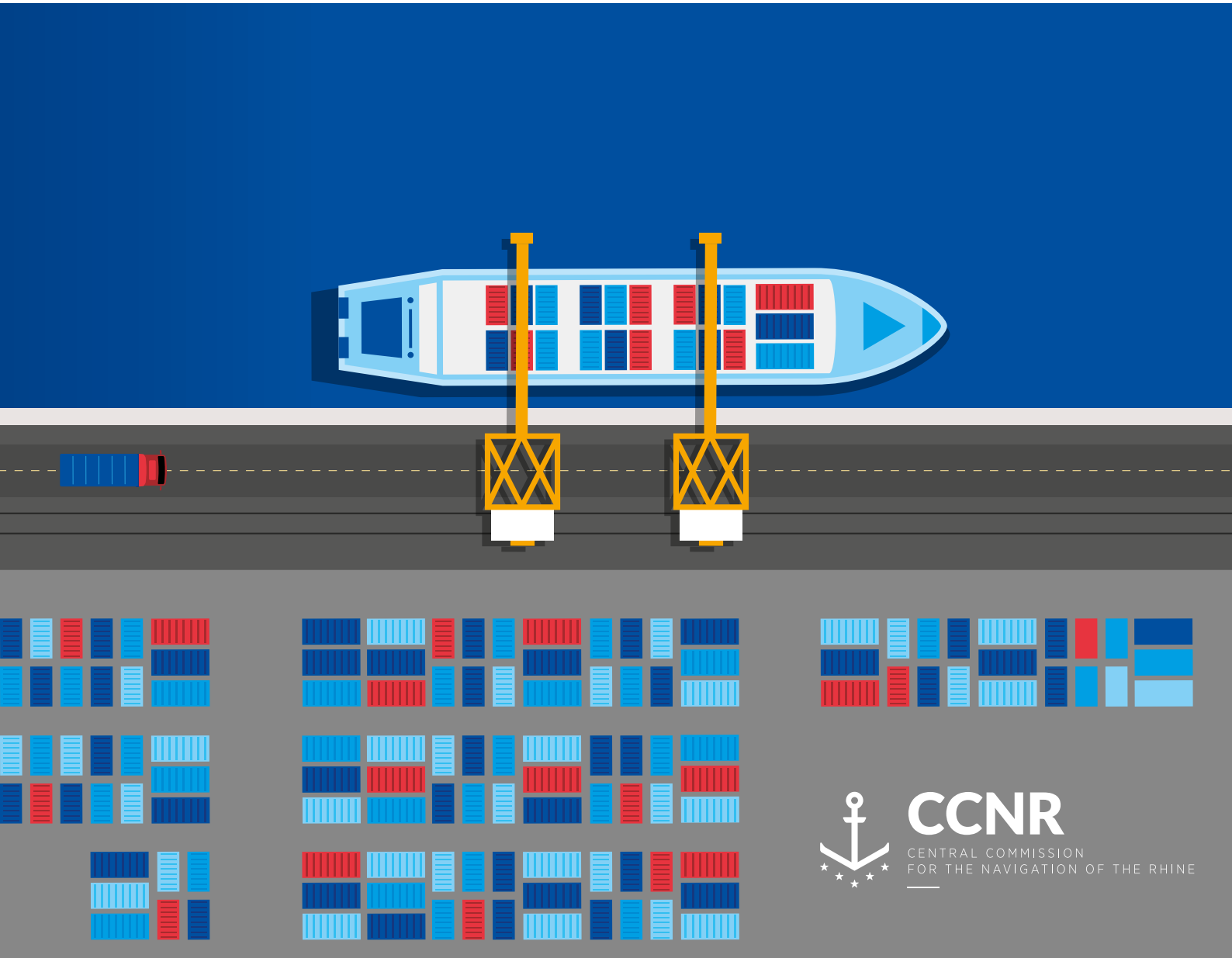
ANNUAL REPORT
2018

INLAND NAVIGATION IN EUROPE
MARKET OBSERVATION



CCNR
CENTRAL COMMISSION
FOR THE NAVIGATION OF THE RHINE

LIABILITY DISCLAIMER

Use of the knowledge, information or data contained in this document is at the user's own risk. The European Commission, the Central Commission for the Navigation of the Rhine and its Secretariat shall in no way be liable for use of the knowledge, information or data contained in this document or any ensuing consequences.

The facts presented in the study and opinions expressed are those of the authors and do not necessarily also represent the position of the European Commission, its agencies or of the Central Commission for the Navigation of the Rhine on the subject in question. This notice does not constitute a formal commitment on the part of the organisations referred to.

September 2018

FOREWORD

Bruno Georges
CCNR Secretary General

Continuing its long and fruitful collaboration with the European Commission, the Central Commission for the Navigation of the Rhine (CCNR) is delighted to present its 2018 European Inland Navigation Market Observation report. This report coincides with a very special year for the CCNR, amid celebration of the 150 years of the Mannheim Act and its reaffirmed principle of freedom of navigation on the Rhine. As all readers of the report will be aware, the positive impact of this founding principle on the inland navigation market can still be observed today. 2018 also marks the start of key negotiations on the next European Union's multiannual financial framework 2021-2027, that will determine inter alia the Union's budget allocated to the transport sector, including inland waterway transport (IWT) and related infrastructure, for the next 7 years. As Commissioner Bulc rightly pointed out in the last edition of our report, "inland navigation still holds huge potentials which we must use to make our transport system more efficient, resilient and sustainable". A most ambitious EU budget should be made available to mirror this outstanding role played by the IWT sector.

The new Market Observation report highlights the key results for the year 2017, providing abundant statistics and elaborating on important market evolutions in relation to various aspects of inland navigation, including transport demand, fleet evolution, inland waterway transport companies and river cruises.

This 2018 edition of the report also includes new and forward-looking thematic studies. These cover in particular new growth opportunities for inland waterway transport, like urban logistics and biomass, for which demand is expected to grow in the future, in the wake of important trends like urbanisation and the greening of the energy sector. By conveying a positive message for IWT in terms of growth potential, scope for improvement and foreseeable changes, these studies are essential components of this report.

The CCNR Secretariat is continuously working to further improve the quality of the annual European Inland Navigation Market Observation reports. In particular, it is aiming to enlarge its statistical sources and the scope of the topics to be covered, thereby strengthening the European dimension and attractiveness of the reports.

Like in previous years, the CCNR Secretariat is very grateful to the European Commission, Eurostat and all National Statistical Offices, as well as to the Mosel, Danube and Sava River Commissions for their valuable and important contribution to the report. In particular, I would like to underline our excellent collaboration with the Danube Commission this year, which greatly enriched our report with regards to aspects related to inland navigation in central and eastern parts of Europe. Once again, the CCNR Secretariat would also like to thank the sector representatives, EBU and ESO, for their good advice and support. The Secretariat is convinced that inland waterway transport can and will grow ever stronger and will continue to benefit from such a partnership between the sector, the River Commissions and the European Commission.

I wish all readers of the report a most pleasant and stimulating read!

CCNR
CENTRAL COMMISSION
FOR THE NAVIGATION OF THE RHINE

Dear readers,

Henrik Hololei
Director-General of DG MOVE

It is my great pleasure to congratulate the Central Commission for the Navigation of the Rhine (CCNR) for this year's European Inland Navigation Market Observation report, which provides, as always, a unique and invaluable source of information on the evolution of the inland waterways transport sector in Europe. This year's edition confirms some of the trends observed and predicted during the previous years, such as the increase of the container and river cruise markets, as well as the potential for inland navigation ports to further develop into major economic clusters.

I am especially pleased that in 2018 cooperation between all the actors involved, from EU to CCNR experts, international organisations and industry stakeholders, has become ever stronger. In particular, the European committee for drawing up common standards in the field of inland navigation, CESNI, has been working full speed to update the European standards in inland navigation. On the year where both the CCNR and the Danube Commission celebrate significant anniversaries, it is important to underline the importance of having a unique forum that gathers experts representing the diversity of the European river basins.

