PLATINA3
IWT policy platform
- FLEET -

Towards accurate European fleet data D2.4

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Executive Summary

About PLATINA3 and the position of this report

The Horizon 2020 PLATINA3 project provides a platform for the implementation of the European Commission's NAIADES III action programme dedicated to inland navigation. PLATINA3 is structured around four fields:

- Market (WP1)
- Fleet (WP2)
- Jobs & Skills (WP3)
- Infrastructure (WP4)

Work package 2 "Fleet" deals with various aspects of the fleet, such as

- a zero-emission fleet;
- a climate resilient fleet;
- digital and automated vessels;
- technical regulations and standards for the fleet and fuels; and
- accurate fleet data.

This report addresses the topic 'accurate fleet data', which is Task 2.4 of PLATINA3 according to the Grant Agreement. The objective of this report is to:

- raise awareness about the need for improved data on the European fleet of inland vessels and databases available at European and national levels,
- assess the possible added value of linking different data sources to better support regulatory work, policy initiatives and market observation.

Introduction to the topic and problems with current fleet databases for inland vessels

Nowadays, several different fleet databases together provide a picture on the European fleet of inland vessels. These databases exist at national and international level and each database is created for specific needs. Public policy and market analysis generally uses this kind of databases. However, in inland navigation, the current use of such data for public policy development or market analysis often reaches its limits. The need for improvement becomes more and more obvious and urgent seen the developments required for energy transition and greening the fleet as well as logistic integration of inland waterway transport. For all these use cases, it is important to have accurate and up-to-date fleet data. Furthermore, the structure of existing databases and their associated data collection processes are often not designed to collect information sets which would be necessary for developing policy recommendations and decisions.

Main databases identified and analysed

The European Hull Database (EHDB) definitely plays a central role in the constellation of data sources on the European fleet of inland vessels. Therefore this report takes a closer look at its current status. It also considers other important databases, such as

- fuel bunkering data collected in the framework of the Convention on the collection, deposit and reception of waste generated during navigation on the Rhine and other inland waterways (CDNI),
- national databases for vessel certificates (analysing the Dutch example),
- fleet database managed by the 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).

Some data fields of the information records are common in databases studied, in particular the ENI (Unique European Vessel Identification Number) is a central element that could provide potentially valuable cross-referencing of data from all databases.

Differences and gaps in databases

However, when data from apparently common fields is compared across datasets, several major differences in definition emerge, which can prevent correct comparison and further application. A good example of this is the comparison between vessels “active” in the Rhine basin in year 2020, where there is a large difference and gaps between the databases considered. Apart from the difficulty of keeping vessels “entries” and “exits” up to date in databases, research on the reasons for these differences between the figures reveal differences between country and activity definitions.

It is important to differentiate between “fleet capacity”, i.e. the maximum number of vessels that could theoretically sail in a given year, and the “activity”, meaning the number of vessels that actually sailed in that same year. Some vessels may also be laid up, either undergoing maintenance or refurbishing works or due to lack of commercial activity. Alternatively, one might define “fleet capacity” also in terms of loading capacity (deadweight) instead of number of vessels.

To avoid misinterpretation regarding the data breakdown per country, it is useful to take into account that different definitions may be used: country of the vessel owner, country of the vessel registration, country of the vessel certificate or country of navigation.

Another gap concerns the vessel type, which is commonly used in data analysis: each database has its own list of vessel types (28 to 54 items) in a way maybe too detailed to be fully understood in the same way by all, especially by those filling-in the data fields. This leads to a high ratio of vessels classified as “other”, as it is observed already in some databases, and distorts analyses. A simple breakdown in a few main fleet families, mirroring current extensive definitions, could be a solution.

Interviews were conducted with various stakeholders (policy makers, market analysts and sector representatives) to define which statistical queries on fleet could be most helpful for their work, with a focus on greening the fleet, digitalisation and safety issues. Some answers to the statistical queries could be given by the EHDB itself if functioning properly while others could require data from another database. The 2nd PLATINA3 stage event organised in October 2021 also allowed to collect information on stakeholders’ needs and to validate preliminary findings and results.

Required data for greening, safety and logistic integration

Regarding greening policies, very little data is available right now to follow the evolution of the fleet regarding greener and innovative vessels. Reliable data on the evolution of engine types (from vessel certificates) or on the type and volume of fuel consumption (for propulsion and auxiliary uses) is necessary for this purpose. Although there are fragmented data available in some countries, there is clear lack of such data on European level. In the coming years, with the possible introduction of an emission label or energy index for inland navigation (see PLATINA3 Deliverable 2.6), current fleet databases should contain the aforementioned new data fields.

Concerning safety policies, the two most common requests made by stakeholders relate to the evolution of the fleet tankers for transport of dangerous goods (especially data related to ADN classification of tankers and hull characteristics). This information could currently be found in national certificates databases or more specialized databases. It allows a better understanding of the consequences of regulatory changes in the ADN regulations (which may impact newly built and existing vessels).

Lastly, in the field of digitalisation policies, the main request concerns data to track the installation rate of navigation and information equipment. Up to now, there is no suitable way to track equipment rate, except for the Inland AIS device which might be available in the Rainwat database. In the future, it will probably be necessary to also monitor the development of automation equipment (such as those for steering or propulsion).

Regarding the EHDB, which will be soon refactored by the European Commission, recommendations are made to obtain accurate and up-to-date data in connection with national certificate databases. It is shown that all databases will benefit from interlinkages between them to support public policies, regulatory work and market observation.

On the longer term, to increase the competitiveness of inland navigation, it is likely that position and voyage-related data will be needed. The data could be based on those sent out by an Inland AIS device. Additionally, data related to transported goods could be necessary. The extensive use of Inland AIS data shows the need for these types of data, and the most secure and controlled way to process it would be via a database at European scale. This type of geographic vessel tracking and positioning data is very sensitive from a legal and commercial perspective. However, it is necessary over time to enable the integration of inland vessels into multimodal supply chains and to facilitate and promote synchro-modality.

Moreover, it could be very useful for market observation, for an accurate definition of navigation areas, for traffic management and to obtain accurate data on CO_2 emissions per tkm to support and monitor the impact of all current environmental policies. However, sensitive data protection issues must be taken into account, as these data contain private information about vessel owners' commercial activities.

Recommendations

The analysis detailed in this report shows clear support from the IWT community to facilitate and develop interconnection of available databases, especially to produce more accurate fleet statistics, better understand the market and support public policies.

This report includes several recommendations to pave the way towards a reliable, up-to-date and comprehensive source of information on the inland shipping fleet, without neglecting data privacy issues. In this respect, the seven recommendations are summarised as follows:

No.	Task	Who
1	The accuracy, the completeness and timeliness of each record for each vessel in EHDB should be monitored to continuously improve data quality	EC or delegated operator
2	The refactoring of EHDB should anticipate the extension of data fields (future-proof)	EC
3	Further explore and prepare the practical execution of creating interconnections between databases	Databases operators (international/ national)
4	Facilitate access to the EHDB for other databases administrators, especially the CDNI, taking into account the existing legal frameworks of the EHDB and the CDNI. Such cooperation would help to demonstrate the opportunities of interconnections.	EC
5	Some important data fields should be harmonised and better defined (country of vessel, vessel types, vessel activity)	Databases operators (international/ national) CESNI
6	Explore the possibility of publication of minimum fleet data (available online in aggregated and anonymised form without special user authorisation to answer the most needed queries)	National inspection bodies / EC
7	Investigate further the legal feasibly as well as possible acceptance (especially by the shipping industry) of collection of dynamic data on the voyage of vessels	Research institutes

List of abbreviations

ADN	European Agreement concerning the International carriage of Dangerous goods by Inland Waterways
Inland AIS	Automatic Identification System for inland navigation
CDNI	Convention on the Collection, Deposit and reception of waste generated during Navigation on the Rhine and other Inland waterways, Strasbourg, 1996
CESNI	European Committee for the Elaboration of Standards In the field of Inland Navigation
ECO-Card	The ECO-card allows skippers to pay the CDNI disposal charge when bunkering gas oil. The payment of the disposal charge allows to deposit, without additional costs, oily and greasy waste arising from the operation of ships at the reception stations provided within the scope of the Convention.
EHDB	European Hull Database
ENI	Unique European Vessel Identification Number
ES-TRIN	European Standard laying down Technical Requirements for Inland Navigation vessels
EU	European Union
GDPR	General Data Protection Regulation
IMO	International Maritime Organization
Inland ECDIS	Electronic Chart Display and Information System for inland navigation
IVR	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
IWT	Inland Waterway Transport
MMSI	Maritime Mobile Service Identity
RIS	River Information Services
RVIR	Rhine Vessel Inspection Regulation
SPE-CDNI	Electronic payment system used by the CDNI
tkm	Tonne-kilometre, abbreviated as tkm, is a unit of measure which represents the transport of one tonne in weight over one kilometre

1. Introduction

The Horizon 2020 PLATINA3 project provides a platform for the implementation of the European Commission's NAIADES III action programme dedicated to inland navigation. PLATINA3 is structured around four fields: Market (WP1), Fleet (WP2), Jobs & Skills (WP3) and Infrastructure (WP4).

Work package 2 "Fleet" deals with various aspects of the fleet, such as

- a zero-emission fleet;
- a climate resilient fleet;
- digital and automated vessels;
- technical regulations and standards for the fleet and fuels; and
- accurate fleet data.

