwt.eu).

<sup>101</sup> [www.interreg-danube.eu/approved-projects/green-danube](http://www.interreg-danube.eu/approved-projects/green-danube).

<sup>102</sup> [www.interreg-danube.eu/approved-projects/grendel](http://www.interreg-danube.eu/approved-projects/grendel).

<sup>103</sup> [www.ccr-zkr.org/files/documents/workshops/wrshp240413/09\\_WvanderLans\\_nl.pdf](http://www.ccr-zkr.org/files/documents/workshops/wrshp240413/09_WvanderLans_nl.pdf).

<sup>104</sup> [http://www.unece.org/fileadmin/DAM/trans/main/wp5/publications/climate\\_change\\_2014.pdf](http://www.unece.org/fileadmin/DAM/trans/main/wp5/publications/climate_change_2014.pdf).

3. *Sustainable Development Goal 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all*



*Target 8.5*

*By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value*

*Target 8.9*

*By 2030, devise and implement policies to promote sustainable tourism that creates jobs and promotes local culture and products*

ILO Working paper No. 297 “Living and working conditions in inland navigation in Europe” (2014)<sup>105</sup> presented a detailed overview of the inland navigation sector in Europe, existing regimes, minimum requirements for crews, conditions of work, safety, health and well-being and social security. The overall conclusion was that the regulatory gaps across international, regional and national borders “are narrowing. As long as international and regional plans of actions keep up their momentum, national plans of actions will soon be forced to follow suit.”

As it was mentioned in the WMU study “Transport 2040: Automation, Technology, Employment – the Future of Work”,<sup>4</sup> and the report of ILO Sectoral Meeting on the Recruitment and Retention of Seafarers and the Promotion of Opportunities for Women Seafarers,<sup>106</sup> innovations offered possibilities for the improvement of working and living conditions of crews, both technical and regulatory. Currently, no official specific safety management regimes exist in the sector, however, this is subject to change; an example is Directive (EU) 2017/2397 of the European Parliament and of the Council of 12 December 2017 on the recognition of professional qualifications in inland navigation, which demands mandatory safety training for all IWT staff, and the European Standard for Qualification in Inland Navigation (ES-QIN) adopted by CESNI in 2018.<sup>107</sup>

Working as a skipper or a deckhand in IWT in Europe still requires a considerable extent of manual labour. However, the work of skippers tends to become more and more digitalized and automated. Modern equipment and systems like AIS, Inland ECDIS, RIS, radar installations and the ongoing modernization of wheelhouses make the work of a skipper more efficient and safer, however, no significant changes have been reached in the recent years. Manual labour is still a major reason for accidents in the sector, however, the development of automated systems such as automated mooring equipment, telescopic mooring poles which are already applied in newly built vessels, can improve the current situation.

The new challenges arising in the sector due to digitalization and automation, including safety and liability, and the role of education have been emphasized in the position paper “Making the future together – Automation in European IWT” of the European Transport Workers’ Federation<sup>108</sup> and in the final report of the project TASCs “Promoting social partnership in employee training” (June 2018) by social partners.<sup>109</sup>

This goal also addresses the promotion of sustainable tourism. UNECE activities related to recreational navigation, in accordance with the strategy of the Working Party on Inland Water

<sup>105</sup> [https://www.ilo.org/wcmsp5/groups/public/---ed\\_dialogue/---sector/documents/publication/wcms\\_234892.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/publication/wcms_234892.pdf).

<sup>106</sup> [www.ilo.org/wcmsp5/groups/public/---ed\\_dialogue/---sector/documents/meetingdocument/wcms\\_712749.pdf](http://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/meetingdocument/wcms_712749.pdf).

<sup>107</sup> [www.cesni.eu](http://www.cesni.eu).

<sup>108</sup> [https://www.etf-europe.org/wp-content/uploads/2018/12/ETF-IWT-Position-on-Automation\\_EN.pdf/](https://www.etf-europe.org/wp-content/uploads/2018/12/ETF-IWT-Position-on-Automation_EN.pdf/)

<sup>109</sup> [http://erc-online.eu/wp-content/uploads/2018/06/Employee-training\\_Final-report.pdf](http://erc-online.eu/wp-content/uploads/2018/06/Employee-training_Final-report.pdf).

Transport (SC.3) till 2021, include this issue in the agenda. This is realized through resolutions No. 13 “International Certificate (international card) for Pleasure Craft”, No. 14 “International Certificate (international card) concerning the Competence of Pleasure-Craft Operators”, and No. 40, “International Certificate for Operator of Pleasure Craft (ICC)”, which is now applied by 23 countries both within and outside the ECE region. Resolution No. 40 is supported by:

- the Guidelines on the application of resolution No. 40
- resolution No. 52 “European Recreational Inland Navigation Network”
- the online database of the ICC specimens issued by countries
- the road map for the implementation of resolution No. 40.

In 2017, SC.3 established the Informal Working Group on Recreational Navigation, tasked to promote the issue and recognition of ICC. As resolution No. 40 has a recommendatory status, further steps for promoting recreational navigation should be its evolution in an international mandatory instrument.

4. *Sustainable Development Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation*



*Target 9.1*

*Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all*

Sustainable and resilient infrastructure is of crucial importance for the IWT sector, as it is more susceptible to weather and climate conditions as compared to other inland transport modes, and there are still missing links, bottlenecks and legislative obstacles<sup>110</sup> for inland navigation across the European waterway system that need to be removed in order to fully capture the sector’s potential as a viable alternative mode of transport. Well-maintained and functioning waterways and waterway infrastructure are key to safe and efficient shipping.

The key issue in implementing this goal is the realization of the European Agreement on Main Inland Waterways of International Importance (AGN) for the whole E Waterway network and joint efforts of contracting parties in eliminating the bottlenecks identified in the Blue Book and resolution No. 49. AGN is in line with the core trans-European transport network set out by Regulation (EU) No. 1315/2013 of the European Parliament and of the Council of 11 December 2013. Therefore, the activities of European Union member States and the ongoing projects by the European Commission are a significant contribution to the implementation of this goal.

Other international conventions relevant to IWT are also significant contributions to this goal.