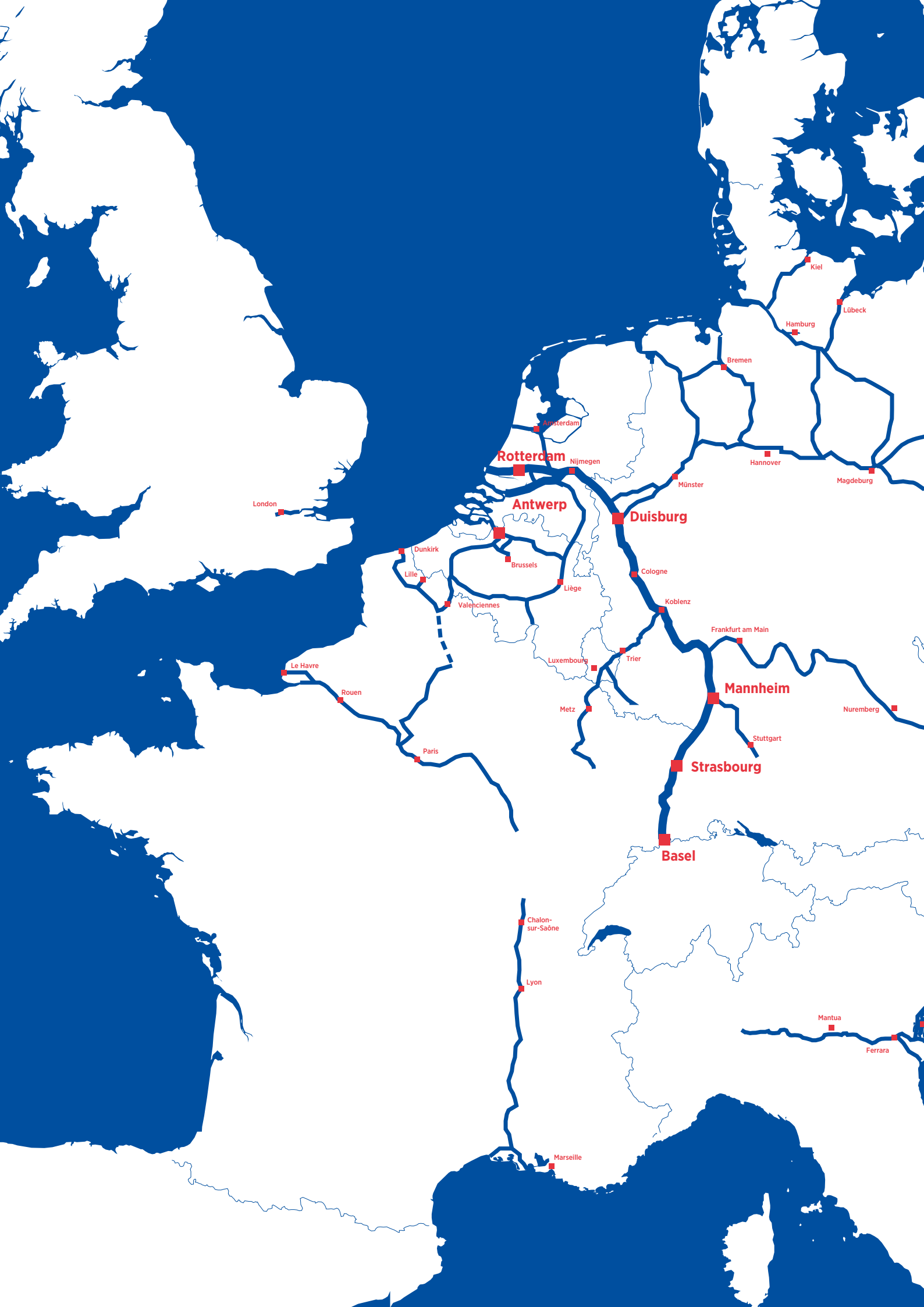
As overall transport demands will continue to grow in the years to come, inland navigation has a clear contribution to make. Importantly, it can help offset some of the heaviest societal costs of transports, such as pollution or road congestion and by being the most environmentally friendly transport mode. Thus, it is and will remain a pillar of the EU transport policy and a priority for infrastructure funding, in particular through the Connecting Europe Facility (CEF) instrument.

However, the inland waterways sector has its own specific challenges to meet. Over the years to come, it will need to engage fullest in its modernisation and integration with the other modes of transport, in order to take a bigger slice from the overall growth of the transport sector.

One of the key evolutions that is currently irreversibly changing our societies and our lives is digitalisation. For the inland waterways transport sector, digitalisation can be a key factor in further improving the quality of services and its integration in the wider logistics chain. DG MOVE has launched a debate for the creation of a Digital Inland Navigation Area (DINA) and will continue to support the development of digital tools for inland navigation.

I wish to thank once again the CCNR Secretariat for their commitment and I very much look forward to continuing our excellent collaboration to address the new and exciting challenges of tomorrow.

European Commission


Kiel
Lübeck
Hamburg
Bremen
Amsterdam
Rotterdam
Nijmegen
Hannover
Münster
Magdeburg
London
Antwerp
Duisburg
Dunkirk
Brussels
Cologne
Lille
Liège
Koblenz
Valenciennes
Frankfurt am Main
Luxembourg
Trier
Le Havre
Rouen
Mannheim
Metz
Nuremberg
Stuttgart
Paris
Strasbourg
Basel
Chalon-
sur-Saône
Lyon
Mantua
Ferrara
Marseille


Szczecin
Berlin
Dresden
Prag
Regensburg
Linz
Vienna
Bratislava
Budapest
Venice
Belgrade
Ruse
Constanța

TABLE OF CONTENTS

EXECUTIVE SUMMARY

In the annual report that follows, a comparative analysis of several economic evolutions and structures in the European inland navigation sector is undertaken. The performances of certain rivers, countries and regions regarding transport demand for goods or passengers, are compared with one another. The results of these comparisons show that most European inland waterways have similar trends when it comes to particular goods segments.

Coal transport, for example, is declining throughout Europe, while the transport demand for containers and for chemicals is rising. The current evolution and outlook of iron ores and metals are much better than for coal, but their evolution is not as prosperous as for containers and chemicals.

The container market is still heavily concentrated on Western Europe. In 2017, more than 99% of total container transport performance took place in only four EU countries: the Netherlands 45%, Germany 40%, Belgium 10% and France 4.5%. The share of all other EU countries represented only 0.2%.

Furthermore, container traffic increased by 6% overall in the EU during 2017, and by 6% on the Rhine. By reaching a level of almost 2.37 mio. twenty-foot equivalent units (TEU) in 2017, the traditional Rhine's container traffic has grown by 84% since the beginning of the millennium (since 2000). Even if absolute values of container traffic are still quite limited on other European rivers, there is a great potential ahead.

This applies, for example, to the hinterland of the seaport of Hamburg, where container traffic on the Mittelland Canal and on the Elbe could play an ever-increasing role in the future. In 2017, the TEU numbers on these inland waterways increased by 3% and by 8% respectively.

This growing tendency is also present for the western German Canal network, which forms an essential link between northern Germany (the Elbe, Mittelland Canal) and the Rhine region. In France, container traffic on the Seine and in the northern French Canal network also continued its upward trend in 2017.

Danube navigation, however, is still very much concentrated on the dry bulk segment, with grain and iron ores representing slightly more than half of total Danube transport. Container transport is still very small on the Danube, but did show some minor increase in 2017.

Nevertheless, total Danube transport on the upper and middle parts of the river recorded an increase in 2017 compared with 2016, despite very difficult climatic conditions at the beginning of 2017. Ice and low water levels blocked Danube navigation in the winter, but the river traffic recovered strongly afterwards.

River cruising is a market segment where the Danube plays a leading role in Europe. The Danube is the most prominent river for cruise traffic in Europe, even ahead of the Rhine. Some long-term figures can be mentioned: between 2002 and 2017, cruise vessel traffic on the Danube (at the German-Austrian border) increased by 89%, on the Rhine by 128%, and on the Main-Danube Canal by 295%. Hence, the famous link between the Danube and the Rhine basin, inaugurated in 1992, saw its cruise traffic almost triple in only 15 years.

Another chapter of this annual report analyses the economic conditions of inland shipping companies, their turnover evolution, freight rates and general conditions. With regard to turnover, it can be observed that the goods transport segment shows a relatively flat long-term annual turnover trend for Europe as a whole. Negative deviations from this flat trend can occur in years with pronounced low water periods, as was the case in 2015, 2016 and 2017. Low water periods have both a stimulating effect on freight rates (transport prices) and a negative effect on cargo traffic. However, the negative effect on turnover due to less cargo traffic can be stronger in magnitude than the stimulating effect due to higher prices. This was the case in the winter of 2016/2017, as the available quarterly turnover figures for selected countries show.

In the passenger shipping segment, the boom in river cruising created an upward trend for the turnover evolution. This upward tendency is visible when looking at the turnover results of Swiss passenger shipping companies, bearing in mind that almost half of all active river cruise vessels in Europe are currently registered in Switzerland.

It seems reasonable to assess the economic sentiment in the sector also by looking at the newbuilding rates of vessels and at the rate of creation of new companies. The results show that newbuilding rates in the goods transport sector continued their recovery in 2017, having reached a low point in 2014 (for dry cargo vessels) and in 2016 (for tanker vessels). New enterprises were created (in the Netherlands) at a higher rate in 2017 and there were fewer bankruptcies than in previous years. If these figures are considered as a whole, the evolutions indicate a better economic climate in the goods transport sector in 2017, compared to the situation a few years ago.