This report addresses the topic 'accurate fleet data', which is Task 2.4 of PLATINA3 according to the Grant Agreement. The title of Task 2.4 is "Input for roadmap for accurate European fleet data" and CCNR Secretariat leads the execution of this task. The objective according to the Grant Agreement is: "*Raise awareness on data sources and possibilities associated to the development and maintenance of a European fleet database, in view to support future EU policies".*

As regards the technical context for defining the task in PLATINA3 it was concluded that there are several databases presenting together a picture on the fleet of inland vessels in Europe. These database exist at national and international level. Each database is designed and maintained to specific purposes and information needs. Public policy development and market analysis generally relies on this kind of databases. However, in inland navigation, the current and possible use of such data for the development of public policies or the analysis of the market remains quite limited. A telling example is the difficulty to carry out an analysis to assess the impact of regulatory changes, especially regarding the evolution of technical requirements on the existing fleet in Europe. For these purposes, it is obvious and urgent to have accurate and up-to-date data based on the same definitions and standards and to develop links between databases. Collecting data from new data fields or data that is not always collected so far is another option.

The objective of this task is therefore to raise awareness of some databases available at the European and national levels and to assess the possible added value of linking different data sources to support regulatory work, policy initiatives and market observation. It also resulted in recommendations regarding the development and improvement of a comprehensive and harmonized European fleet data warehouse (system of interlinked databases).

In 2010, the first PLATINA project highlighted the need for a European shipping fleet database. A concept based on a unique identifier for vessels (ENI – Unique European Vessel Identification Number) was developed, notably to support the further development of the River Information Services (RIS), by allowing waterways operators to have access to reliable key vessel data provided by certifying authorities. This concept led to the creation of the European Hull Database (EHDB). The Directive 2013/49/EU[1] introduced an obligation for related European Union (EU) Member States to

1 Commission Directive 2013/49/EU of 11 October 2013 amending Annex II to Directive 2006/87/EC of the European Parliament and of the Council laying down technical requirements for inland waterway vessels.

collect and transmit data on their fleet and to the EHDB. Beyond the support to RIS, the legal purposes of EHDB also include maintaining or enforcing safety of navigation and collecting statistical data.

The EHDB definitely plays a central role in the constellation of data sources on the European shipping fleet. Therefore this report presents in chapter 2 a closer look at its current status as well as the on-going revision initiated by the European Commission in 2020. However, this report also aims to broaden the perspective by considering important databases, described in chapter 3 of this report:

- the fuel bunkering data collected in the framework of the Convention on the collection, deposit and reception of waste generated during navigation on the Rhine and other inland waterways (CDNI),
- the national certificate databases (using the Dutch one as an example),
- the fleet database managed by the 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).

Another important driver is the on-going revision of the vessel certificate model by the CESNI/PT Working Group (see paragraph 2.7). Indeed, the data currently available in the EHDB is extracted from the vessel certificate model (the minimum data for the EHDB is defined in Annex 2 of the European Standard laying down Technical Requirements for Inland Navigation vessels - ES-TRIN). The revised model of the vessel certificate could include new data sets, such as engine characteristics or energy sources. It could be a new source of information for statistical queries in particular to support environmental or digitalisation policies.

More generally, the revision of the EHDB can be seen as an opportunity to rethink the management of data related to the inland navigation fleet thus creating an invaluable source of information for stakeholders (policy makers, market analysts and various sector representatives) by combining several current data sources while respecting personal data protection rules.

As regards the contents of this report to guide the reader:

- Chapter 2 summarises the methodology used for this study.
- Chapter 3 does address the European Hull Database (EHDB)
- Chapter 4 describes and highlights the specificities of three other database (CDNI data, national certificate database, IVR database).
- Chapter 5presents the investigation of opportunities for linking the databases, with a focus on the description of data fields and how different statistical query needs could be met by these databases alone or linked together. The chosen scope of queries will be reduced to the most important topics: greening, digitalisation and safety (if related to vessel technical requirements).
- Chapter 6 concludes the analyses and presents the recommendations to achieve better data analysis in the inland navigation sector, especially in relation to EHDB.

It should be noted that the technical feasibility of the recommendations is not addressed in this report because it is not within the scope of the task and due to limited resources available.

2. Methodology

Two complementary approaches were used for the preparation of this report:

- one is oriented towards the available data in four main databases of the inland navigation sector (concerning mainly Rhine and Danube areas),
- the other is determined by the needs of statistical queries for decision makers regarding the identified policy fields (greening, digitalisation and safety) or market analysts.

To elaborate this report, a literature review was made and complemented by interviews conducted with various database owners and users. Each data source is described according to the template below:

- Database
- Objective/Use
- Scope (Member states)
- Mandatory data fields
- Optional data fields
- Data owner
- Database Manager
- Families of users (and associated access rights)
- Number of vessels (end of 2020)
- Year of the oldest data field
- Frequency of update – date of last update
- Possible causes of unreliable or incomplete data
- Possible needs for improvement

Specific attention was paid to the comprehensiveness of the database and to eventual needs for improvement. Questions that could be the most useful for the stakeholders (decision makers regarding the identified policy fields or market analysts) were also listed. For each statistical query, it is stated whether the answer could be given via a statistical query in the EHDB or whether a link to other data sources would be needed.

The pre-identified conclusions and recommendations on how best to meet these needs were discussed during the 2nd PLATINA3 stage event[2] which was hosted by CCNR and took place in October 2021. The received feedback from stakeholders is taken into account recorded in this report.

2 The video registration, presentations and meeting report of the 2nd PLATINA3 Stage Event are available on-line and can be accessed by means of the following weblink: https://platina3.eu/event/strasbourg/

3. Current state-of-play of the European Hull Database

3.1 Origin

In 2010, a first pilot for a fleet database was opened in the framework of the first PLATINA project to achieve a gradual interlinkage with national databases of vessel certification authorities and RIS operators. The primary objective was to meet the need of RIS operators to have access to reliable data on vessels, which are available at the level of the vessel inspection bodies.

The legal basis was created in Directive 2013/49/EU[3] and the corresponding Rhine Vessel Inspection Regulation (RVIR[4]), in particular to define the minimum set of data to be exchanged among vessel certification authorities and RIS authorities.

3.2 Legal basis and purpose

In accordance with Article 19 of Directive (EU) 2016/1629[5] and Article 2.19 of the RVIR, the EHDB shall contain selected information regarding inland waterway craft, including each vessel's unique European vessel identification number (ENI), its name, its dimensions as well as an electronic copy of the vessel certificate (Union or Rhine certificate). The above-mentioned Directive applies only to EU Member States with waterways as listed in it Annex 1[6].

The data in the EHDB may serve the following purposes:

- applying the Directive (EU) 2016/1629 (meaning the enforcement of vessel technical requirements and the cooperation between the certification authorities) and of Directive 2005/44/EC7 on harmonized river information services (RIS),
- ensuring waterway traffic and infrastructure management,
- maintaining or enforcing safety of navigation,
- collecting statistical data.

3.3 Access rights

According to Annex 2 of Delegated regulation (EU) 2020/4748, the access rights of EHDB are the following:

- full access granted to certification authorities;
- limited access granted to RIS operators for the application of Directive 2005/44/EC;
- read-only access granted to statistical offices, authorized international organisations and "bodies ensuring waterway traffic and infrastructure management, as well as maintaining or enforcing safety of navigation";

3 Commission Directive 2013/49/EU of 11 October 2013 amending Annex II to Directive 2006/87/EC of the European Parliament and of the Council laying down technical requirements for inland waterway vessel.
4 Available on the CCNR website - https://www.ccr-zkr.org/13020500-fr.html.
5 Directive (EU) 2016/1629 of the European Parliament and of the Council of 14 September 2016 laying down technical requirements for inland waterway vessels, amending Directive 2009/100/EC and repealing Directive 2006/87/EC.
6 In Denmark, Estonia, Ireland, Greece, Spain, Cyprus, Latvia, Malta, Portugal, Slovenia and Finland, there are no inland waterways, or inland navigation is not used to a significant extent. This directive is not addressed to them.
7 Directive 2005/44/EC of the European Parliament and of the Council of 7 September 2005on harmonised river information services (RIS) on inland waterways in the Community.
8 Commission delegated regulation (EU) 2020/474 of 20 January 2020 on the European Hull Data Base.

- read-only access granted to authorities of a third country, in accordance with Article 19(5) of Directive (EU) 2016/1629.

In 2017, 13 countries, 25 organisations, 70 users from certification authorities and 90 users from RIS authorities were registered for access to EHDB (see table 1).

3.4 Dataset

Annex 2 of ES-TRIN[9] specifies the content of the data set being stored in the EHDB for each vessel (10 mandatory data fields and 14 optional data fields). Those are limited to data for identification.

For all vessels, the following information is mandatory for the description of the vessel (10 data fields): "*Name of the craft/vessel; ENI; type of craft; length over all; breadth over all; draught; source of data; deadweight; displacement; operator; inspection body; number of inland navigation vessel certificate; expiration date; creator of dataset.*" Moreover, in accordance with Directive (EU) 2016/1629 and RVIR, this information also includes a historic listing of all vessel certificates issued, renewed, replaced and withdrawn and any rejected or pending applications.

The optional additional information (14 data fields) is: "*the national number; type of craft in accordance with the technical specification for electronic ship reporting in inland navigation; single or double hull in accordance with ADN/ADNR; height; gross tonnage (maritime vessels); IMO number (maritime vessels); call sign (maritime vessels); MMSI number; ATIS code; type, number, issuing authority and expiry date of other certificates.*"

Besides, as requested by Directive (EU) 2016/1629, an electronic copy of vessel certificates shall be uploaded via web services as pdf file (including stamp and signature) and stored with the data set of the corresponding vessel.