The significance of building up a solid regulatory framework aimed at increasing the efficiency of inland water transport, ensuring the appropriate balance among all transport modes, streamlining cargo flows and promoting the multimodality was emphasized in the Wroclaw declaration.<sup>111</sup> Ministers suggested “to countries lacking a sufficient regulatory framework for inland water transport to use and consider acceding to the United Nations international conventions relevant to inland water transport”, as well as pointed out “the importance of bilateral and multilateral treaties and agreements for the development of

<sup>110</sup> Resolution No. 49, revision 2; 2011 White Paper, para. 176.

<sup>111</sup> [www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration\\_e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration_e.pdf).

international transport and cross-border systems”. The recommendations on monitoring the implementation of the Wroclaw declaration by member States were adopted by SC.3 in November 2019.

UNECE resolutions aimed at ensuring navigation safety on European inland waterways are:

- CEVNI
- The European Code for Signs and Signals on Inland Waterways (resolution No. 90)
- Resolution No. 61, revision 2
- Resolutions on RIS : Nos. 48, 57, 58, 63, 79 and 80.

In order to assist member States in monitoring indicators across many goals, the UNECE Working Party on Transport Statistics (WP.6) has published a series of articles on how our existing transport statistics can be used to directly monitor transport-related progress of the implementation of the Sustainable Development Goals, and how these data can also feed in to provide insights into progress on many other goals. The paper focused on tonne-kilometre statistics brings together data on road, railway and inland waterway transport from the UNECE’s transport statistics database, Freight volumes by mode are required for tracking in particular indicator 9.1.2 on passenger and freight volumes. These numbers can also be the basis for calculating indicators on energy efficiency, infrastructure usage, environmental impact or safety levels of different modes of transport.<sup>112</sup>

Furthermore, collecting and visualizing internationally comparable data on main international traffic lines are of major and increasing importance in Europe, given the growing volume of international and transit traffic. The E-Road and E-Rail censuses carried out under the auspices of UNECE, provide comparable data on traffic flows on main European roads and railways on a pan-European basis. In 2018, the secretariat proposed to consider collecting an E-Inland Waterway census as a useful analytical tool for policymakers in member States.

5. *Sustainable Development Goal 17: Strengthen the means of implementation and revitalize the global partnership for sustainable development*



The overall issue of strengthening the means of implementation and revitalizing the global partnership for sustainable development is addressed by ITC through its work on harmonizing and simplifying the rules and regulations, managing and updating international legal instruments, by supporting industry and transport policy makers.

In the Wroclaw declaration, ministers encouraged “countries, including governmental executive bodies, the private sector, associations and academia, associations and academia, to maintain policy dialogue on good practices and measures relevant to the implementation of the objectives under the patronage of the Inland Transport Committee of the United Nations Economic Commission for Europe with the aim of ensuring that the development of Inland Water Transport is pursued in an internationally harmonized manner” and invited “regional integration organizations, United Nations Regional Commissions, River Commissions, international and public organizations, international financial institutions, and academia to contribute to the dialogue”.<sup>113</sup>

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<sup>112</sup> [www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/SDG\\_TKM\\_paper.pdf](http://www.unece.org/fileadmin/DAM/trans/main/wp6/pdfdocs/SDG_TKM_paper.pdf).

<sup>113</sup> [www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration\\_e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration_e.pdf).



6. *Sustainable Development Goal 3: Achieve gender equality and empower all women and girls*

This goal has been addressed by UNECE,<sup>114,115</sup> ILO and International Transport Workers' Federation (ITF), however, in the last decade the focus was primarily on gender issues in the maritime sector outside the scope of ECE activities:

- The Women Seafarers' Health and Welfare survey report<sup>116</sup> conducted in 2014–2015 jointly by the International Maritime Health Association, the International Seafarers' Welfare and Assistance Network, the International Transport Workers' Federation (ITF) and the Seafarers Hospital Society estimated that only 1–2% of the world's seafarers were women, mostly in the cruise sector.
- The study "Transport 2040: Automation, Technology, Employment — the Future of Work"<sup>117</sup> published by World Maritime University (WMU) in January 2019 estimated the share of female workers in the gender composition of the whole transport sector as 20 %.<sup>117</sup>
- In the European Union, this share counts for 22 %, and for waterborne transport 20 % of workers are women.<sup>118</sup> The European Union project "Women in Transport – European Union Platform for change", launched on 27 November 2017, aims to strengthen women's employment and equal opportunities for women and men in the transport sector.<sup>119</sup> For this purpose, the Declaration on equal opportunities for women and men in the transport sector has been developed<sup>120</sup> and the study has been conducted, and the final report "Business case to increase female employment in transport" was published by the European Commission in January 2019,<sup>121</sup> which provided recommendations on how to support further actions in improving female employment in the transport sector.
- The ILO Sectoral Meeting on the Recruitment and Retention of Seafarers and the Promotion of Opportunities for Women Seafarers (Geneva, 25 February–1 March 2019)<sup>122</sup> stressed that women represented only a very small percentage of the total number of seafarers: while some were doing well, others faced challenges, including scepticism over their strengths and capabilities, unequal treatment and sexual harassment. The meeting addressed issues identified by women seafarers as problems in their seafaring careers and provided recommendations for future action by ILO, governments, shipowners' and seafarers' organizations and other key players.

Based on recent initiatives, studies and conclusions, it can be seen that there is a gap in the data on gender issues for inland navigation, and efforts should be made to extend them to the sector in order to provide recommendations and propose actions for improvement.

**C. The Ministerial Declaration "Inland Navigation in a Global Setting" adopted at the International Ministerial Conference on Inland Water Transport in Wrocław (Poland) on 18 April 2018**

The International Ministerial Conference "Connecting by Inland Navigation" was held on 18 and 19 April in the city of Wrocław in Poland. This event was organized jointly by the Ministry of Maritime Economy and Inland Navigation of Poland and the UNECE as the first high-level conference for inland Navigation that was held on a global level. High-ranking participants came also from non-UNECE regions like Asia and Africa.

<sup>114</sup> [www.unece.org/fileadmin/DAM/trans/doc/2009/itc/ECE-TRANS-2009-08e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2009/itc/ECE-TRANS-2009-08e.pdf).

<sup>115</sup> [www.unece.org/fileadmin/DAM/trans/doc/2009/itc/ECE-TRANS-2009-07e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2009/itc/ECE-TRANS-2009-07e.pdf).

<sup>116</sup> [www.itfglobal.org/en/reports-publications/women-seafarers-health-and-welfare-survey](http://www.itfglobal.org/en/reports-publications/women-seafarers-health-and-welfare-survey).