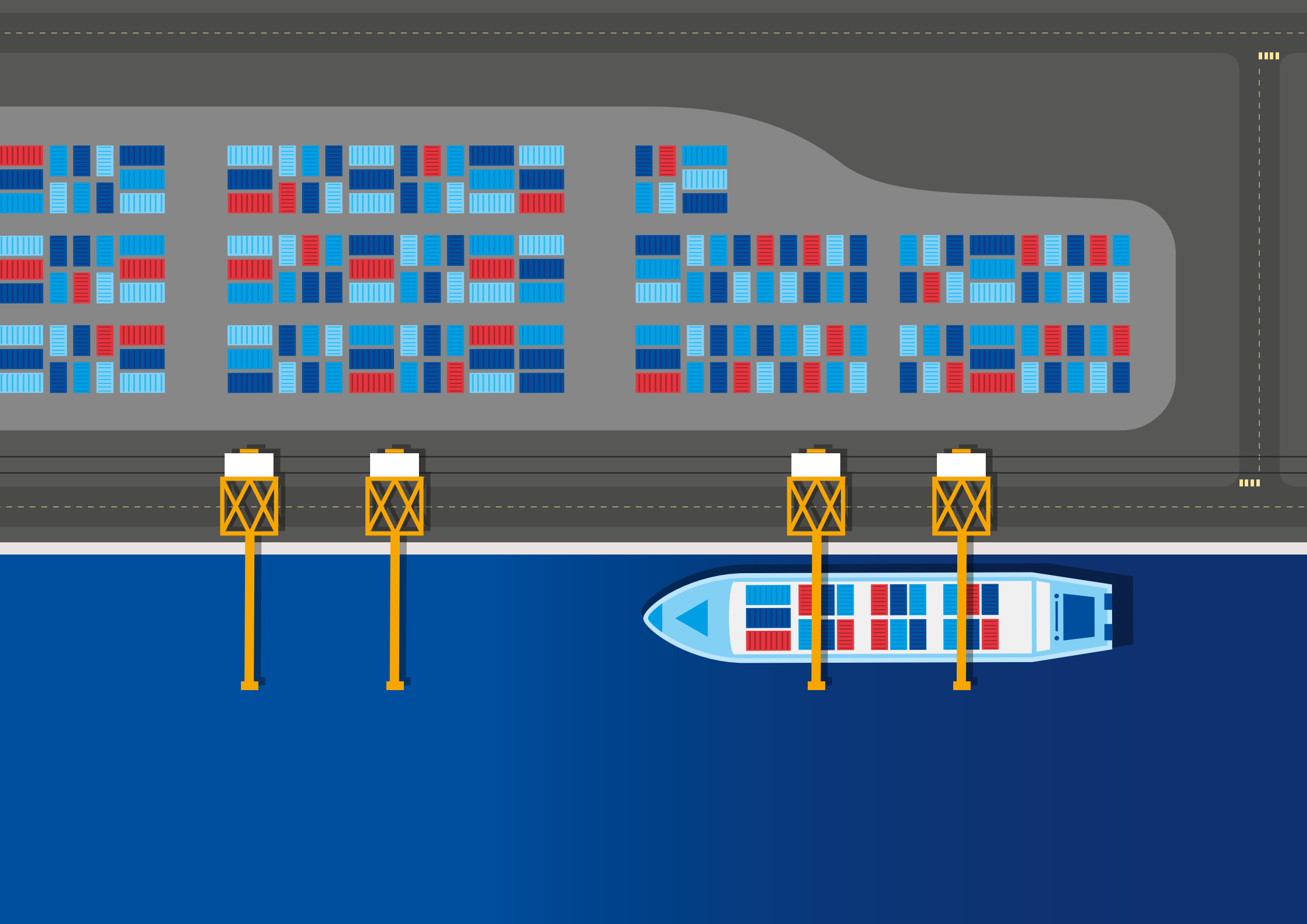
In the cruise sector, newbuilding rates have weakened in recent years, as they did in 2017. However, this weakening is also a result of the very high rate in newbuilding in the recent past and can be considered as a kind of normalisation process.

This annual report also includes a study of new market opportunities for IWT, such as urban transport chains and biomass transport. In large European agglomerations, characterised by air pollution and saturation of roads, inland waterway shipping sparks renewed interest for urban logistics. Based on the example of Paris it can be seen that IWT is able to absorb transport segments with high growth potential such as building materials, shops delivery and e-commerce.

Another new market of inland shipping is biomass transport. With the growing role of biomass in the energy sector (both for producing electricity and heat), new possibilities for IWT arise. Since biomass is of a mass cargo character (wood, wood pellets, rapeseed, and other materials that can be transported at low cost in large volumes), inland shipping is perfectly suited to become the main transport mode for this major energy resource of the 21th century.

To illustrate this scenario, the report analyses three important case studies by looking at the way biomass is exploited in the inland ports of Liège (Belgium/river Maas), Mannheim (Germany/river Rhine) and Straubing (Germany/river Danube). They may serve as benchmark cases for other cities and ports in Europe.

→ www.inland-navigation-market.org



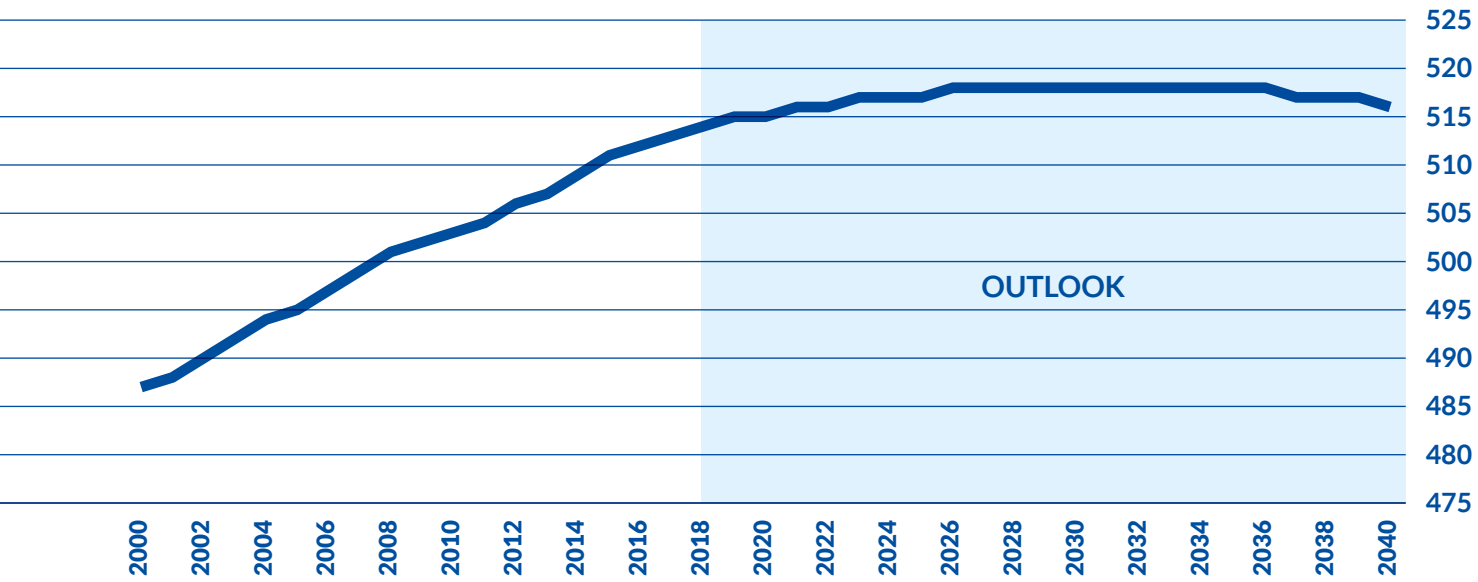
01

ECONOMIC CONTEXT

- **2017 has been a record year for the Eurozone, with a GDP growth of 2.4%. Forecasts show a sustained economic growth in Europe over the coming years.**
- **The activity of certain traditional sectors of IWT such as building materials and steel segment is assumed to expand in the next years.**
- **The energy sector, a decisive segment for inland shipping, is restructuring progressively towards renewable sources of energy such as biomass. This represents an important potential of growth for the IWT sector.**

GENERAL ECONOMIC CONDITIONS
AND OUTLOOK IN EUROPE

EVOLUTION OF THE TOTAL POPULATION IN THE EUROPEAN UNION – PAST EVOLUTION AND OUTLOOK (IN MILLION PERSONS)