3.5 Content

In 2020, 14211 "active" vessels were listed in the EHDB, as shown below in table 1 with the distribution by countries. The term "active" is defined here relative to a valid vessel certificate and not to a vessel in service. With this definition, a vessel will become "inactive" when its certificates expire, the vessel is scrapped or transferred to a country outside the EU (or is not concerned by the Directive (EU) 2016/1629).

As a preliminary remark, it can be noted that German and Swiss vessels are missing and that data for the Netherlands seems to be underestimated (state of play 21 January 2021). The (10 + 14) data fields are uploaded by 26 national certification authorities which own the data and currently have to enter all data from the vessel certificate manually.

The renewal period of vessel certificates is:

- 5 years for passenger vessels and high-speed craft and
- 7 to 10 years for cargo and other vessels.

9 European Standard laying down Technical Requirements for Inland Navigation vessels, edition 2021/1, available on https://www.cesni.eu/documents/es-trin-2021/.

This duration of vessel certificates does not imply a frequent update of the data. Moreover, the last update in EHDB varies from 0 to 4 years depending on the country. All these elements show that some improvements could be made in order to increase the accuracy at least on an annual basis.

Number of "active" vessels in EHDB (21/01/2020)			
Country	Number of vessels	Date of last update	Number of organisations
AT	343	01/2020	1
BE	1 731	07/2018	3
BG	344	12/2019	3
CZ	408	11/2019	1
FR	2522	12/2019	1
GB	98	06/2019	1
HR	201	01/2020	1
LU	15	07/2018	1
NL	6714	10/2019	1
PL	734	10/2019	8
RO	731	02/2016	2
SE	2	07/2018	1
SK	368	05/2019	2
Total	14211		26

Table 1: extract from EHDB database showing the number of active vessels per country of certification on 21/01/2020. (In this case, "active vessels" refer to a vessel with a valid vessel certificate).

3.6 Refactory

The EC planned an ambitious refactory of the EHBD mainly due to technical obsolescence issues (link between national databases and the EHDB). As presented at the Commission Expert Group meeting on the 9th of March 2021[10], and in accordance with recent exchanges with the EC, this work will probably start only after the summer 2022 with a foreseen completion date in March 2023. This work could be a good opportunity to incorporate the needs of the users of the national administrations in terms of improvements[11] and, if possible, to expand the scope of the database to meet the growing need for accurate and reliable data from the entire inland shipping sector.

3.7 Possible evolution of the EHDB taking into account a new model of vessel certificate

The CESNI/PT working group is currently elaborating a new model of vessel certificate and the corresponding ESI instruction. The revision of the model as well as the corresponding instruction was deemed necessary to:

10 European Commission, Expert group on technical requirements for inland waterway vessels (E03496), 14 March 2022, https://ec.europa.eu/transparency/expert-groups-register/screen/index.cfm?do=groupDetail.groupDetail&groupID=3496&NewSearch=1&NewSearch=1.
11 See for examples the proposals expressed by EU Member States during the meeting on 28 November 2017 in Strasbourg (CESNI/PT (17)m 89)

- Take into account the wide experience gained by the certification authorities,
- Integrate the recent evolutions of the technical requirements and reinforce the modular approach within the certificate,
- Reduce fraud possibilities,
- Support the proper implementation of the European Hull Database (EHDB).

More generally, the aim is to support policy initiatives on digital tools in inland navigation, in particular the initiatives of the European Commission, the gradual introduction of electronic documents and the information exchange between inspection bodies. Important preparatory work was conducted in 2018-2019 by consultants[12] regarding the evaluation of the current model of the vessel certificate, relying notably on questionnaires sent to the industry and national authorities. This preparatory work provides a comprehensive overview of the possible data fields that could be suitable for a new inland navigation vessel certificate and paves the way for further digitalisation, including the creation of a "ship file". The outcome of this preparatory work was submitted in the CESNI/PT Working Group and some fundamental issues were discussed such as:

- the future vessel certificate being a hard copy extract of the database;
- using a modular approach (instead of a fixed number of pages), but still with minimum common data set;
- a more systematic list of vessel types (see Annex 1 of this report);
- a possible automatic translation of the remarks mentioned by the inspection body.

In particular, a comprehensive list of data fields related to all Chapters of the ES-TRIN requirements is currently being reviewed by CESNI/PT experts. This on-going work aims at selecting fields for the new vessel certificate model. This is also based on a new definition of vessel types and introduces new fields such as engine characteristics, energy source, safety and information equipment.

In the preparatory work, three groups of data are considered, with each group having a wider scope in terms of information than the previous:

- core information, which must be provided for each vessel,
- the same data supplemented by specific modules depending on the type of vessel,
- a ship file that also includes administrative information, technical documents for the vessel certification, such as design drawings and equipment-related documents. These documents would be in electronic form, which would highly facilitate the work of administrations, shipowners, other private parties and police forces.

As a reminder, a vessel operating on EU waterways or on the Rhine must carry a vessel certificate (either a Union inland navigation certificate or a Rhine vessel inspection certificate). The certificate is issued by the competent national authorities (inspection bodies) and confirms the full compliance of the vessel with the relevant technical requirements (in particular ES-TRIN). In any case, the further development of the vessel certificate model would allow the national inspection bodies to collect and share additional data. It could constitute a significant new source of information for statistical queries. The CESNI/PT work is planned to end in 2023 for integration into the next ES-TRIN revision (meaning ES-TRIN 2025 which could enter into force in January 2026).

12 Study on revision of the Model of Inland Navigation Vessel Certificated laid down by ES-TRIN, B. Bieringer, C. Tournaye, CESNI (2018). Not yet publicly available.

4. Overview of three fleet databases and gap analysis

4.1 SPE -CDNI database

The Convention on the collection, deposit and reception of waste generated during navigation on the Rhine and other inland waterways (CDNI) entered into force in 2009. Its task is to organise the collection, deposit and reception of waste generated by navigation on the Rhine and connected waterways of the 6 Contracting Parties (Germany, Belgium, France, Luxembourg, The Netherlands and Switzerland). The SPE-CDNI (Electronic payment system of CDNI) was introduced in 2011 to allow payment for the collection and disposal of oily and greasy waste according to Part A of the CDNI Convention. It covers the entire fleet within the scope of the CDNI, which corresponds to approximately 70% of the European fleet.

The system is based on indirect financing: the CDNI disposal charge is paid on the fuel bunkering. The disposal charge for oily and greasy waste is €8.50 for 1000 litres of zero-rated bunkered gasoil with effect from 1st January 2021. The ECO-card allows skippers to pay the CDNI disposal charge when bunkering gas oil. The payment of the CDNI disposal charge allows to deposit, without additional costs, oily and greasy waste arising from the operation of ships at the reception stations provided within the scope of the Convention. Each bunkering transaction is automatically recorded in the SPE-CDNI. It generates automatic, accurate and real-time data for each refuelling of each vessel, which could be valuable data for analysis during the current period of the energy transition. Fuel bunkering data are collected by national organisations (in charge of the implementation of Part A at national level) and then transferred to the CDNI Secretariat to break down the waste disposal charge revenues by country, accordingly to the volume of waste collected in each country (international financial equalisation). The data on the refuelling site also provides information on the vessel´s navigation area, which is interesting for market observation or even future policies or regulations.

In year 2020, 1 281 346 m3 of fuel were consumed by 8954 vessels in the perimeter of the Convention. It is worth noting that fuel bunkering could give a very accurate information about the activity of a vessel in a given year. These figures are published on the CDNI's website in the quarterly resolutions[13] and in the annual report[14], through the revenues from the disposal charges (international financial equalisation). However, the bunkering time and sailing time might be different when the ship operators bunker in advance to anticipate an increase in fuel prices for instance.

Nevertheless, this data collection was not originally intended to be a database (there is no legal basis in this respect). The SPE-CDNI database has been created for a specific purpose: supporting waste collection and implementing an international financing system based on the "polluter-pays principle". The data contained is considered by the legal services of certain CDNI Contracting Parties as personal data. As such, their use is limited to the strict purpose for which the database was created. Moreover, the data is not stored permanently and currently only data from 2019 onwards is available in SPE-CDNI. In other words, this data is not public as it contains personal information on the owner and his commercial activity. Subject to the approval by CDNI Member States, certain data may be available upon request and under strict conditions. Nowadays, vessels' names and ENI are

13 CDNI Published resolutions https://www.cdni-iwt.org/resolutions/?lang=en
14 Annual IIPC reports https://www.cdni-iwt.org/annual-iipc-reports/?lang=en

not shared by CDNI to external parties. A pre-requisite to envisage such data sharing is a careful examination of the compatibility with personal data protection rules. Furthermore, the SPE-CDNI architecture does not allow easy extraction of data for simple analysis.

4.2 National Dutch certification database (as example of national database)

The national Dutch database, owned by the Ministry of Infrastructure and Water Management, collects all data from certifying authorities. It contains the data from various certificates:

- the country of national registration certificate according to the UNECE Convention[15],
- the vessel certificate (Union or Rhine[16]) issued by classification societies or other national recognised organisations according to the model laid down in ES-TRIN annex 3[17], and
- other certificates such as measurement certificates according to the UNECE Convention[18].

These data are all entered manually in specific databases, meaning that for instance all data fields of vessel certificates are available for data analysis. When all data is gathered in the national database, a tool (named WIOB) generates the vessel certificate and data are then “frozen” in the database.

This database was created in 2005 and integrates the oldest data. In 2020, 8500 vessels with ENI for inland navigation are listed. It includes all vessels for which vessel certificates were issued in the Netherlands, regardless of the country of national registration or the owner’s country. It does not include vessels that are declared inactive by the certification authorities three months after the vessel certificate is not renewed.