<sup>117</sup> [https://commons.wmu.se/cgi/viewcontent.cgi?article=1071&context=lib\\_reports](https://commons.wmu.se/cgi/viewcontent.cgi?article=1071&context=lib_reports).

<sup>118</sup> <https://ec.europa.eu/transport/sites/transport/files/images/women-in-transport-infographic.jpg>.

<sup>119</sup> [https://ec.europa.eu/transport/themes/social/women-transport-eu-platform-change\\_en](https://ec.europa.eu/transport/themes/social/women-transport-eu-platform-change_en).

<sup>120</sup> [https://ec.europa.eu/transport/sites/transport/files/2017-declaration-equal\\_opportunities\\_en.pdf](https://ec.europa.eu/transport/sites/transport/files/2017-declaration-equal_opportunities_en.pdf).

<sup>121</sup> <https://publications.europa.eu/en/publication-detail/-/publication/6f833428-54f9-11e9-a8ed-01aa75ed71a1/language-en/format-PDF/source-93300850>.

<sup>122</sup> [www.ilo.org/wcmsp5/groups/public/---ed\\_dialogue/---sector/documents/meetingdocument/wcms\\_712749.pdf](http://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/meetingdocument/wcms_712749.pdf).

Starting in 1991, UNECE organized Ministerial Conferences in this sector have played a key role in coordinating the development of the European waterways. They were also the starting point of the development of the multimodal network of the Pan-European transport corridors. Finally, they set up action plans on an improved role of inland waterway transport in the European modal mix.

The first in the line of these events was the Pan-European Ministerial Conference Dedicated to Timely Issues of Inland Waterway Transport, which was held on 11 September 1991 in Budapest, the second Pan-European Conference on Inland Waterway Transport took place on 5 and 6 September 2001 in Rotterdam (The Netherlands). This was followed by the Pan-European Conference on inland waterway transport which took place on 13 and 14 September 2006 in Bucharest. One major outcome of this meeting was the subsequent adoption of resolution No. 258, “Supporting further development of inland water transport” on 8 February 2007 by the Inland Transport Committee (ITC), the highest policy-making body of UNECE.<sup>123</sup> After a 10-year break, it was followed by the International High-Level Conference on Inland Water Transport on 22 February 2017 in Geneva during the eightieth session of ITC.

The Wrocław conference focused on main areas relevant to effective and sustainable transport, that can ease the congestion on roads while having a very favourable performance when it comes to energy consumption and emissions per tonne-kilometre.

The Conference covered key aspects for the development of inland waterway sector, including:<sup>124</sup>

- The coordinated development of inland waterways at national and regional level;
- Inland water transport around the world;
- Major international projects and investments in inland waterways;
- Employment and education in inland navigation;
- Reducing the carbon footprint of inland navigation and advancing climate action;
- The legislative framework for inland water transport and UN legal instruments.

At the Conference, a declaration was signed by 14 countries and, later on, four more countries have become signatories.<sup>125</sup> The ministers recognized the importance of inland navigation for the European economies and its positive impact on sustainability.

Inland waterway transport is described as an important and integral part of well-balanced logistics chain throughout Europe. IWT has a very high standard when it comes to cost efficiency, energy efficiency, reliability and overall safety. It is practically free of congestion and produces very low emissions per tonne-kilometre. The ministers also emphasized the favourable role of IWT in the fight against climate change.

The ministers suggested the creation and maintenance of a regulatory framework aimed at increasing the efficiency of inland water transport. This can best be done bilaterally and multilaterally through treaties and agreements as a result of an ongoing policy dialogue as well as the exchange of good practices in IWT. They furthermore suggested to those countries in need of a better regulatory framework to agree to the UN’s international conventions regarding the sector.

The ministers stressed that IWT is very competitive in terms of safety, efficiency and reliability and has huge potential as part of an integrated logistics chain, which can lower the

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<sup>123</sup> UNECE, 2018, International Ministerial Conference “Connecting by Inland Navigation”, [www.unece.org/trans/areas-of-work/inland-water-transport/meetings/inland-water-transport/meeting/2018/international-ministerial-conference-connecting-by-inland-navigation/doc.html](http://www.unece.org/trans/areas-of-work/inland-water-transport/meetings/inland-water-transport/meeting/2018/international-ministerial-conference-connecting-by-inland-navigation/doc.html).

<sup>124</sup> [www.unece.org/info/media/news/transport/2018/international-ministerial-conference-to-focus-on-how-to-unlock-potential-of-connecting-by-inland-navigation/doc.html](http://www.unece.org/info/media/news/transport/2018/international-ministerial-conference-to-focus-on-how-to-unlock-potential-of-connecting-by-inland-navigation/doc.html).

<sup>125</sup> Ministerial declaration of the International Ministerial Conference on Inland Water Transport, Wrocław, 18 April 2018, [www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration\\_e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2018/sc3/Ministerial-declaration_e.pdf).

use of road transport for large quantities of cargo over longer distances. Multimodality is therefore key in order to take full advantage of IWT, which can ease congestion, lower emissions and energy consumption. Inland navigation is highly dependent on a reliable and accessible infrastructure in order to achieve its peak performance. The coordinated development and maintenance of a serviceable waterway infrastructure that proves to be resilient to climate change throughout Europe is therefore a precondition for the success of multimodality.

The ministers also addressed that the modernization of the European IWT fleet so that the vessels can navigate safely, efficiently and in an environmentally friendly manner. The ministers asked the IWT sector to invest in new technologies that increase the level of navigational safety, like alternative propulsion systems and reduce the ecological footprint of the fleet, like RIS and automation. Retrofitting the existing fleet might not be enough to reach the desired level of modernization. If necessary, new types of vessels must be developed.

Finally, the ministers call for the enhancement of the attractiveness of the sector as mode of transport, as well as for those working on IWT vessels. Inland navigation still has a low profile in the logistics industry due to its geographical limitations and a relative unfamiliarity among logistics decision-makers. The perception of IWT must be safe, reliable and available in order to create awareness and a broad acceptance as a viable link in the transport chain. It is up to the sector to create this image. However, there must be a level-playing field between the modes of transport, for which the countries are encouraged to act.

To make the sector more attractive as a job market, education and training must be contemporary and must meet high standards in order to assure that young people see the work on the European rivers as a viable career opportunity. It is also necessary to ease the mobility of workers in the IWT through a wider recognition of professional certificates.