Source: Oxford Economics

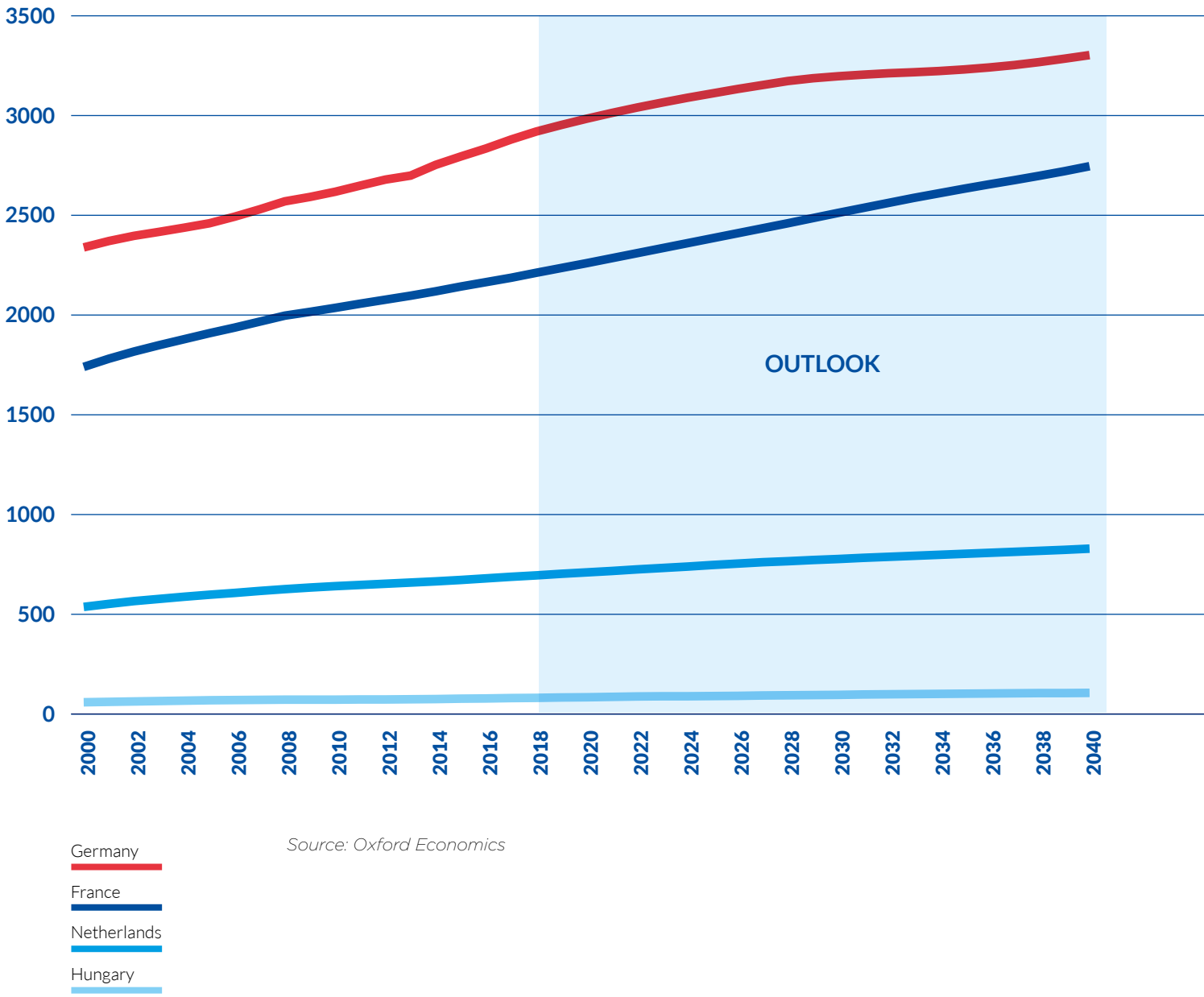
With decreasing fertility rates in developed countries, the expected evolution of the size of the European population is characterised by a saturation curve, which will reach its peak in the 2020s and 2030s. This will also have consequences on economic growth, especially potential growth.

Potential output is, in contrast to GDP, not the actual aggregate production level of an economy, but its potential level. It is determined by the aggregate capital stock, aggregate labour supply and the degree of technological progress. It is therefore also influenced by population growth. Forecasts point to an average yearly growth rate for potential output of around 1% per annum in Germany, France, and the Netherlands. This would mean a lower rate compared to the time period 2000-2017 - which is also explained by the weak demographic evolution of Europe.

+1%

growth of potential output per year until 2040

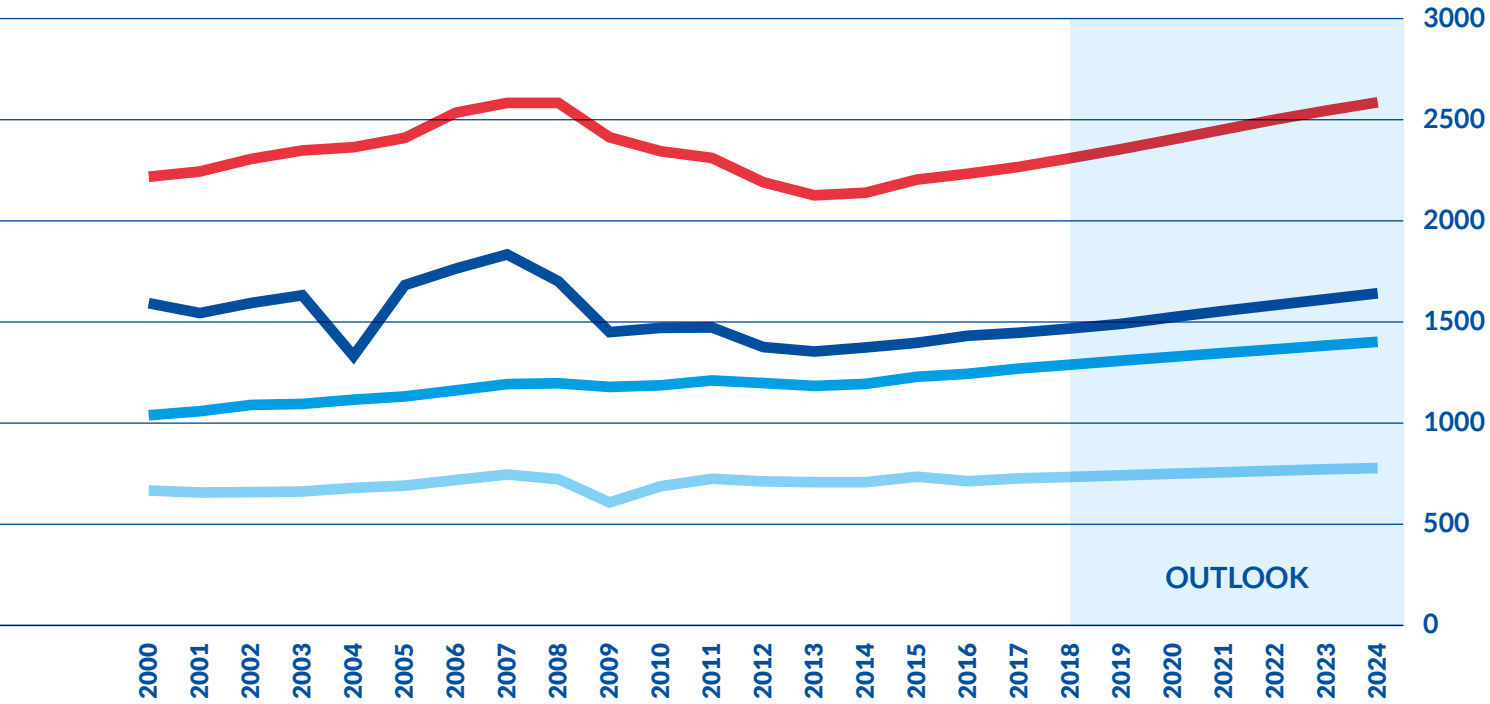
POTENTIAL OUTPUT – PAST EVOLUTION AND OUTLOOK (BILLION EURO, 2010 PRICES = 100)



Source: Oxford Economics

ECONOMIC CONDITIONS
OF IWT-RELATED SECTORS

EU GROSS OUTPUT OF ACTIVITIES CONTRIBUTING TO INLAND WATERWAYS GOODS TRANSPORT (EU GROSS OUTPUT IN BILLION REAL US$ - 2010 US$)