Vessel data is provided upon request to the Waterway Administration (Rijkswaterstaat) or the Statistical Office (Statistics Netherlands - CBS) after extraction and anonymisation. It should be noted that the Statistical Office supplies data on actual active fleet, as it has established a network of measuring points along the Rhine. Once a vessel is recorded, it is considered as active for the year. These data are sent by the CBS to the CCNR Secretariat which uses them within the Market observation system[19].

By assembling national databases, it seems possible to assess size (number of vessels) and loading capacity of the European fleet over time. Hereby, a basic distinction between dry, liquid cargo vessels, push and tugboats, passenger vessels as well as floating equipment is at present possible. But in order to go further into details (technical parameters of vessels, area of operation, engine data, etc.), these national databases are often not exact enough or are not up to date. Regarding the last point, one important problem hereby is the existence of inactive vessels in databases.

15 Convention on the registration of inland navigation vessels (Geneva, 1965): https://treaties.un.org/doc/Publication/UNTS/Volume%201281/volume-1281-I-21114-English.pdf.
16 See definition given in ES-TRIN, Article 1.01(12.4).
17 CESNI, ES-TRIN 2021/1, 13 October 2020, https://www.cesni.eu/documents/es-trin-2021/.
18 Convention on the measurement of inland navigation vessels (Geneva, 1966): https://treaties.un.org/doc/Publication/MTDSG/Volume%20II/Chapter%20XII/XII-5.en.pdf.
19 CCNR, Market observation of the European inland navigation sector, https://inland-navigation-market.org/.

4.3 IVR Ships Information System

The IVR (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) keeps a European ship register since 1879, which initially covered Rhine navigation but was extended to the Danube region in 2001. The database has been available online by subscription since 2014, except for vessel owners who can access their data free of charge. This database is compliant with the GDPR regulation, as owners of all registered vessels are asked for consent to publish data.

The data is collected directly from ship owners or by compiling information from vessel inspection bodies[20] (when public), from the publication of new vessels in the press, from Dutch ports and from loss prevention tools. When fully populated, the dataset can provide a wide variety of technical information on the vessel´s hull, and also some data that is not generally available in "certification databases", such as about engines, the "Green Award" certification[21] (which is used for fees reduction in Dutch ports), etc.

The IVR database contains about 20 000 vessels in 2020 (17 500 for the Rhine area). Vessels are manually removed from the database as "non active" when scrapped, based on notification from the owner or on information from the scraping shipyards. This definition of activity is different from other databases, where non-activity is based on an invalid vessel certificate.

4.4 Data gap analysis

The analysed databases (EHDB, IVR, SPE-CDNI, national certificate databases) are key for monitoring and analysing the fleet. They each serve a specific purpose, with related specific data fields, such as for vessel certification, national registration, insurance, waste disposal charge, etc.

Some fields are common and among these, the ENI is a central element that could allow a potentially valuable cross-referencing of data from all databases.

Nevertheless, when data from seemingly common fields are compared, several major differences in definitions are observed. It can prevent correct comparison and further application. A simple example is the differences in the total number of "active" vessels in 2020 for the Netherlands. The same may be observed for the wider Rhine area, including the Moselle (i.e. Germany, the Netherlands, France, Belgium, Switzerland and Luxemburg):

	EHDB	IVR	NL DB	SPE-CDNI
Number of Rhine vessels	10 982(*)	17 482	-	8 954
Number of Dutch vessels (as example)	6 714	9 626	8 500	5 441

20 List of European inspection bodies published by CESNI https://listes.cesni.eu/3000-en.html
21 Green award certification, https://www.greenaward.org/.

Activity based on	certificate renewal	non scrapped vessel	certification renewal	fuel bunkering
Country definition based on	certification	national registration	certification	ECO-count opening

Table 2: number of "active" vessels in 2020 extracted from databases.
(*) Swiss and German vessels are missing. "National registration" refers to the registration made according to the Convention on the registration of inland navigation vessels (Geneva, 1965) (see paragraph 3.2)

Taking as a reference the number of vessels from the Dutch database, the gap with EHDB and IVR databases is significant (-21% to +13%) and generates doubts about the possibility of conducting reliable data analysis. It confirms that the number of vessels registered in EHDB could be underestimated (no more automatic data uploading from national database is a possible explanation) and that those from IVR could be overestimated (maybe due to the lack of manual removal of scrapped vessels from IVR database). It could be explained by the differences in the way to define the country of a vessel and if it is active (sailing) or not.

Another example of a gap could be given by taking as a reference the SPE-CDNI data which is a good reference for defining the number of actual active (sailing) vessels in a given year (the gap may be more significant in 2020 due to the Covid-19 pandemic and lower activity). The difference is -35% of vessels in the SPE-CDNI database compared to the Dutch national database, respectively -18% of vessels in the SPE-CDNI database compared to the EHDB for Rhine vessels.

It is therefore very important to distinguish between "fleet capacity", i.e. the number of vessels that could sail during a year, and "activity", i.e. the number of vessels that actually sail during a year. Alternatively, one might define "fleet capacity" also in terms of loading capacity (deadweight/passengers) instead of number of vessels. When following this approach, three categories may be defined:

1) available capacity
2) active capacity
3) operational capacity

The difference between available and active capacity relates to the question if a vessel that is registered and has valid certificates has actually sailed during a certain period of time. Some vessels may also be on hold because of maintenance/refurbishing work, use as floating storage or lack of commercial activity. The active capacity will of course be different to the available capacity, except for some special times (economic boom, etc.). The difference between active and operational capacity relates to the degree of capacity utilization. During low waters or during an economic crisis, not all of the capacity of a vessel is actually utilized, so not the entire fleet capacity that is active is really operational.

The stage event organised in October 2021 allows to confirm that "number of vessels with a valid certificate", "number of vessels in activity" and "the fleet capacity" are the most needed fleet-related data (39% of respondents highlighted these data).

To avoid misinterpretation when breaking down the data by country, it is also useful to take into account the different definitions (or references) used: country of the owner, country of the national registration, country of the vessel certificate (as generally indicated in the first three digit of the ENI for new vessel certificates) or the country/area of navigation (e.g. country of ECO-Card). For example, the country of the owner of the vessel can be Switzerland, which is different from the country of the Dutch operator of the vessel. This vessel can also have a vessel certificate issued in Germany or can be registered in Luxembourg. Therefore, the "country of the vessel" can have different meanings.

Another example would be the analysis of the fleet breakdown by vessel type. The two main lists of vessel types are the ones defined in ES-TRIN and UNECE Recommendation n°28[22]. They are used in EHDB and national databases. Other databases may have their own definition of vessel type (28 to 54 items see details in annex 1). The breakdown is too detailed to be understood in the same way by all, especially by those filling-in the data fields. This could lead to a high proportion of vessels classified as "Other", as already observed in some databases, and possibly distort the analysis.

A simple breakdown in a few main fleet families, in parallel to the current definitions (see details in Annex 1), could be a solution to compare the data from different sources:

- IVR is using 5 main fleet families for classification (dry cargo vessel, tanker, pusher/tugboat, passenger vessel or other),
- The CESNI/PT Working Group is working on new definitions of vessel types (see also paragraph 2.7), as part of the work to define a new vessel certificate model. The vessel type for motor vessel could be divided in the following main families:
    - Motor Cargo vessel,
    - Motor Tank vessel,
    - Canal peniche,
    - Tug,
    - Pusher,
    - Passenger vessel (that could be split in 3 sub-families),
    - High-speed vessel (> 40 km/h).

  Other vessel types are foreseen, for instance for police or service vessels, but shall not be detailed here.
- The PROMINENT[23] project suggested a classification into 12 families that could be suitable for environmental policies, as it added a size and engine power differentiation:
    - Push boats (< 500 kW, 500-200 kW and >2 000 kW)
    - Motor cargo vessels (<80m, 80-109m, >110m)
    - Motor tankers (80-109m, >110m)
    - Coupled convoys
    - Ferries
    - Large cabin vessels
    - Day trip and small cabin vessels

  This classification is used in research studies such as from the CCNR[24] but not by authorities.

22 Codes for types of means of transport - UNECE CEFACT Trade Facilitation Recommendation No. 28, July 2010.
23 The PROMINENT IWT project, 2018, https://www.prominent-iwt.eu/.
24 CCNR Study, research question C, version 2, https://www.ccr-zkr.org/12080000-en.html.

Such pre-defined breakdowns into fleet families would be easy to use, implying less filling variability, and lend themselves to accurate data analysis in support of policy development and market observation. Moreover, the experience gained in the framework of data collection for market analysis is very valuable to understand the challenges associated with the databases and the difficulty to confront different sources or to cope with the absence of available data. In particular, the experience gained by the Danube Commission as described in Annex 2 was useful for its analysis.

As a conclusion from this short gap analysis of the existing inland shipping fleet databases, it seems desirable to better define and harmonise some data fields that are crucial for data analysis. This concerns above all the “activity of a vessel”, the “country of a vessel” and the “type of a vessel”. So far, unclear and inconsistent definitions lead to too much uncertainty about the accuracy of the data. This could be a stumbling block for further development of inland shipping fleet databases and especially regarding the proposed interlink between databases.

5. Opportunities associated to databases interconnection

The previous Chapters have described four large databases that relate to the inland shipping fleet in Europe. This chapter now intends to provide an idea on what benefits could be created if connections between the databases would become possible.

5.1 Comparison of data fields

Each database analysed in this report brings its own added value depending on its intended use. To highlight this point, main and optional data fields of each database are listed below in Table 3.