As of November 2018, the following countries have signed the Ministerial Declaration:

Austria, Belarus, Belgium, Bulgaria, China, Croatia, Czech Republic, Germany, Luxembourg, Netherlands, Poland, Portugal, Romania, Russian Federation, Slovakia, Switzerland, Thailand and Ukraine.

On 22 February 2019, ITC at its eighty-first session adopted its resolution No. 265 “Facilitating the Development of Inland Water Transport” in support of the Ministerial Declaration adopted in Wrocław (ECE/TRANS/288, Annex III).

## **Chapter V. Towards a sustainable and competitive IWT in Europe: next steps and recommendations**

The broad geographical scope of the United Nations Economic Commission for Europe creates an excellent framework for closer cooperation of IWT stakeholders and political decision-makers throughout Europe. The Wrocław declaration may serve as a blueprint and starting point for this, and it would be highly desirable to create a framework of dedicated international cooperation.

The 2011 White Paper pointed out seven areas in which policies and actions were of particular importance at that time. Policy recommendations and proposals for action on each of the recommendations were attached to these policy fields:

- (a) Infrastructure development;
- (b) Modernization of the fleet;
- (c) The use of RIS;
- (d) Changing market requirements;
- (e) Labour market challenges;
- (f) Climate change, and
- (g) The enhancement of the institutional and regulatory regime.

In 2015, SC.3 prepared an overview of the implementation of the policy recommendations of the 2011 White Paper.<sup>126</sup> Since then, the recommendations have been included in the SC.3 strategy till 2021 and were the basis for the Wroclaw declaration. The main achievements of the 2011 White Paper include:

- (a) increase in the number of contracting parties to AGN; the adoption of the third revised edition of the Blue Book and the second revision of resolution No. 49, the development of the online Blue Book database;
- (b) support of ongoing projects such as the restoration of the E 40 waterway and EMMA;
- (c) continued work on technical prescriptions for inland navigation vessels and the adoption of the second revision of resolution No. 61;
- (d) continued work on updating CEVNI in cooperation with River Commissions and the adoption of the European Code for Signs and Signals on Inland waterways (SIGNI);
- (e) maintaining and updating resolutions on RIS,
- (f) cooperation with the European Commission, CESNI and River Commissions on automation, digitalization and other issues newly included in the agenda of SC.3, and
- (g) workshops and activities seeking to further implement the conclusions and recommendations of the 2011 White Paper.

A milestone in this work was the Wroclaw conference organized in accordance with Policy Recommendation No. 4 of the 2011 White Paper. Based on its outcome, the recommendations have been revised to align them with the 2030 Agenda for Sustainable Development and the current situation and challenges in the sector and recent changes in the institutional and regulatory framework, and the relevant UNECE actions have been proposed.

Futhermore, the recommendations are brought in line with the ITC strategy to 2030, adopted at its eighty-first session in February 2019.<sup>127</sup>

Based on this, and on the areas identified in documents ECE/TRANS/SC.3/2019/1 and 2, Policy Recommendations going forward can be divided into seven priority areas:

- (a) Increased coordination in the development of modern, sustainable and resilient E waterway network;
- (b) Renewed focus in building up a solid regulatory framework aimed at increasing the efficiency and safety of inland water transport;
- (c) Identifying and assisting member States in applying measures to increase the modal share of IWT, and improve its integration in multimodal transport and the logistics chains through the promotion of multimodality;
- (d) Encouraging the modernization and greening of the fleet and infrastructure to better tackle environmental challenges;
- (e) Promote the development and pan-European application of River Information Services (RIS) and other information technologies (IT);
- (f) Promote the development of automation, digitalization and other innovations in the IWT sector;
- (g) Address labour market challenges at the pan-European level, make the sector more attractive and increase the mobility of workers.

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<sup>126</sup> [www.unece.org/fileadmin/DAM/trans/doc/2015/sc3wp3/ECE-TRANS-SC3-2015-01e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2015/sc3wp3/ECE-TRANS-SC3-2015-01e.pdf).

<sup>127</sup> ECE/TRANS/288/Add.2, available at [www.unece.org/fileadmin/DAM/trans/doc/2019/itc/ECE-TRANS-288add2e.pdf](http://www.unece.org/fileadmin/DAM/trans/doc/2019/itc/ECE-TRANS-288add2e.pdf).

**Policy Recommendation No. 1****Increased coordination in the development of modern, sustainable and resilient E waterway network**

AGN provides a strategic tool and coordinated international plan for the development and construction of a network of inland waterways of international importance (E waterway network). Contracting States intend to undertake the development and construction of inland waterways and coastal routes used by sea-river vessels as part of national programmes and plans. Therefore, efforts should be made to promote the agreement and increase the number of contracting parties.

IWT relies on a fully functioning and effective infrastructure. In recent years, the focus on the impact of climate change has had an impact on inland navigation, the performance of IWT and the whole logistics chains. The further development of the E-waterway network has to address this issue to ensure the resiliency of the waterway network.

*Proposed UNECE actions:*

(a) Continue promoting and facilitate accession to AGN based on the road map for ratification, acceptance, approval and accession;<sup>128</sup> continue consultations with member States on possible concerns on its implications or ratification;

(b) Further strengthen the monitoring mechanism to review and update the development of the AGN network, in particular, by maintaining the Inventory of Main Standards and Parameters of the E Waterway Network (“Blue Book”), the Inventory of most important bottlenecks and missing links in the E Waterway Network (resolution No. 49) and the online Blue Book database by coordinating this work with the European Commission and other relevant stakeholders;

(c) Encourage ongoing initiatives on waterway construction, maintenance and rehabilitation plans of international waterways and invite other countries to consider these initiatives when maintaining their waterways;

(d) Facilitate actions to ensure the resilience of the sector to climate changes. In particular, promote the implementation of the recommendations of the UNECE Group of Experts on Climate change impacts and adaptation for international transport networks by member States;

(e) Continue monitoring and support of the ongoing infrastructure projects of European waterways of international importance.

**Policy Recommendation No. 2:****Renewed focus in building up a solid regulatory framework aimed at increasing the efficiency and safety of inland water transport**

As described in documents ECE/TRANS/SC.3/2019/1 and 2, the regulatory framework in European IWT continues to be diverse and complex. International conventions and agreements relevant to IWT are the tools which ensure that the development of the sector is pursued in an internationally harmonized manner. Therefore, efforts should be made to increase the efficiency of mandatory instruments and the number of contracting parties to them, as well as updating them in accordance with the ITC strategy till 2030.