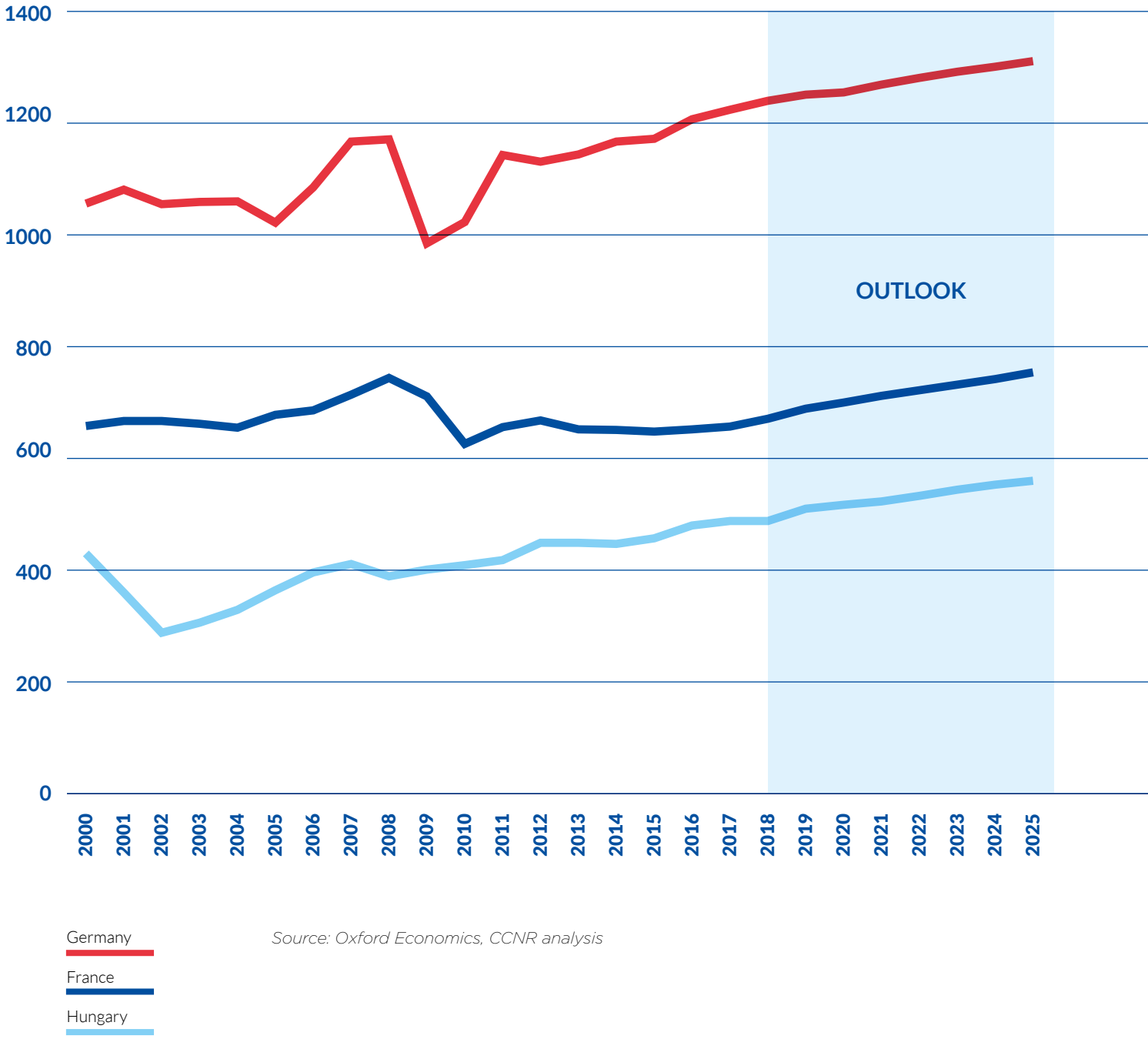
Construction
Wood & Wood products
Food & Beverages
Chemicals

Source: Oxford Economics, CCNR analysis

The construction sector is assumed to expand its activity in Europe, fostered by important trends such as urbanisation, strong demographic growth in certain regions and cities, and immigration. Wood and wood products are promoted by the greening of the energy sector, which increases the demand for biomass. Special attention to biomass and its role in inland waterway transport (IWT) is given in the chapter "Outlook".

There is a positive outlook for the production of metals, although it varies in strength from one country to another. The country with the highest steel production in Europe is Germany. Its steel production has recovered better from the economic crisis than the steel production in France. Moreover, the outlook for the German steel production is more growth orientated, while it is more stagnation orientated in France.

GROSS OUTPUT OF METAL PRODUCTS (IN BILLION REAL US$ - 2010 US$)



Source: Oxford Economics, CCNR analysis

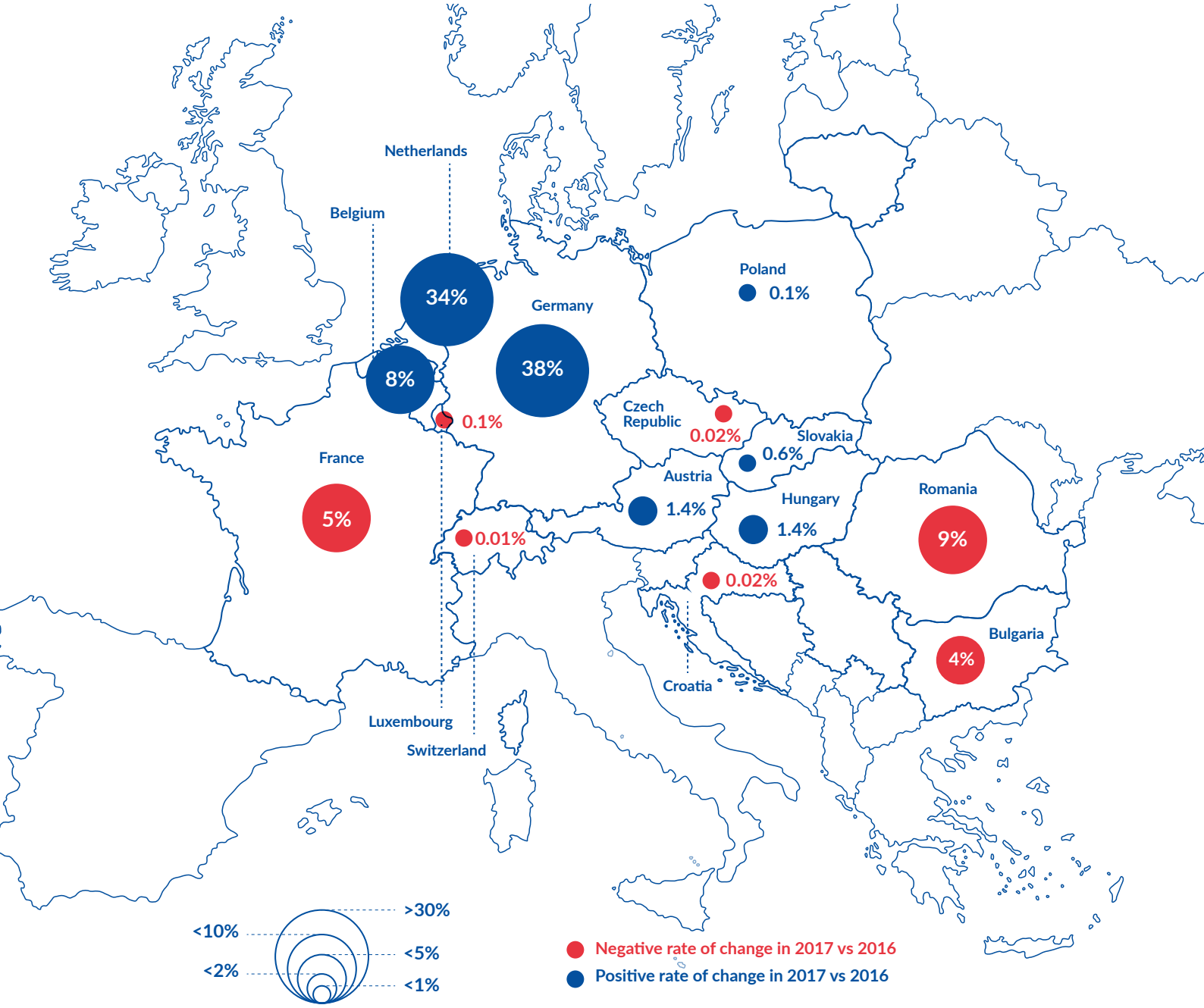
02

FREIGHT TRAFFIC ON INLAND WATERWAYS

- In 2017, total EU transport performance on inland waterways reached 146 million tonne-kilometres, an increase of 1% compared with 2016.
- This overall performance was mainly boosted by the Rhine and Western Europe, where increasing figures were observed for countries such as Belgium, Germany and the Netherlands.
- Container transport on European inland waterways accounts for more than 16 million tonne-kilometres, and increased by 5% in 2017. More than 99% of this traffic takes place in Rhine countries.
- Danube traffic suffered under ice and low water conditions in January 2017 but recovered very well afterwards; traffic figures on the upper Danube stretch (Austria, Slovakia, Hungary) were, at the end of the year, slightly higher than in 2016. The lower Danube countries (Romania and Bulgaria), however, did not reach the results of 2016.