	EHDB (certification database) according to ES-TRIN annex 2	**SPE-CDNI (electronic payment system)**	**IVR ships information systems**	**Dutch certification database**
Main data fields	ENI, name of the craft/vessel; type of craft; length over all; breadth over all; draught; source of data (certificate); deadweight; displacement; operator (owner); inspection body; number of inland navigation vessel certificate; expiration date; creator of dataset. + pdf copy of the certificate	**bunkering (volume, location, date**), vessel owner, vessel name, ENI, country of ECO-count	ENI, vessel name, company name / owners' name, vessel type, country of national registration, deadweight, **year of construction**, length	**all fields in the vessel certificate according to ES-TRIN annex 3 (50 topics, including, area of navigation, year of construction, passenger number, engine characteristics…)** **and information from measurement and national registration certificates**
Optional data fields	national number (national registration); type of craft in accordance with the technical specification for electronic ship (UNECE Recommendation 28) reporting in inland navigation; single or double hull in accordance with ADN/ADNR; height; gross tonnage (maritime vessels); IMO number (maritime vessels); call sign (maritime vessels); MMSI number; ATIS code; type, number, issuing authority and expiry date of other certificates.	vessel type, flag (vessel national registration), vessel type, engine power, year of construction, hull type, deadweight, length etc	information from certificates, owner details, hull details, **engines characteristics,** vessel type group (dry cargo, tank cargo, Push/Tug, passenger, other)**, "green award" label**	

Table 3: details on mandatory and optional fields in databases.

While the EHDB represents the minimum data fields required for vessel identification, the bold data fields in Table 3 could be information brought from other databases which are useful to characterise the fleet for greening, digitalisation, or safety policies. This is e.g. information on area of navigation (authorised in the vessel certificate versus usual sailing area), fuel consumption, engines characteristics (number, individual and total installed power, manufacturer, type, year), number of maximum passengers, etc. This topic is covered in Chapter 4.2 and in Table 4 below.

These data, thanks to the ENI number (which is a sensitive information as it allows for a unique identification of the vessel), could be combined with the general vessel data of the EHDB to allow for a more valuable statistical analysis. However, it should be kept in mind that the data exchange between the EHDB and the national databases containing vessel certificates does not work very well at present. The Dutch national database shows interest of storing more certificate data than the (14+10) fields requested by the regulations. This is also the purpose in revising the vessel certificate model.

5.2 Statistical queries

Interviews were conducted with various stakeholders (policy makers in relation to the identified policy fields, market players) in order to define which statistical queries could be the most helpful for their work, if possible. A summary of the main responses is shown in Table 4, with a focus on greening, digitalisation and safety issues. The first column highlights whether the answer to the statistical query could be brought by the EHDB itself if it worked properly, and if not, what data would be needed from another database. As examples of questions useful for national or international public policies:

- What is the number of vessels navigating in a specific area and using hydrogen as a fuel? (Such a question is helpful to define the bunkering facilities needed for instance).
- How many vessels longer than 110 meters operate on the river Moselle? (It could help to define the need for turning areas or mooring places)
- What is the share of vessels equipped with Inland AIS device on the waterway of a corridor? Indeed, such information is needed to implement additional services like Aids to navigation (AtoN) or Application Specific Messages (ASM) based on Inland AIS devices.
- How many cabin vessels are equipped with sewage treatment plant on the Danube? (It could help to define the need in terms of deposit stations)

Reference is also made to the new vessel certificate model being prepared by the CESNI/PT Working Group to promote digitalisation and associated tools. It introduces new data fields such as engine type, navigation and information equipment.

Greening policies

Currently, very little data is available to track the evolution of the fleet regarding greener and innovative vessels. For example, it is difficult to estimate how many vessels in Europe are powered by electric motor, whether it is full electric or hybrid, how many vessels are using engines using alternative fuels (e.g. methanol) and thus it would be difficult to assess the impact of an incentive policy. Only one reference regarding greening is found in the databases examined this report: the list of the “Green Award” certificates in the IVR database. As explained above, these certificates allow a reduction of duties in Dutch ports. During the stage event organised in October 2021, engine type (Stage V, CCNR II, …) appeared as the most needed fleet-related data to better support greening policy initiatives (78 of the respondents selected this data). In the coming years, if an international emission label or energy index for inland navigation (see report 2.6) is introduced, then it would be recommended to add new data fields in fleet databases to record such information and allow an accurate picture of the status of the fleet. At shorter term, the Dutch Emission Performance Label System was implemented in November 2021 and would be already a new source for such information.

Regarding engines, the Regulation (EU) 2016/1628[25] (knows as Regulation NRMM) requires that newly installed engines comply with Stage V, with a limitation of NOx, HC, CO and particulate matter emissions. Some fields regarding engine characteristics are already available in the IVR database, and these could also be amended later on with the new vessel certificate model. But up to now, there is no straightforward way to follow the first implementation of new engines. It should also be noted that no data is available on exhaust after-treatment equipment installed on older engines, such as Selective Catalytic Reduction (SCR) devices or Particulate Matter Filter (PMF).

With regard to the important issue of reducing CO2 emissions for the coming decades, a first assessment could be done using the SPE-CDNI fuel bunkering and the corresponding emission factors in g of CO2/fuel litre (for examples GLEC values which are periodically reviewed[26] and the standard ISO 14083[27] currently under development). These calculations could be done only in the Rhine basin area which is the geographic scope of the database. Furthermore, there is limited reliable data available to assess CO2 emissions in terms of tkm for cargo vessels (or a comparable indicator for passenger vessels), as no voyage-related information with effective weight of transported goods (or number of passenger) is currently available.

Finally, regarding the use of alternative fuels (natural gas, hydrogen, methanol…), the monitoring of the evolution of the fleet could help to define location of new bunkering infrastructures. Several data fields are necessary for this: type of fuel, bunkering and area of navigation. This information could be largely provided by the SPE-CDNI database, with some adaptation to record information on new alternative fuels. Nevertheless, SPE-CDNI does not contain the right tools to go further in the analysis: protected access to the data of the system, lack of legal analysis to operate the database, inadequate database architecture as a result no extraction tool, unstandardised categorisation of vessel types, gasoil-based system not taking into account alternative fuels, etc.

Subject to technical and legal questions, a link to the EHDB could help optimise the system, especially with data-crossing via ENI number, allow key queries in the Rhine area. In the Danube area, the question remains to be addressed.

<u>Safety policies</u>

The two most common demands proposed by the stakeholders relate to the development of tankers for the transport of dangerous goods. European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN[28]) defines a classification with the letters G, C, N for tankers[29]. Under these requirements, a double hull is mandatory for tanker vessels carrying dangerous

25 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.
26 STC-NESTRA, « GHG emission factors for IWT, 22 May 2018, https://www.smartfreightcentre.org/pdf/GLEC-report-on-GHG-Emission-Factors-for-Inland-Waterways-Transport-SFC2018.pdf.
27 ISO/DIS 14083, "Greenhouse gases — Quantification and reporting of greenhouse gas emissions arising from transport chain operations", 2022, https://www.iso.org/standard/78864.html.
28 UNECE, AND agreement, 2021/1, https://unece.org/sites/default/files/2021-01/ADN%202021%20English.pdf.
29 Type G : carriage of pressurized or refrigerated gases, type C : carriage of liquids (flush-deck/double hull type), type N : carriage of other liquids than type C.

goods. Data to track the classification (G, C, N) or the evolution of the hull (single/double) can be found in IVR and some national databases. Again, linking these databases to a full EHDB could lead to a more accurate and direct European analysis. Of course, it raises questions of responsibility of the body in charge to compile data and sort out possible inconsistencies.

Another aspect that has been highlighted is the contribution to increasing safety in shipping through a more adequate and appropriate infrastructure. For example, the data currently available allows the study of vessel dimensions (e.g. length). This information is useful to determine the size of turning areas or mooring places. Again, this data would be more useful if it were linked to the navigation area.

Digitalisation policies

The main demand related to data to track the rate of installation of navigation and information equipment (such as Inland AIS equipment combined with Inland ECDIS equipment"[30]) and also to track in the future the installation of automation equipment (such as those used for steering or commanding propulsion). For example, the discussions in the Moselle Commission showed the future need to track installation of Inland AIS devices and Inland ECDIS equipment to assess the effectiveness of recent regulatory measures. So far, there is no way to track the equipment installation rates in an appropriate way, except for Inland AIS equipment which could be made available by combining information contained in the EHDB and in the Rainwat database[31]. This database contains the MMSI used by an Inland AIS device and the ENI number. An interconnection with the EHDB would bring added value to monitor the implementation of Inland AIS devices. During the stage event organised in October 2021, the rate of vessels equipped with Inland AIS equipment was the most needed fleet related data to better support digitalisation policy initiatives (78% of the respondents selected this data).