*Proposed UNECE actions:*

(a) Continue promoting the international conventions under the purview of ITC which are relevant to inland navigation and invite countries lacking a sufficient regulatory framework for inland water transport to use and consider acceding to these conventions;

(b) Suggest to countries lacking a sufficient regulatory framework for inland water transport to use and consider acceding to the United Nations international conventions relevant to inland water transport;

<sup>128</sup> ECE/TRANS/SC.3/2019/7.

(c) Continue monitoring and support the process of implementation of international conventions under the ITC purview which are relevant to inland navigation and continue efforts how to make them more efficient and attractive to other UNECE member States as well as United Nations Member States;

(d) In close cooperation with River Commissions, continue promoting CEVNI and promote SIGNI as the basis for transparent and standard rules for inland water navigation at the pan-European level and develop appropriate mechanisms that ensure streamlined and effective maintenance and monitoring of its provisions;

(e) Support all efforts to establish a pan-European legal framework for private law aspects of inland navigation, such as the implementation of the international conventions existing in this area;

(f) Assess potential new legal instruments to further facilitate the growth and use of inland waterways, pleasure navigation and tourism and increase the sustainability of transport;

(g) Support the UNDA project on the implementation of transport related Sustainable Development Goals in selected landlocked and transit/ bridging countries and contribute to the implementation of its outcome.

### **Policy Recommendation No. 3:**

#### **Identifying and assisting member States in applying measures to increase the modal share of IWT, and improve its integration in multimodal transport and the logistics chains through the promotion of multimodality**

Intermodal transport becomes more and more important for the European IWT industry. IWT is very competitive in terms of safety, efficiency and reliability and can be a substitute for road transport for large quantities of cargo over longer distances, but IWT has still untapped potential in the integrated logistics chain. The increased volume of transported containers by waterway over the past decades is considerable, but the use of inland vessels in a fragmented transport chain is not its traditional domain and logistics decision makers are therefore often unaware of the potentials of this mode of transport. The advantages of transport make it ideal for certain flows within a multimodal transport chain.

The task set out in the Wroclaw declaration is therefore encouraging investment in the sector aimed at building and modernizing the inland waterway infrastructure, the fleet and ports as well as fostering innovation and using alternative fuels and increasing the market share of inland water transport.

#### *Proposed UNECE actions:*

(a) Continue raising awareness of the competitive and complementary advantages of IWT at high-level policy events, such as the annual sessions of the ECE Inland Transport Committee or major international transport events, such as an international conference on IWT currently planned for 2023;

(b) Encourage measures to ensure the appropriate balance among all transport modes. Undertake and coordinate measures to facilitate integration of inland water transport in multimodal transport and logistics chains in order to facilitate access to financial resources of international financial institutions for their development;

(c) Continue cooperation with the rail and road sectors through joint meetings and other activities of UNECE bodies dealing with inland water, road, rail, intermodal transport and logistics in order to facilitate the integration of inland water transport in the multimodal transport and logistics chain;

(d) Encourage multimodality in IWT operations by promoting the relevant international agreements, such the Protocol on Combined Transport on Inland Waterways to the European Agreement on Important International Combined Transport Lines and Related Installations (AGTC), with a view to facilitate integration of inland water transport in multimodal transport and logistics chains;

(e) Use UNECE instruments, such as jointly organized high-level conferences, dedicated working parties, workshops and capacity-building events, to promote the favourable impact of the use of IWT in the logistics chain on the environment as well as the economic advantages for transport of larger quantities of cargo shift via inland waterways over long distances.

**Policy Recommendation No. 4:**

**Encouraging the modernization and greening of the fleet and infrastructure to better tackle environmental challenges**

This recommendation aims to support the ongoing activities on the fleet modernization and greening and the prevention of environmental pollution from vessels. While the 2011 White Paper focused mainly on CO<sub>2</sub> reduction, the current discussions and resulting vessel concepts tackle also other emissions, such as sulphur oxides and nitrogen oxides. Recent initiatives include new types of low-emission vessels and zero emission vessels that use electric energy from hydrogen fuel cells or batteries and therefore do not emit any combustion-related pollutants.

The main fields of action include the harmonization of rules and promotion of the implementation of innovations such as new propulsion systems and fuels, but also a deeper cooperation in the field of ongoing digitalization of the sector.

The management and proper disposal of IWT related wastes, is an important factor for the enhancement of the environmental impact of IWT.

*Proposed UNECE actions:*

(a) Continue exchanging best practices and support programmes and pilot projects aimed at modernization and greening of the fleet, new and enhanced vessel types, low and zero emission propulsion systems and monitor their implementation;

(b) Continue to support European regulations on the management of IWT-related waste, such as the Convention on the collection, deposit and reception of waste produced during navigation on the Rhine and other Inland Waterways (CDNI) and support the development of the International Danube Ship Waste Convention;

(c) Continue work on developing and harmonizing the pan-Europeans prescriptions for inland vessels and river-sea vessels;

(d) Support and encourage research studies and activities, aimed at maintaining and further increasing the IWT competitive edge in environmental performance, including research on the measures to reduce the emissions by inland vessels and on alternative fuels for inland vessels;

(e) Support the initiative to reduce greenhouse gas emissions by 35% compared with 2015 by 2035, reduce pollutant emissions by at least 35% compared with 2015 by 2035, and largely eliminate greenhouse gases and other pollutants by 2050 set out in the Mannheim declaration. Encourage other member States to do so;

(f) Promote the role of water transport using alternative fuels or electromotion in an urban environment. Support the development of clean and sustainable, enhanced or alternative propulsion systems for inland navigation vessels and other environment-related issues.

**Policy Recommendation No. 5:**

**Promote the development and pan-European application of River Information Services (RIS) and other information technologies (IT)**

RIS corridor management enables them to be used not only as a safety management tool, but as an integrated system, that serves as a facilitator in the whole logistics chain, by making relevant RIS data available to logistics planners and ship operators in order to ease the planning and monitoring of waterborne freight flows. This will be the next step in the deployment of RIS supporting inland navigation as an important transport mode in the international multimodal logistic chain.

The acceptance and widespread use of Information Technologies in IWT and the necessary exchange of sensitive data is highly dependent on a high and reliable level of data protection.