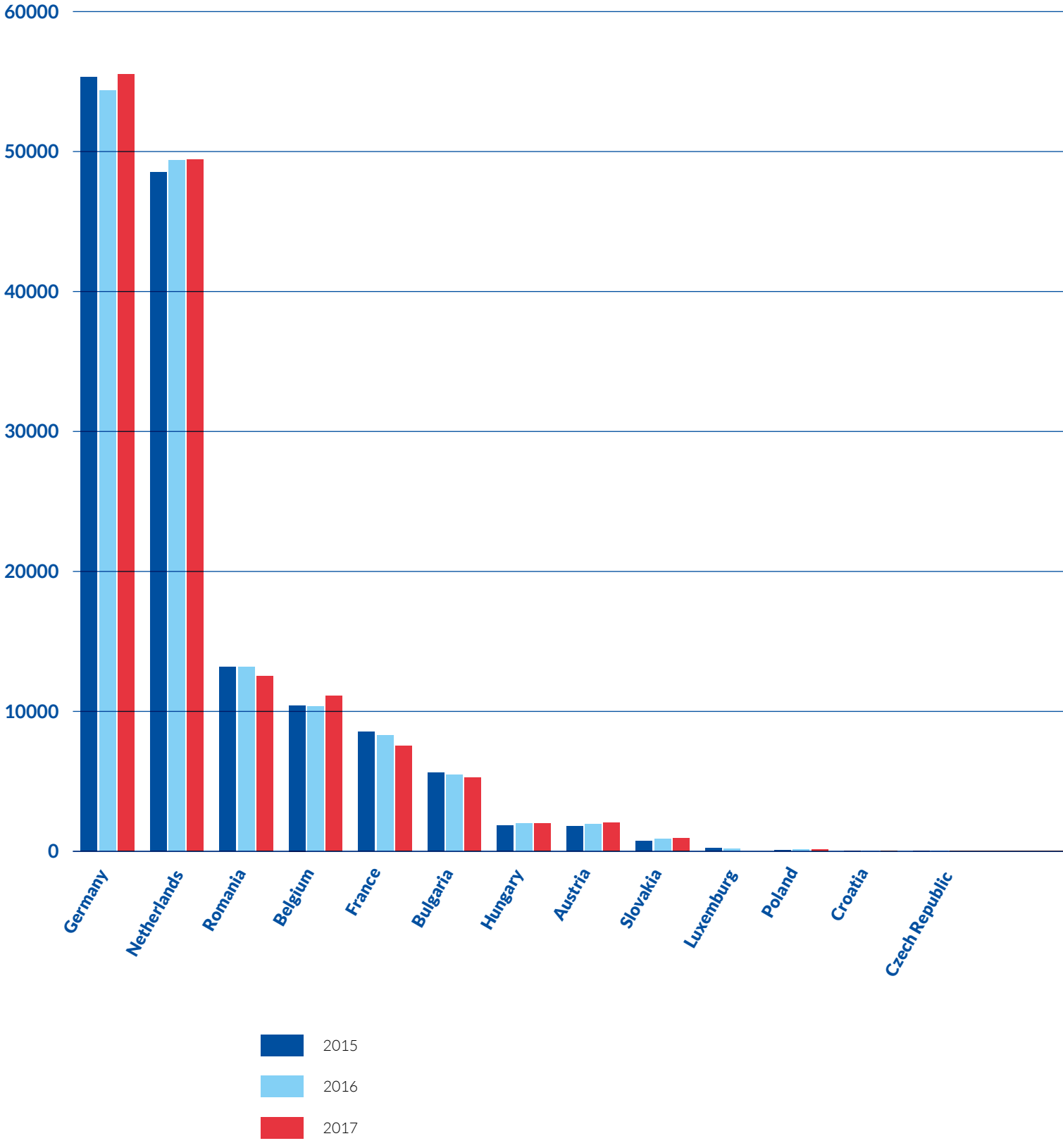
INLAND NAVIGATION
GOODS TRANSPORT IN EUROPE

SHARE OF THE COUNTRIES' TKM IN TOTAL TRANSPORT PERFORMANCE IN EUROPE
(SHARE IN %)



Source: Eurostat

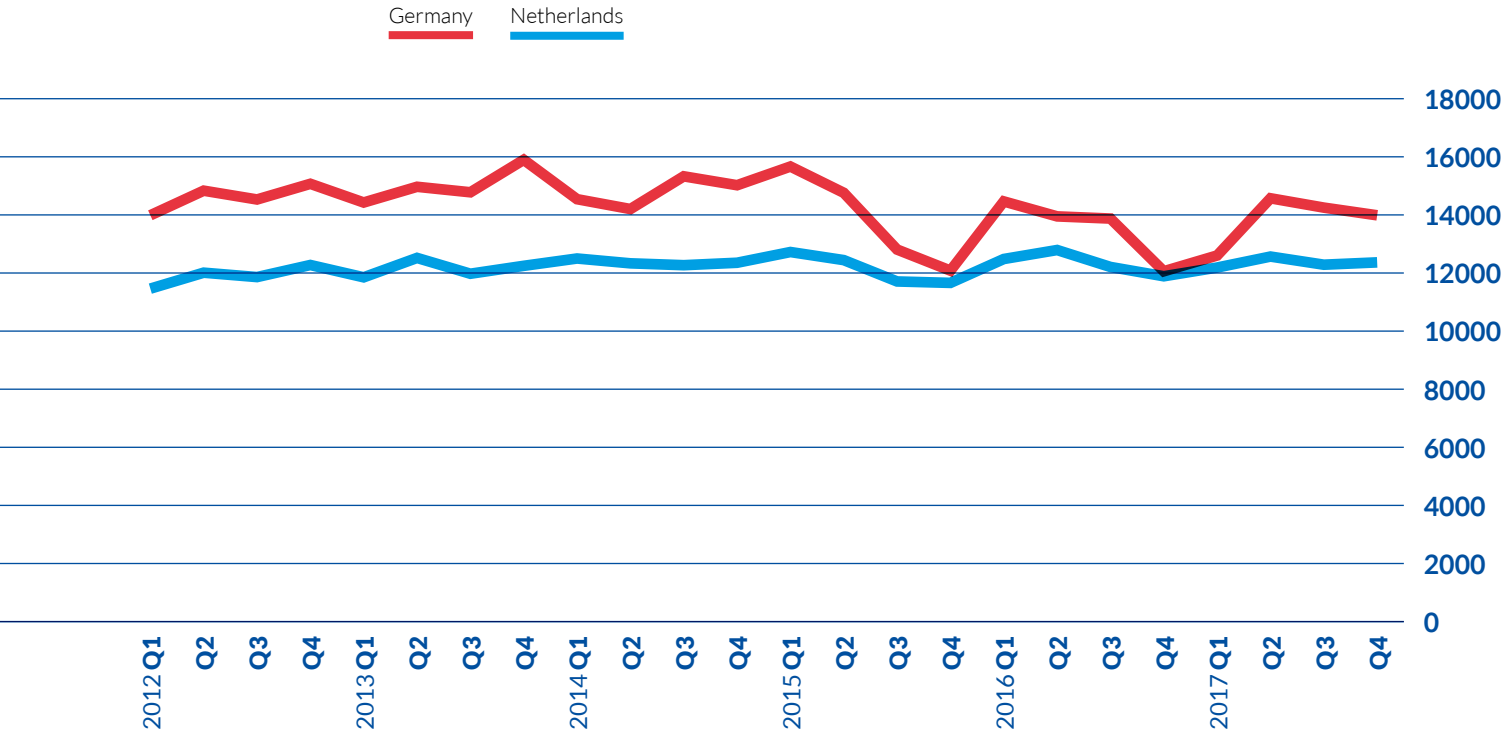
IWT TRANSPORT PERFORMANCE IN 2015, 2016 AND 2017 IN MAIN EU IWT COUNTRIES
(TRANSPORT PERFORMANCE IN MILLION TKM)