In terms of long-term development, there is a clear need for a database that tracks the Position-Navigation-Time (PNT) of the vessels. This need of position information data of vessels was confirmed by the evaluation study of the RIS directive 2005/44/EC carried out for the European Commission[32]. The success of private sector applications based on Inland AIS signals is proof of the need for dynamic data on vessel traffic on waterways, for example for traffic management at locks or in ports even if those private applications are not fully in respect of national and international data protection regulations, as no owner consent is obtained. This kind of data (PNT of vessels) could be very useful also for market observation, e.g. for an accurate definition of navigation areas, for the indication of the degree of operational activity per region and also for supporting greening policies: very detailed data on each vessel trip, combined with the actual weight of the transported cargo, would be the true indicator of environmental performance, giving accurate data of CO_2 emissions per transport performance (considering accurate voyage-related information) and allowing comparison with other transport modes. To enable meaningful GHG indicators in a format compatible with most current reporting systems, associating fuel consumption with transport activity (tonne km) is essential. These data are very sensitive in terms of competition within the inland navigation sector and should be carefully protected. They could be collected from waterway management databases (including from lock crossings), from ERI messages (if mandatory), or from measuring points at national level and in a secure way. In this context, the data collected by the Moselle Commission for the calculation of tolls on the international river Moselle can be mentioned as an example. Indeed, the Moselle Commission collects

30 ES-RIS: https://www.cesni.eu/en/information-technologies/
31 https://digitallibrary.un.org/record/616426?ln=en
32 https://op.europa.eu/en/publication-detail/-/publication/54513464-7ec0-11ea-aea8-01aa75ed71a1

very accurate data on vessels as they pass through the locks. Several stakeholders, such as the association of insurance companies (IVR), recommend carrying out a detailed legal analysis to potentially use AIS as data source in respect of the data protection regulations. Finally, the dynamic recording of vessel positions could be necessary for a better integration into managed supply chains.

PNT data can help to improve safety of navigation and to support evolution of regulations, especially police regulations which address vessel operation. Having an idea of the number of vessels navigating simultaneously on a stretch helps to define appropriate traffic rules. Knowing the exact position of previous accidents can lead to changing local rules to mitigate the risks of collisions or grounding. It can take the form of changes in signalling or configuration of the waterway etc. Finally, there is a growing market for (aggregated, non-identifiable) location data, which can support private operators in better forecasting, optimisation of business processes, etc.

domain	statistical query	available in EHDB (as defined in ES-TRIN, Annex 2)	could be available in the new vessel certificate model	needs to be combined with other databases
general characteristics of the fleet	Number of vessels potentially in activity (valid vessel certificate)	yes	yes	-
	Dimensions of the vessel of the fleet (L, B, T in meters)	yes		
	Cargo fleet capacity - sum of the deadweight of vessels potentially in activity (in tons)			
	Passenger fleet capacity (sum of number of maximum passengers)	no	yes (item 19.1.1)	IVR, national databases
	Number of vessels in activity per year (real sailing)	no	no	SPE-CDNI (only in the Rhine area)
	Age of the fleet	no	yes (construction date, item 2.1.9)	IVR (construction date), national databases
	Repartition per vessel type	yes (28 types)	yes (item 2.1.1)	-
	Number of vessels per navigation area (Rhine or outside Rhine)	no	yes	
greening	Engine types (Stage V, CCNR II, CCNR I or below) or other energy converter (e.g. fuel cell)	no	yes, item 9.1	IVR (engine type approval number)
	Engine power (resp. energy converter) in kW	no	yes, item 9.1	IVR
	Used type of fuel	no	no	SPE-CDNI (only in the Rhine area) for fossil gasoil (EN 590)
	Bunkering infrastructure (needs for new alternative fuels)	no	no	SPE-CDNI (bunkering sites and fuel volumes, only in the Rhine area)
	Fuel bunkering per vessel type	no	no	SPE-CDNI + vessel type via ENI
	Total CO2 emissions in g	no	no	SPE-CDNI (fossil gasoil EN 590) + GLEC values of emission per litre
digitalisation	Rate of vessels equipped with Inland AIS equipment	yes partially	yes, see item 7.2.1	Rainwat
	Rate of vessels equipped with Inland ECDIS in navigation mode (radar equipment combined with ECDIS)	no	no	Not yet available
	Rate of vessels equipped with Track Guidance Assistant (TGA) -steering and propulsion	no	not yet foreseen, but possible evolution	Not yet available
safety	Number of tanker vessel with double hull	no	yes, see 3.1.7	IVR, classification society databases, national ADN databases
	ADN type (N, C, G)	no	no	

Table 4: Statistical queries that would be the most useful to characterise the fleet for greening, digitalisation, or safety policies. Indications on data that could be available in the new model of vessel certificate (and thus in national certification database).

6. Recommendations for the development and improvement of an accurate European inland shipping fleet database

Modern inland navigation in Europe needs a reliable, up to date, comprehensive source of information on the inland shipping fleet in activity in order to address some of the challenges associated with emissions reduction and digitalisation and to successfully keep pace with the modal split targets enshrined in the European Green Deal and the European Mobility Strategy. Inevitably, one is confronted with a dilemma:

- On one hand, the principle of data protection must be preserved,
- On the other hand, a wider range of verified information must be made available to the IWT community.

The European Commission announced to work on the upgrade of the European Hull database. The first priority is to propose a complete and frequently updated set of data regarding all inland vessels in Europe (including non-EU Member States such as Switzerland, Serbia, Moldova and Ukraine). For this purpose, in the current way of functioning, data from vessel certificates should be uploaded automatically from databases filled in at national level in all countries.

The **accuracy, the completeness and timeliness of each record for each vessel should be monitored to continuously improve data quality**. This is a first recommendation for the European Commission which is currently the operator of the EHDB. Beyond the refactoring of the database, the regular verification of data quality is an essential task. The reliability of data will lead to a better acceptance of the use of the EHDB and create added value to future services that will use the data more efficiently. When appropriate, the European Commission might delegate the data verification task to an external party who meets the requirements in terms of data confidentiality and public obligations.

Moreover, it is suggested that the data fields in EHDB are extended to all data from vessel certificate that is manually entered at national level (and not only the basic 24 data fields for vessel identification and a pdf copy of the vessel certificate). It also anticipates the introduction of the new vessel certificate model as prepared by the CESNI/PT Working Group, generating more information to support environmental, safety and digitalisation policies. Indeed, some useful data are not yet available in any database, such as characteristics of the engine (or other energy converter) or the installation of navigation and information equipment. The ongoing work on the revision of the vessel certificate model (see 3.7) could be an opportunity to collect additional vessel-related data. This data should be located in an extended EHDB. Moreover, the possible introduction of an international emission label or energy index for inland navigation (see PLATINA3 task 2.6) is also a great opportunity to collect data and generate an overview of the fleet’s environmental performance.

The second recommendation addressed to the European Commission is that the **extension of data fields** is already anticipated in the refactoring of EHDB or the database design is future-proof to accommodate this change in the coming years. It echoes the views expressed by the EU Member States during the Commission Expert Group meeting on the 9th of March 2021[33].

As shown in Chapter 4, more information could be obtained by **linking the EHDB with other databases, cross-referencing being done with the help of the ENI number**. Subject to legal and technical questions, such interconnection is an opportunity to bring information that is not available yet, e.g. fuel bunkering, estimation of consumption and thus eventually emission calculation, ADN classification, etc. and to generate additional value for designing and monitoring the implementation of public policies. Of course, such interconnection raises questions of responsibility regarding who compiles the data and sorts out possible inconsistencies. Indeed, experience gained in research projects compiling data from different sources pointed to data reliability issues and the necessary corrections to be made by human operators.

The 2nd stage event organised in October 2021 in the framework of PLATINA3 shows a clear support to such interconnection of databases, especially to produce statistics with added value and better know the market (78%), to get more accurate data fleet (76%) and to support public policies in the field of safety (56%). So, the third recommendation is to further explore and prepare the practical execution of creating such interconnections. This is mainly aimed on policy makers, but at second stage also the engagement of private stakeholders including (but not only) shippers organisations and other transport users could be considered

It shall be noted that the SPE-CDNI database contains fuel bunkering data only for the Rhine basin area and their use is limited to the strict purpose for which the database was created (as the data is considered as personal data). If fuel consumption cannot be recorded in the Danube area, other methodologies as those studied in PLATINA3 task 2.6 should be considered to collect data at the European level. Moreover, for some types of vessels not intended for the transport of goods or passengers, the “volume of fuel” may not be the relevant indicator for measuring the activity and other parameters linked to the specific type of craft (e.g. floating equipment) might be used. For the time being, another challenge is the absence of reliable data on the consumption/bunkering of alternative energy (e.g. biofuels, LNG, electricity).

In order to enable linking of existing databases with each other, the EHBD could centralise data from databases (as it currently does with some national certification databases) or play the role of platform for exchanges between other databases (no storage of data), with controlled access to different data families depending on the user profile. Furthermore, such a system should allow predefined queries. In this context, the fourth recommendation is: it would be **highly desirable in the short term that the European Commission facilitates access to the EHDB for other databases administrators, especially the CDNI, taking into account the existing legal framework of the EHDB and the CDNI**. Such cooperation would help to demonstrate the opportunities of interconnections.

33 European Commission, Expert group on technical requirements for inland waterway vessels (E03496), 14 March 2022, https://ec.europa.eu/transparency/expert-groups-register/screen/index.cfm?do=groupDetail.groupDetail&groupID=3496&NewSearch=1&NewSearch=1.

Prior to interconnecting data sources and considering data analysis needs , the fifth recommendation is that some **important data fields should be harmonised and better defined**. The sub-recommendations below are addressed to database operators, especially national authorities, IVR, CDNI, and the European Commission.

- The definition of country or of vessel type differs from one database to the other. Vessels could be double counted or not depending on the country taken as reference (country of certification, country of national registration, country of the owner, etc.). Vessel types are often too detailed, leading to misinterpretation and incorrect answer when filling in the database, or classification as "other". These two fields are very common in data analysis and are even the basis for a good understanding of the sector in Europe. They are generally combined to all other statistical queries. For vessel types, it is recommended to use two levels of description, the first with e.g. 14 main families being the same for all databases (as defined in Chapter 3.4 and Annex 1(1.4) regarding the new vessel certificate model). Regarding the "country" of the vessel, it could be either the country of the owner/operator, the country of national registration according to the 1965 Convention or the country that issued the vessel certificate in accordance with ES-TRIN. Nevertheless, the definition that might be most useful for and most difficult to collect for the analysis of the IWT sector remains the area of navigation. For market analysis, a relevant breakdown of this data field could be based on the river names (Rhine, Danube, others). Indeed, for the time being, only vessels navigating on or off the Rhine could be identified through the vessel certificate (there are different technical requirements in ES-TRIN for existing vessels whether they operate on the Rhine or not). The recommendation is to use the "country of registration" (as this is the criteria used by national authorities to assign the first digits of ENI numbers).