The ongoing work of the European Commission on the assessment of Directive 2005/44/EC on harmonized RIS on inland waterways in the Community, updating international RIS standards and the creation of the CESNI Expert Group on Information Technology in 2019 provide an updated background for the future work in this field.

*Proposed UNECE actions:*

(a) Further support a pan-European dialogue on the implementation and further development of RIS and RIS corridor management;

(b) Cooperate with the European Commission and the CESNI Expert Group on Information Technology and regularly update RIS related resolutions maintained by SC.3, as well as other relevant instruments: CEVNI and SIGNI;

(c) Cooperate with the European Commission to ensure that the interests of member States outside the European Union are duly noted in the European Hull Database maintained by the European Commission;

(d) Encourage other uses of IT to facilitate IWT operations and inspections of inland vessels and elaborate and promote the harmonized rules and criteria in this area.

**Policy Recommendation No. 6:**

**Promote the development of automation, digitalization and other innovations in the IWT sector**

In recent years, such innovations as automation, smart shipping and digitalization have already become a part of inland shipping. It is therefore essential to promptly address the new challenges. Digitalization for the sector can improve administrative procedures and processes, facilitate the movement of goods, increase the efficiency of logistics and management of cargo flows and facilitate integration with other transport modes and promoting multimodality. However, potential risks and challenges include cyber security; creation of new qualifications, education programmes and assessment procedures, social impacts and liability issues as well as additional costs.

In this respect, experience from other transport modes could be used by the sector to develop a common information and exchange system, single window and reporting formalities in ports, electronic consignment notes and other relevant achievements.

*Proposed UNECE actions:*

(a) Promote the development of automation in inland navigation as a part of the activity of ITC on Intelligent Transport Systems, the development of the international regulatory framework and encourage measures aimed at reducing possible negative impacts on the sector;

(b) Support the developments in the digitalization of transport documents and measures aimed at improving administrative procedures for inland water transport, simplified reporting procedures by means of digital tools, RIS electronic reporting related services and other activities;

(c) Continue the cooperation with the European Commission on issues related to digitalization in IWT;

(d) Improve cooperation with the UNECE Trade Division and working parties under the purview of ITC on exchanging best practices on recent developments in automation and digitalization in other transport sectors;

(e) Encourage and support the development of a harmonized international legal framework for the digitalization of transport documents and consider a possible impact on the existing legal instruments, in particular, the Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI);



(f) Encourage and support the measures to be undertaken in order to ensure cybersecurity and other relevant aspects.

**Policy Recommendation No. 7:**

**Address labour market challenges at the pan-European level, make the sector more attractive and increase the mobility of workers**

The IWT labour market currently suffers from the lack of qualified staff in the sector, with general or with special qualifications, the increased average age of workers, low wages and differences in crew member wages in different parts of Europe. The reasons given are more severe working conditions compared to other sectors, the image of the inland water transport sector, insufficient social protection and social security and the lack of harmonization of job profiles, occupations and qualifications.

The situation could be improved by increasing the efficiency and competitiveness of inland water transport, the visibility of the sector and the prestige of jobs, as well as through computerization by introducing modern technologies.

*Proposed UNECE actions:*

(a) Support and contribute to the ongoing work of the European Union, CESNI and River Commissions to address labour market challenges with particular emphasis on social, economic, safety and liability implications of the current labour practices, automation and digitalization

(b) Support and encourage activities aimed at ensuring the equal rights and opportunities for women in inland navigation, make the sector attractive for younger workers and increase the attractiveness of the sector;

(c) Continue harmonizing the approaches for issuing certificates for boat masters and crew members and the recognition of certificates, in particular, resolution No. 31 with Directive (EU) 2017/2397 and the ES-QIN standard, exchanging best practices and facilitating mobility of workers between the European Union and non-European Union countries;

(d) Harmonize training and education principles at a pan-European level, support the development of RIS technologies and standardization in educational and training programmes for students;

(e) Continue monitoring and supporting the process of opening up national inland waterways to vessels flying foreign flags and supporting the activities of member States to promote and implement Pan-European rules for inland navigation and signs and signals on inland waterways on their territory.

## Annex

## European inland navigations regimes

Note: Instruments that are not legally binding are highlighted in italics. N/A indicates the absence of recommendations or regulations.

<i>Content of the regulatory framework</i>	<i>UNECE</i>	<i>EU</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>	<i>CESNI</i>
1. General provisions							
1.1 Standards and parameters of inland waterways	European Agreement on Main Inland Waterways of International Importance (AGN)	Regulations (EU) Nos. 1315/2013 and 1316/2013 of 11 December 2013  Commission Delegated Regulation (EU) 2017/849 of 7 December 2016	N/A	N/A	Classification of the Sava River Waterway	N/A	N/A
1.2. Access to market	N/A	EU regulations (EEC) 3921/91 and (EC) 1356/96	The Mannheim convention (as amended by Additional Protocol No. 2)	Convention regarding the regime of navigation on the Danube (the Belgrade Convention)	Framework Agreement on the Sava River Basin	Convention on the canalisation of the Mosel (1956)	N/A
2. Technical and safety requirements							
2.1 Navigation rules	<i>Resolution No. 24 – CEVNI: European Code for Inland Waterways</i>  <i>Resolution No. 90 SIGNI - European Code for Signs and</i>	N/A	Police Regulations for the Navigation of the Rhine	<i>Basic Rules of Navigation on the Danube</i>  <i>Instruction for installation of signs of fairway buoyage and</i>	Navigation Rules in the Sava River Basin  Rules For Waterway Marking in the Sava River Basin	Police Regulations for the Navigation of the Mosel	N/A