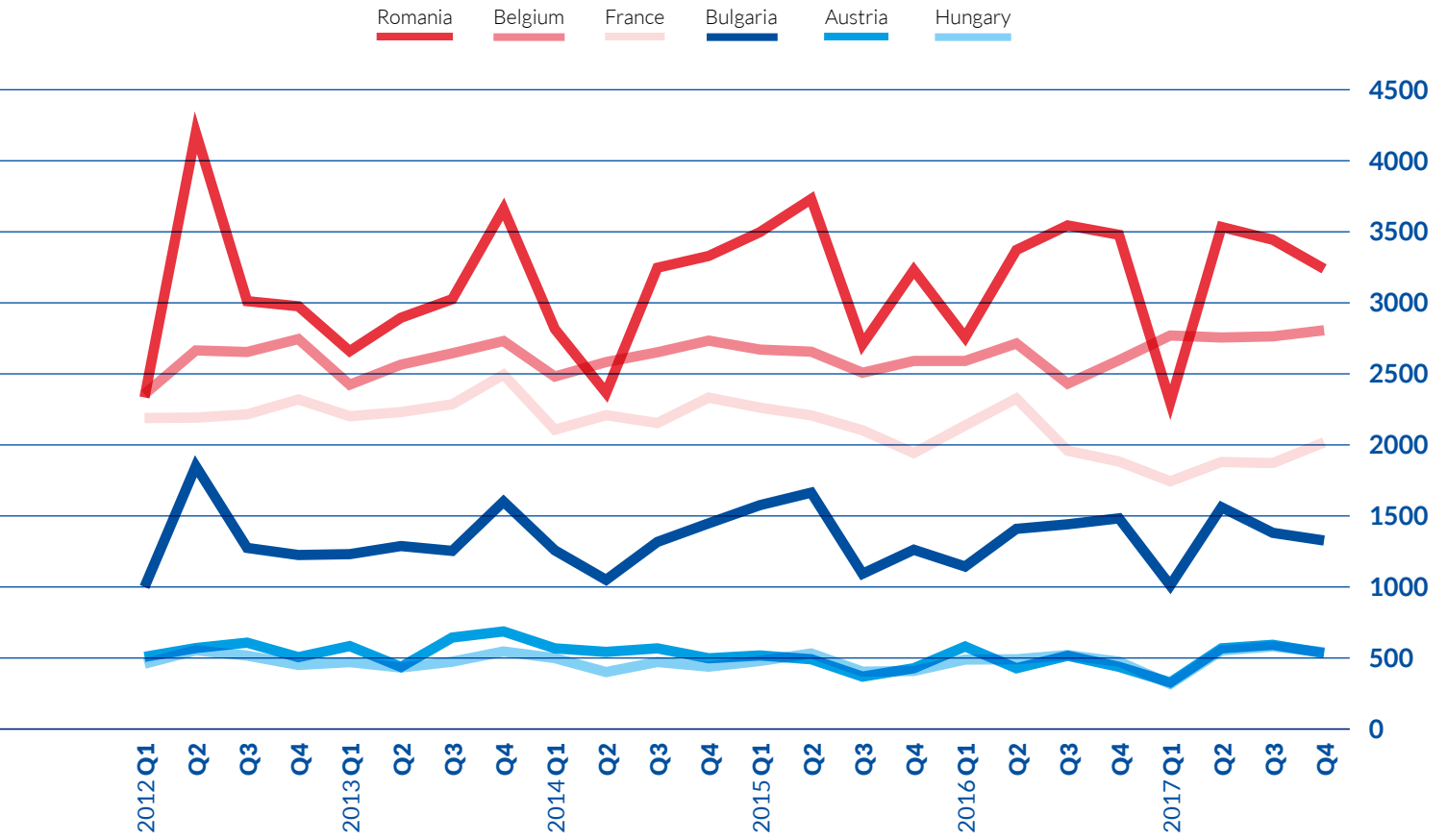
Source: Eurostat

QUARTERLY TRANSPORT PERFORMANCE EVOLUTION IN MAIN IWT EU COUNTRIES

(TRANSPORT PERFORMANCE IN MILLION TKM)