- Another key data field for fleet analysis is the "activity" of a vessel, i.e. how to assess the number of vessels that are actually sailing or operating in a given year. The activity is often defined as a "non-scrapped vessel" or as vessel with a "valid vessel certificate". This definition is not accurate enough to give a correct view of the activity during a given year: some vessels might not sail in that year (as observed during the Covid pandemic) or simply be used as temporary cargo storage facilities. Information could be given with bunkering data from the SPE-CDNI database: a vessel is active if it was refuelled in a given year (even if the bunkering time might be different than the sailing time). This is another example of the added value of interconnecting databases. It could be addressed as a concrete case for a third recommendation which aims to further explore and prepare the practical execution of creating such interconnections.

In accordance with international data protection regulations such as the GDPR, another possibility would **be to make data available online in aggregated and anonymised form without sp**ecial user authorisation to answer the most needed queries. This solution was supported by more than half of the participants during the above-mentioned stage event. So, the sixth recommendation is addressed to the national inspection body and the European Commission which could **explore the possibility of such publication in accordance with the relevant regulations and could make the data available online**.

This leads to the last point, the ultimate development that the EHDB could meet in line with the growing information needs of the sector: the introduction of dynamic data on the voyage of vessels and on goods transported. Wide use of data emitted by Inland AIS devices shows the needs for this type of PNT data, and the most secure and controlled way to handle them would be through a database at European scale. This very sensitive data would be necessary over time to better facilitate the integration of inland navigation into supply chains and thus favour synchro-modality. Such data is of large importance for shippers and forwarders for instance.

As alternative to EHDB, which is not accessible for private parties such as shippers and forwarders, such operational real-time data for synchromodal decision making can be handled by corporate / private databases and tools based on positioning systems (e.g. GPS / GALILEO instead of AIS).

Generally speaking, dynamic data on vessels voyages could also be very useful to improve safety of navigation, to support the evolution of regulations, for market observation, for a precise definition of navigational areas, for traffic management, and also to give accurate data of CO_2 emissions in tkm to support and monitor the impact of all current and future environmental policies. Such data (even if only in the aggregate form) would also be commercially extremely valuable. As Inland AIS data is considered as personal data, such position-related information linked with ENI has to be compliant with data protection regulations. The seventh recommendation is to **investigate further the legal feasibly as well as possible acceptance (especially by the shipping industry as well as shippers) of such collection of dynamic data by promoting wide consultations with the sector: shipping industry, shippers, etc.**.

Annex 1: Vessel type definitions

1.1 EHDB and national databases: 28 vessel types (according to current vessel certificate model and associated definitions in ES-TRIN)

✓
01 Craft
02 Vessel
03 Inland waterway vessel
04 Sea-going ship
05 Motor vessel
06 Motor tanker
07 Motor cargo vessel
08 Canal barge
09 Tug
10 Pusher
11 Barge
12 Tank barge
13 Dumb barge
14 Lighter
15 Tank lighter
16 Cargo lighter
17 Ship-borne lighter
18 Passenger vessel
19 Passenger sailing vessel
20 Day-trip vessel
21 Cabin vessel
22 High-speed vessel
23 Floating equipment
24 Worksite craft
25 Recreational craft
26 Dinghy
27 Floating establishment
28 Floating object

1.2 IVR database: 54 vessel types and 5 vessel type groups

1.3 CDNI database: 29 vessel types

VESSEL TYPE
GENERAL CARGO SHIP
CONTAINER SHIP
ROLL ON ROLL OFF SHIP
BULK TRANSPORT BARGE
PUSH BARGE CARGO
LIGHTER
PONTOON CARGO
TANK VESSEL
PUSH BARGE TANK
TANK LIGHTER
PONTOON TANK
PUSH BOAT
TUG
PUSH TUG
PASSENGER SHIP
CRUISE SHIP
SCHOOL SHIP
MOTOR FERRY
TANK VESSEL
OTHER CARGO SHIP
BUNKER BOAT
BILGE OIL REMOVER
OTHER TANK SHIP
LAUNCH
SERVICE SHIP
OTHER PASSENGER SHIP
WORKING BOAT
DREDGER
PLEASURE BOAT

1.4 New vessel certificate model: 14 sub-families of vessel types

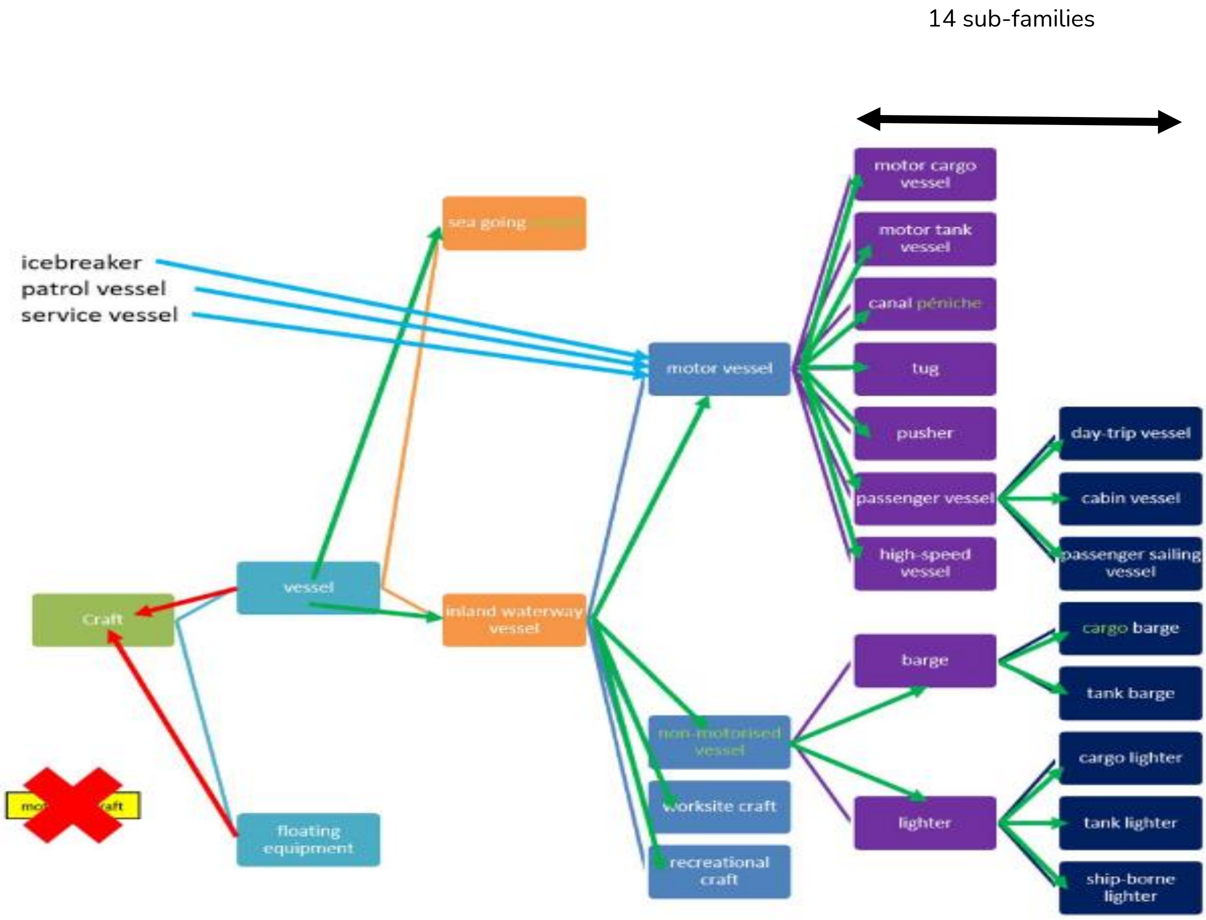

Figure 2-3 Hierarchy of definitions – proposed new structure

'craft': a vessel or item of floating equipment;					
	'vessel': an inland waterway vessel or sea-going vessel;				
		'sea-going vessel': a vessel approved and intended primarily for sea-going or coastal navigation;			
		'inland waterway vessel': a vessel intended solely or mainly for navigation on inland waterways;			
			'motor vessel': an inland waterway vessel built to navigate independently under its own motive power;		
				'motor tank vessel': a motor vessel intended for the carriage of goods in fixed tanks	
				'motor cargo vessel': a motor vessel, other than a motor tank vessel, intended for the carriage of goods;	
				'canal péniche': a motor vessel not exceeding 38,5 m in length and 5,05 m in breadth;	
				'tug': a motor vessel specially built to perform towing operations;	
				'pusher': a motor vessel specially built to propel a pushed convoy;	
				'passenger vessel': a motor vessel constructed and equipped to carry more than 12 passengers;	
					'day-trip vessel': a passenger vessel without overnight passenger cabins;
					'cabin vessel': a passenger vessel with overnight passenger cabins;
					'passenger sailing vessel': a passenger vessel built and fitted out also with a view to propulsion under sail;
				'high-speed vessel': a motor vessel capable of reaching speeds over 40 km/h in relation to water;	
			'non-motorised vessel': an inland waterway vessel either having no motive power of its own or having only sufficient motive power to perform restricted manoeuvres		
				'barge': a non-motorised vessel built to be towed;	
					'tank barge': a barge intended for the carriage of goods in fixed tanks
					'cargo barge': a barge, other than a tank barge, intended for the carriage of goods
				'lighter': a non-motorised vessel built or specially modified to be pushed	
					'tank lighter': a lighter intended for the carriage of goods in fixed tanks
					'cargo lighter': a lighter, other than a tank lighter, intended for the carriage of goods
					'ship-borne lighter': a lighter built to be carried aboard sea-going ships and to navigate on inland waterways;
			'worksite craft': an inland waterway vessel, appropriately built and equipped for use at worksites, such as a reclamation barge, hopper or pontoon barge, pontoon or stone-dumping vessel;		
			'recreational craft': an inland waterway vessel intended for non-commercial purposes of sport or pleasure;		
	'floating equipment': a floating installation carrying working gear such as cranes, dredging equipment, pile drivers or elevators;				