<i>Content of the regulatory framework</i>	<i>UNECE</i>	<i>EU</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>	<i>CESNI</i>
	<i>Signals on Inland Waterways</i>			<i>marking system on the Danube</i>			
2.2 Technical requirements for inland vessels	<i>Resolution No. 61, Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels</i>  <i>Resolution No. 69, Guidelines for Passenger Vessels also suited for carrying Persons with Reduced Mobility</i>	Directive (EU) 2016/1629 of 14 September 2016 laying down technical requirements for inland waterway vessels	Rhine Vessel Inspection Regulations	<i>Recommendations on Technical Requirements for Inland Navigation Vessels</i>	Technical Rules for Vessels in the Sava River Basin	Police Regulations for the Navigation of the Mosel	European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN)
2.3 Requirements for issuing the boatmasters' certificates	<i>Resolution No. 31, Recommendations on Minimum Requirements for the Issuance of Boatmaster's Licences in Inland Navigation with a view to their Reciprocal Recognition for International Traffic</i>	Directive (EU) 2017/2397 of the European Parliament and of the Council of 12 December 2017	Regulations concerning Navigation Personnel on the Rhine (RPN)	<i>Recommendations on the Establishment of Boatmasters' Licences on the Danube</i>	Rules on minimum requirements for the issuance of boatmaster's licences on the Sava river basin	Police Regulations for the Navigation of the Mosel	European Standard for Qualification in Inland Navigation (ES-QIN)
2.4 Requirements on transport of dangerous goods	European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways	Directive 2008/68/EC of 24 September 2008 on the inland transport of dangerous goods	European Agreement concerning the International Carriage of Dangerous Goods	<i>Regulations for the transport of dangerous substances on the Danube</i>	Rules for the transport of Dangerous Goods in the Sava River Basin	European Agreement concerning the International Carriage of Dangerous Goods	N/A

<i>Content of the regulatory framework</i>	<i>UNECE</i>	<i>EU</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>	<i>CESNI</i>
			by Inland Waterways			by Inland Waterways	
2.5 River information services	<i>Resolution No. 57, Guidelines and Recommendations for River Information Services</i>	Directive 2005/44/EC on harmonized river information services (RIS) on inland waterways in the Community	Guidelines and Recommendations for River Information Services		Rules on harmonised River Information Services (RIS) on the Sava River Basin		
2.6 Recreational navigation	<i>Resolution No. 40, International Certificate for Operators of Pleasure Craft</i>						
3. Civil and public law aspects of inland water transport operations							
3.1 Contract for the carriage of goods	Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI)		Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI)	Budapest Convention on the Contract for the Carriage of Goods by Inland Waterway (CMNI)			
3.2 Limitation of liability in inland navigation			The Strasbourg Convention of 2012 on the limitation of liability in inland navigation (CLNI)				
3.3 Rules concerning collision of inland vessels	Convention relating to the Unification of Certain Rules concerning						

<i>Content of the regulatory framework</i>	<i>UNECE</i>	<i>EU</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>	<i>CESNI</i>
	Collisions in Inland Navigation						
3.4 Registration of inland vessels	Convention on the Registration of Inland Navigation Vessels	Directive (EU) 2016/1629 of 14 September 2016 laying down technical requirements for inland waterway vessels	Police Regulations for the Navigation of the Rhine				
3.5 Measurement of inland vessels	Convention on the Measurement of Inland Navigation Vessels						
4. Environmental aspects of inland navigation							
4.1 Prevention of pollution by inland vessels	<i>Resolution No. 21, Prevention of Pollution of inland Waterways by vessels</i> <i>Resolution No. 61, Recommendations on Harmonized Europe-Wide Technical Requirements for Inland Navigation Vessels</i>	Regulation (EU) 2016/1628 of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery	Police Regulations for the Navigation of the Rhine	<i>Recommendations on organization of the collection of waste from the vessels navigating on the Danube</i>	Protocol on the prevention of water pollution caused by navigation to the Framework Agreement on the Sava River Basin		European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN)
4.2 Waste management	<i>Resolution No. 21, Prevention of Pollution of inland Waterways by vessels</i>		Convention on Collection, Retention and Disposal of Waste Generated during Navigation on the	<i>Recommendations on organization of the collection of waste from the vessels navigating on the Danube</i>	Protocol on the prevention of water pollution caused by navigation to the Framework		

<i>Content of the regulatory framework</i>	<i>UNECE</i>	<i>EU</i>	<i>CCNR</i>	<i>DC</i>	<i>SC</i>	<i>MC</i>	<i>CESNI</i>
	<i>Resolution No. 24 – European Code for Inland Waterways (Chapter 10)</i>		Rhine and Other Inland Waterways (CDNI)		Agreement on the Sava River Basin		
4.3 Environmental impact of IWT infrastructure development	Convention on Environmental Impact Assessment in a Transboundary Context (ESPOO Convention)	<p>Directive 2011/92/EU of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment</p> <p>Strategic Environmental Assessment (SEA)</p> <p>Directive 2001/42/EC</p> <p>Directive 2000/60/EC establishing a framework for the Community action in the field of water policy</p>					

## Appendix I

### Inland waterway networks outside Europe

#### A. The Congo River Basin

##### Navigation

The three main navigable rivers in the Congo river basin are the river Congo from Kisangani in the east of the Democratic Republic of Congo (DRC) to the twin cities of Kinshasa and Brazzaville, about one hundred kilometres to the east of the mouth of the Congo river. The second navigable river in the basin, and a main tributary to the Congo river is the Oubangui river, which is navigable from the town of Bangui in the Northwest of the DRC to its confluence with the main river west of the town of Mbandaka. The last main tributary of the Congo river is the Kasai river, which is navigable from the town of Ilebo to its confluence with the Congo river northeast of Kinshasa/Brazzaville. The overall length of the network of navigable rivers in the Congo river basin is about 17,000 kilometres but only a rather small portion of this network is able to handle larger vessels, able to carry more than 500 tonnes of cargo.<sup>129</sup>

##### Fleet

The operational fleet on the Congo river and its tributaries is estimated at roughly 2,450 self-propelled vessels, 2,500 dumb barges, 300 pontoons and 518 push boats,<sup>130</sup> of which the last three are commonly combined to cargo convoys - the majority of the goods on the river are transported on these convoys consisting of a push boat and several barges (with a capacity of 500 to 2,000 tonnes). There is, furthermore, a fleet of smaller boats and crafts propelled by outboard motors or even paddles, which transport a wide variety of cargo, from foodstuffs to household goods up and down the vast river system.

##### Challenges

The Congo river is somewhat unusual compared to other major rivers in the world. It is not possible for vessels to navigate the river from Kinshasa/Brazzaville westwards to the sea, since massive rapids, the Livingston Falls, make navigation impossible.

The composition and draught of the larger convoys that navigate the Congo river and its main tributaries vary according to the seasons in the region. There are years, where navigation is impossible altogether due to long-lasting low water periods.

#### B. The Mekong river system

##### Navigation

The Mekong river system is over 4.350 kilometres in length. It is the 7<sup>th</sup> largest river in Asia, and an important trade link between its riparian states of China, Laos, Thailand, Cambodia and Vietnam. While in the upper, navigable stretches of the river, between China and Cambodia, only smaller vessels of less than 250 tonnes can operate, the middle stretches from Thailand via Laos to Cambodia can accommodate larger vessels carrying more than 300 tonnes. The river is suitable for larger, also seagoing vessels, with a capacity of 5.000 tonnes up to the Cambodian capital of Phnom Penh. However much of the traffic is dedicated to domestic movements and cross border transport to Vietnam by smaller inland vessels. The lower part of the River basin and the estuary area, the Mekong Delta, is characterized by a very wide riverbed and numerous estuaries. The Mekong Delta can accommodate larger vessels in greater numbers, a total of 78 percent of the annual cargo volume, and 89 percent

<sup>129</sup> [www.cicos.int/navigation-interieure/voies-navigables](http://www.cicos.int/navigation-interieure/voies-navigables).

<sup>130</sup> [www.cicos.int/navigation-interieure/flotte/](http://www.cicos.int/navigation-interieure/flotte/).

of the passenger traffic on the Mekong is handled in the delta region, whereas Thailand on the upper Mekong only accounts for six percent of the transport volume.

### **Fleet**

The fleet on the river is rather diverse. The upper stretches of the navigable Mekong river system mainly accommodate smaller cargo vessels with loading capacities of up to 100 metric tonnes and smaller passenger vessels or speedboats of less than 100 passengers. On the middle stretches of the Mekong, the national fleet of Thailand is rather small with 183 vessels, while the fleet of Laos is somewhat larger in quantity (2,961 vessels), but also consists of smaller craft with a loading capacity of less than 100 metric tonnes. The lower stretches of the river in Cambodia and the delta region in Vietnam are considerably larger in capacity and size.<sup>131</sup> Almost all the Mekong IWT fleet (about 98 percent) is registered in Vietnam and therefore in the Delta region. In 2012, a large number of 190,190 dry cargo vessels with an average loading capacity of 64 tonnes were registered in the Delta region. In addition, 39,872 passenger vessels with an average capacity of 13 passengers and 3,459 tanker vessels were registered in the region.

### **Challenges**

The upper and the middle part of the Mekong have unpredictable fairway conditions, especially in the dry season, which makes the navigation on the river even more demanding. There are very few larger riverports available on the upper stretch of the river and most of the transshipment is done directly via the natural riverbank. Navigation safety is a considerable issue and there is no RIS system available throughout the entire stretch of the river. In addition to this, sand mining and the erosion of the riverbed due to the reduced sediment load, that comes along with the dredging operation is an issue.

The creation of a safe navigation channel, that can accommodate larger vessels throughout the entire year, as well as reliable and safe port infrastructure must be one of the top priorities for the development of the Mekong as a transport route for cargo and passengers.

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<sup>131</sup> Mekong River Commission, Council Study: Report for Navigation Thematic Area, 2017, p. 15: [www.mrcmekong.org/assets/Publications/Council-Study/Council-study-Reports-Thematic/Report-for-Navigation-Thematic-Area-Dec-2017.pdf](http://www.mrcmekong.org/assets/Publications/Council-Study/Council-study-Reports-Thematic/Report-for-Navigation-Thematic-Area-Dec-2017.pdf).



## Appendix II

### Greening the fleet: trends and developments

While liquefied natural gas (LNG) was a very widely discussed topic over the past years and it was already presented as the future fuel for inland navigation vessels, this euphoria has somewhat cooled down, since the LNG installation and the necessary tanks are very spacious and expensive. The lack of a reliable and widely available LNG bunkering infrastructure also hampers a widespread introduction. It can be expected that hydrogen may see similar challenges, but there are currently no real-life pilot projects aiming at the use of hydrogen as a fuel for combustion engines.

Fuel produced according to Gas-To-Liquid (GTL) technology is an available fuel that closely resembles diesel fuel, but it is distilled out of natural gas instead of mineral oil. It is non-toxic, odourless and colourless and can be used in existing engines and can be handled and stored just like diesel fuel.

LNG and GTL are available, but they are still fossil fuels, that will produce NO<sub>x</sub> and CO<sub>2</sub> when combusted.

Electrical powertrains are also becoming more and more available in IWT. Several vessels already operate with hybrid propulsion systems, where the propeller is driven by an electrical engine. However, the electrical energy is produced mainly by diesel generators. There are, as of now, pilots and projects for battery powered vessels and for vessels that are using hydrogen in fuel cells in order to produce the electrical energy for propulsion.

The cleaning of the exhaust gases by scrubbers, as it is already practiced in the maritime world, or by catalysts, is as of now, not commonly in use in the IWT sector.

Scrubbers are devices, that remove particles from the exhaust gasses by washing them out. This process works mainly for sulphur oxide (SO<sub>x</sub>), but also carbon dioxide (CO<sub>2</sub>) and nitrogen oxide (NO<sub>x</sub>).

There are, in general, two types of scrubbers:

- Open type scrubbers, which wash out particles using sea water. The resulting mixture of sea water and particles is then treated in order to neutralize the chemical components washed out of the exhaust gas. The cleaned water will be pumped overboard after the process.
- Close type scrubbers use fresh water and an alkaline agent in order to remove particles. The water solution is re-usable and there is no discharge into the waterway, which makes this type of scrubber more suitable for the IWT sector. Since IWT vessels are, per definition, commonly navigating in fresh water, the simpler and less costly open type scrubber is no option for inland vessels.

Moreover, sulphur dioxide is far less of a problem in European IWT, since the vessels mainly use low sulphur diesel fuel instead of high sulphur diesel fuel, which has been the industry standard until recently, or even heavy fuel oil (HFO), which has a high sulphur content and is still the most commonly used marine fuel, but did not find use on inland vessels.

But: the average engine used in IWT is far from environmentally friendly. New and greener propulsion systems are a constant, and increasingly important subject for the sector. As of now, almost the entire fleet uses diesel engines. Hybrid propulsion, LNG, hydrogen fuel cells and battery powered propulsions are currently developed, tested and implemented. The success of these systems in the future will be highly dependent on their reliability, their availability, their durability and probably very importantly, their price. Ultimately, there might be no single substitute for the diesel engine arise from the current battle of the systems, it is highly likely, that we will see a combination of different systems existing alongside each other, each fit for a designated purpose. Even the diesel engine might still be around for quite some time.