Table 2-2 Proposed new definitions in hierarchical order

Annex 2: Current state-of-play of data collection on the Danube

Introduction

In addition to the main European inland navigation fleet databases at national and international level described in this report, the methodology of statistical data collection in the Danube region has to be taken into consideration. This statistical activity of the Danube Commission (DC) started with the publication of the first Statistical Yearbook issued in 1958. Until today, the Statistical Yearbook of the DC is one of the very few sources providing an overview of the Danube fleet and its development.

In order to provide regular statistical information on Danube navigation, to track the modal shift, to meet the requirements of growing interest in the development of IWT potential as well as to complement existing statistical databases (UNECE, CCNR) and to contribute to the achievement of a global key target for the development of uniform European inland waterways fleet statistics, it is important to assess and consider how the statistical data collected by the DC can contribute to the future development of more harmonized and functional European fleet data collection approaches. Statistical information collected by the DC and released in its Yearbooks enables stakeholders and competent authorities to draw the necessary conclusions regarding the solutions of practical problems of Danube navigation based on the analysis of digital data, and the breakdown of fleet data by individual DC Member States (except Germany and Austria) in combination with other available statistical sources and databases can provide valuable information.

Together with DC's Market Observation Reports, which complement the existing fleet statistics with dynamic data collected on vessels passing through Danube locks and the EU border station of Mohács (Hungary), this offers the possibility to compare static data collected by DC for the Statistical Yearbook and to estimate the correlation with the actual number of active fleets on the Danube River.

In this activity, the DC is working in close collaboration with DG MOVE, Eurostat (CGST), UNECE and the International Transport Torum (ITF). At this stage, some questions of the legal basis for data collection and processing, the scope of data collection, the results of this activity and the problems and prospects for the development of the fleet database remain unsolved.

The Methodology of Data Collection for the Danube Fleet Statistics

In accordance with its annual work plan, the DC collects information for the preparation of yearbooks and publications on statistical and economic issues of Danube navigation. For this, the DC uses statistical data provided by the Member States collected with special forms.

The DC statistic forms for Danube fleet data collection based on the following information obtained from the DC Member States:

- type of cargo;
- age of the vessel;
- vessel type: self-propelled, barges, push boats, tugs;
- engine power;
- deadweight cargo capacity of the vessel;
- information about ship owner.

It must be emphasized that the statistics of the DC do not use extensive definitions and subdivisions for vessels families in order to avoid misinterpretations and inaccuracies that may occur due to the different definitions for fleet families in different countries and in different databases.

Based on the data received with the data collection forms from its Member States, the Secretariat produces its “Statistics of Danube Navigation”, which systematizes the information for the previous year. On the basis of this document, the "Statistical Yearbook of the Danube Commission" is prepared and subsequently published, which provides an overview of the economic situation of Danube navigation based of the most important indicators for a given year. This information is also cross-checked with statistical data from strategically located Danube locks and the border station of Mohács (Hungary) on the number of vessels that sailed during the period in question.

An important part of the DC`s statistics is the data related to transport of dangerous goods by the Danube fleet which, according to ADN, is also provided by the Member States on an annual basis and plays an important role from a safety perspective as one of the aspects to be covered by the fleet statistics.

Main issues of the of the Danube fleet data collection

The DC statistics cannot be correlated with existing European fleet databases as they do not have operate such confidential data as ENI, which can be shared with competent stakeholders and authorities upon request. Another problem with data collection in DC is an issue related to the General Data Protection Regulation (GDPR).

In the past, there have been repeated discussions to find a solution for data collection in many countries, where private companies are not obliged to provide fleet data due to national regulations (also in accordance with the ADN). For this reason, all data collected by the DC for its fleet statistics is provided by the Member States on a voluntary basis. This in its turn leads to a rather different approach to data collection in the different countries (both EU and non-EU Member States). Some countries provide data by means of questionnaires addressed to local shipping companies or by means of data, received from national classification societies or other national institutions that maintain fleet databases at national level, as well as from port authorities, lock administrations and customs authorities.

As a considerable amount of statistical data was missing, there were certain gaps in the final results, both for the calendar year and in comparison, with previous years. In certain cases, it was considered most useful to clarify the available data or to fill in the missing data by using additional sources in order to avoid an imbalance in the derivation of the final values of the main indicators.

In order to carry out an investigation of the Danube fleet statistics and to compare the available statistics, different sources were used to provide an analysis of the accurate data for the Danube fleet. Relevant data for the Danube fleet was derived from:

- The Market Observation of European Inland Navigation (common project of the CCNR and the EC), 2018-2019;
- Annual Report on Danube Navigation in Austria (Viadonau), 2019;
- Danube navigation statistics (DC) 2017- 2019;
- PROMINENT project (data for Danube fleet was retrieved from the Viadonau publication “The Blue Pages (2016)”;
- ECORYS (Danube20+).

The results are broken down in tables by country and vessel type and in some cases differ significantly depending on the source of data. This proves again a need for a harmonized approach to data collection and the importance of linking to official EU and non-EU fleet databases.

UA- Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics UNECE 2018
Self-propelled	26	27	44	91	41	1222
Barges	246	241	266	423	413	-
Push boats & Tugs	56	56	59	-	82	-
Total:	328	324	369	514	536	1222

MD - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics UNECE 2018
Self-propelled	11	-	-	-	13	2
Barges	57	-	-	-	26	7
Push boats & Tugs	22	-	-	-	11	7
Total:	90	-	-	-	50	16

RO - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics CCNR 2019	Statistics UNECE 2018
Self-propelled	164	-	-	59	103	1284	161
Barges	1139	-	1021	397	1108		1123
Push boats & Tugs	295	-	-	-	234	296	296
Total:	1598	-	1021	456	1445	1580	1580

BG - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics CCNR 2019	Statistics UNECE 2018
Self-propelled	62	75	66	17	30	145	34
Barges	163	160	156	100	166		112
Push boats & Tugs	53	54	53	-	51	30	30
Total:	278	289	275	117	247	175	176

RS - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics CCNR 2019
Self-propelled	81	99	65	20	97	109
Barges	168	178	165	102	408	
Push boats & Tugs	60	53	54	-	159	33
Total:	309	330	284	122	664	142

HR - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics CCNR 2019	Statistics UNECE 2018
Self-propelled	32	25	15	14	12	127	19
Barges	116	108	98	34	122		108
Push boats & Tugs	36	35	34	-	41	35	35
Total:	184	168	147	48	175	162	162

HU - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics CCNR 2019	Statistics UNECE 2018
Self-propelled	70	-	-	-	79	313	70
Barges	243	-	-	-	263		243
Push boats & Tugs	56	-	-	-	23	56	56
Total:	369	-	-	-	365	369	369

SK - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics CCNR 2019	Statistics UNECE 2018
Self-propelled	10	11	9	33	20	109	9
Barges	100	100	99	110	144		100
Push boats & Tugs	33	33	33	-	39	33	33
Total:	143	144	141	143	203	142	142

AT - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	ECORYS (2016)	Statistics Viadonau 2019
Self-propelled	-	-	13	344	-	17
Barges	-	-	139	232	-	139
Push boats & Tugs	-	-	17	-	-	17
Total:	-	-	169	576	-	173

DE - Dry and liquid cargo

Type of vessel	Statistics DC 2017	Statistics DC 2018	Statistics DC 2019	PROMINENT 2016	Statistics UNECE 2018
Self-propelled	45	3	1171	198	1187
Barges	91	89	805	12	818
Push boats & Tugs	31	-	411	-	418
Total:	167	92	2387	210	2423

Number of vessels on Danube based on the Statistics of the Danube Commission (2018)

Type of vessel	UA	MD	RO	BG	RS	HR	HU	SK	AT*	DE**
Self-propelled	27	11	164	75	99	25	70	11	17	45
Barges	241	57	1139	160	178	108	243	100	139	91
Push boats & Tugs	56	22	295	54	53	35	56	33	17	31
Total:	324	90	1598	289	330	168	369	144	173	167
Subtotal:	**3652**									

* Austrian fleet is given according to the statistics of Viadonau (2019)

**German fleet is calculated according to the port of registry

Type of vessel	UA	MD	RO	BG	RS	HR	HU	SK	AT	DE***
Self-propelled	27	11	164	75	99	25	70	11	17	1171
Barges	241	57	1139	160	178	108	243	100	139	805
Push boats & Tugs	56	22	295	54	53	35	56	33	17	411
Total:	324	90	1598	289	330	168	369	144	173	2387
Subtotal:	**5872**									

*** German fleet is calculated according to the vessels` activity in Danube transportations

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