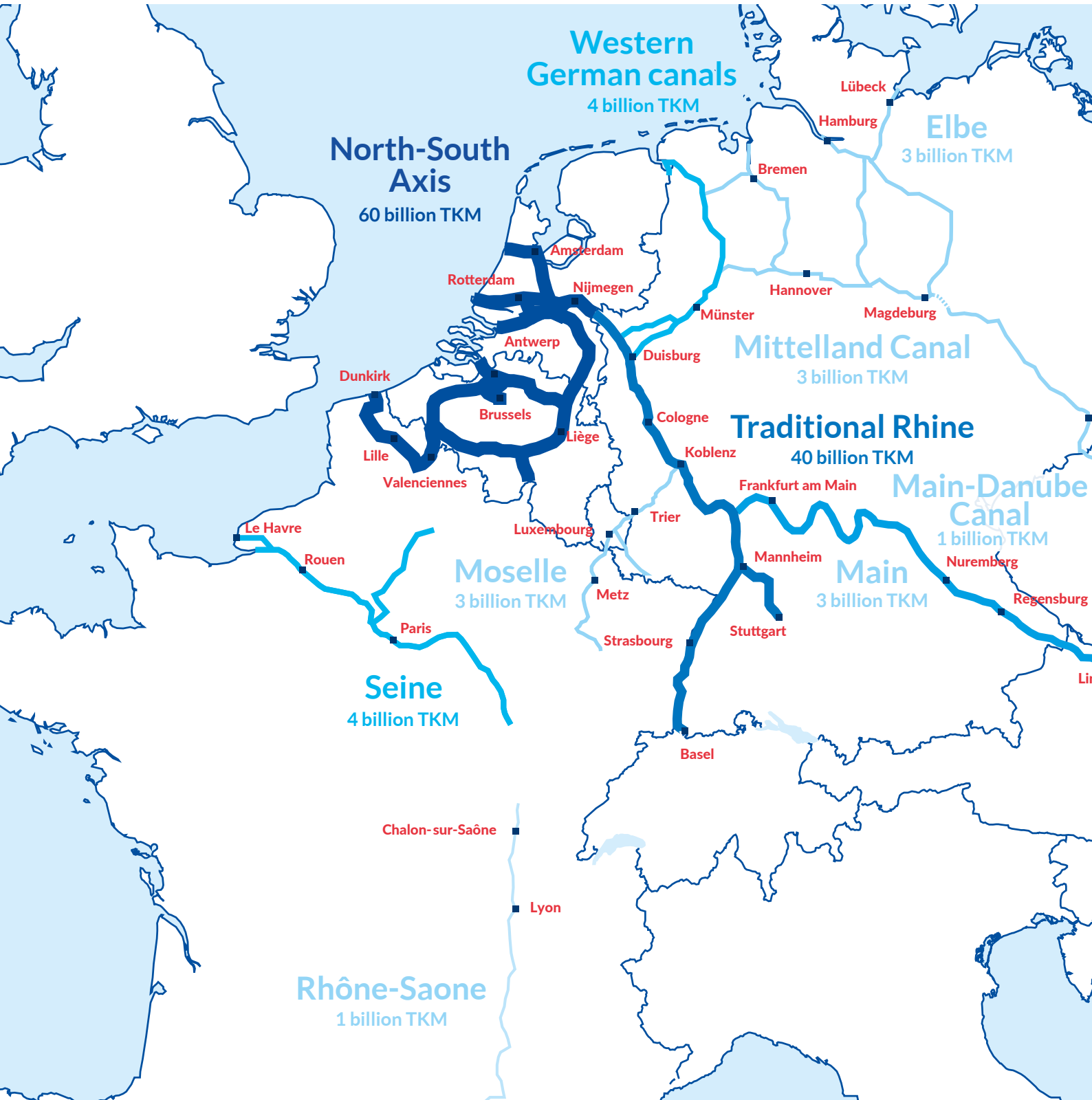
Source: Eurostat



Source: Eurostat

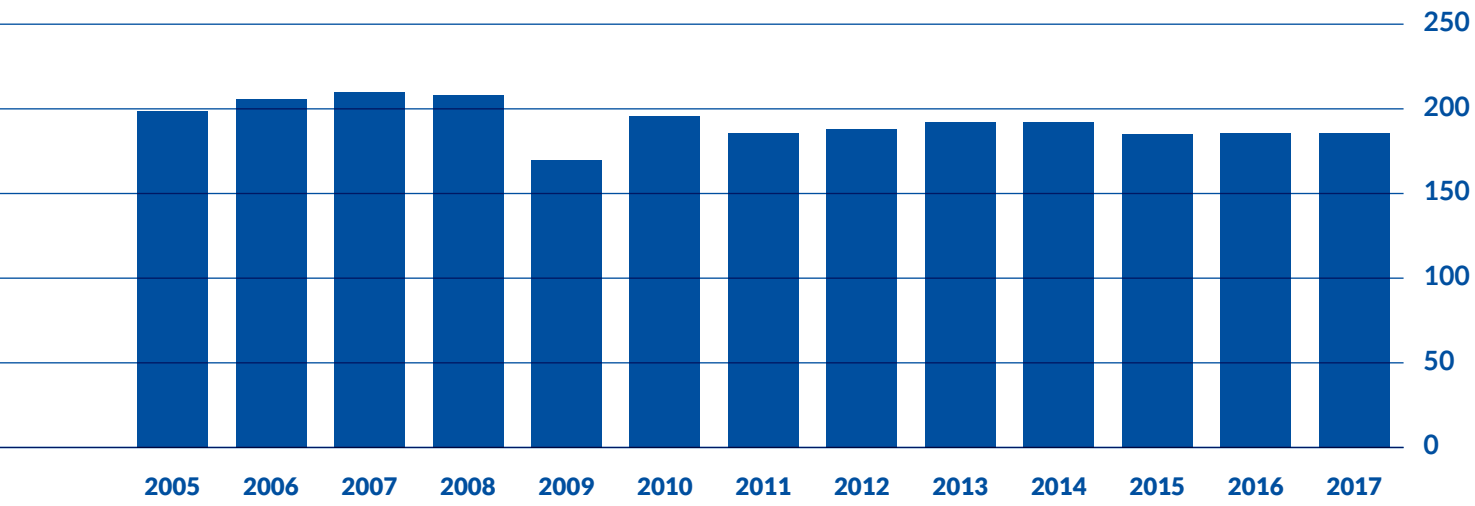
INLAND NAVIGATION

GOODS TRANSPORT IN MAIN EUROPEAN RIVER BASINS



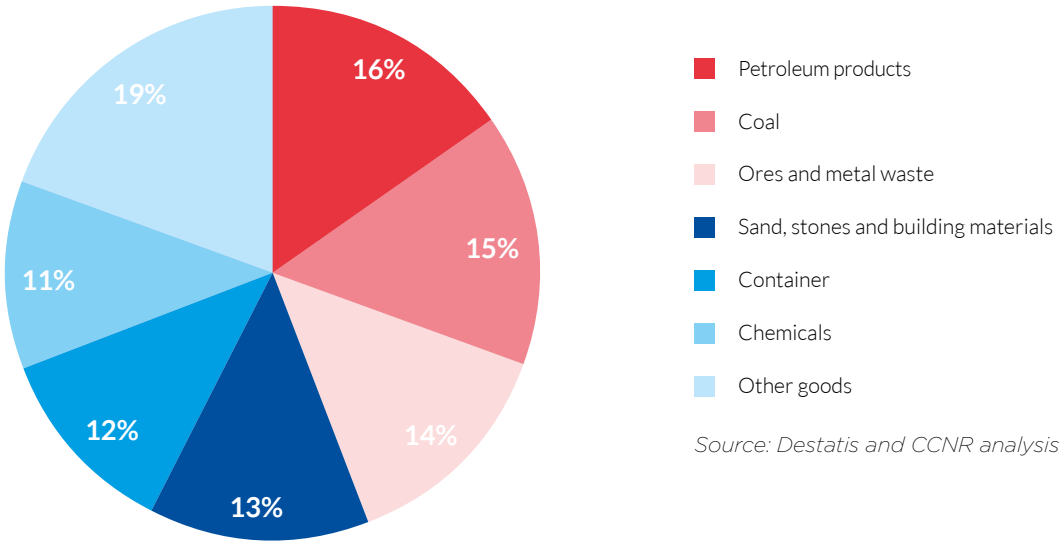
TRANSPORT PERFORMANCE IN MAIN EUROPEAN RIVER BASINS (IN BILLION TKM)

YEARLY VOLUME OF GOODS TRANSPORTED ON THE TRADITIONAL RHINE
(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis, CCNR

SHARE OF PRODUCTS TRANSPORTED ON THE RHINE (2017)



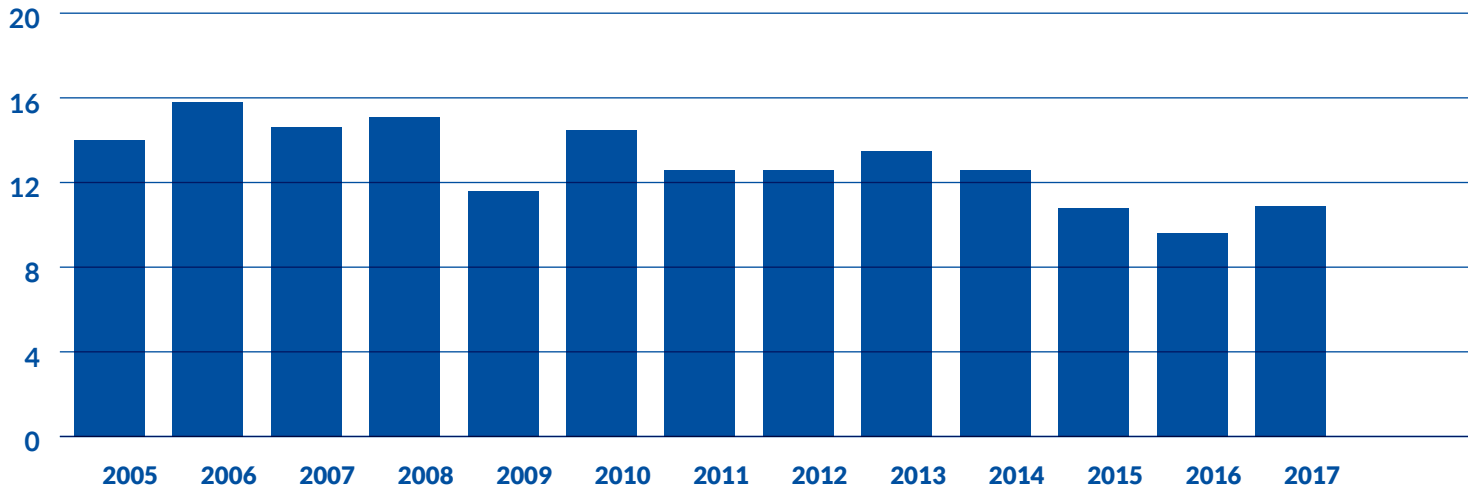
Source: Destatis and CCNR analysis

The Rhine is by far the most important European basin per volume of goods transported, with a share of 2/3 of European volumes transported by IWT on this river. Focusing on the "Traditional Rhine" (the Rhine between Basel and the Dutch-German border), transported volume accounts for not far from 50% of the volume transported on European inland waterways.

The stable traffic level in 2017 compared to 2016 is mainly due to the increase of container transport and building materials transport, while coal and agricultural products transports were declining. Poor harvests in 2016 also impacted agricultural products transport in the first semester of 2017, which explains the 14% decrease of this segment of transport over the year.

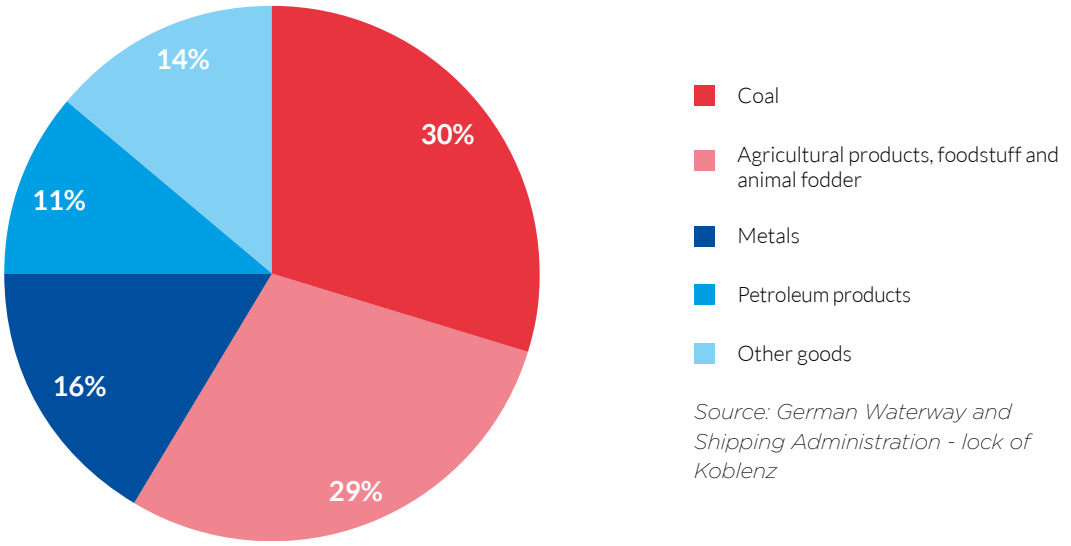
YEARLY VOLUME OF GOODS TRANSPORTED ON THE MOSELLE

(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis, CCNR

SHARE OF PRODUCTS TRANSPORTED ON THE MOSELLE (2016)

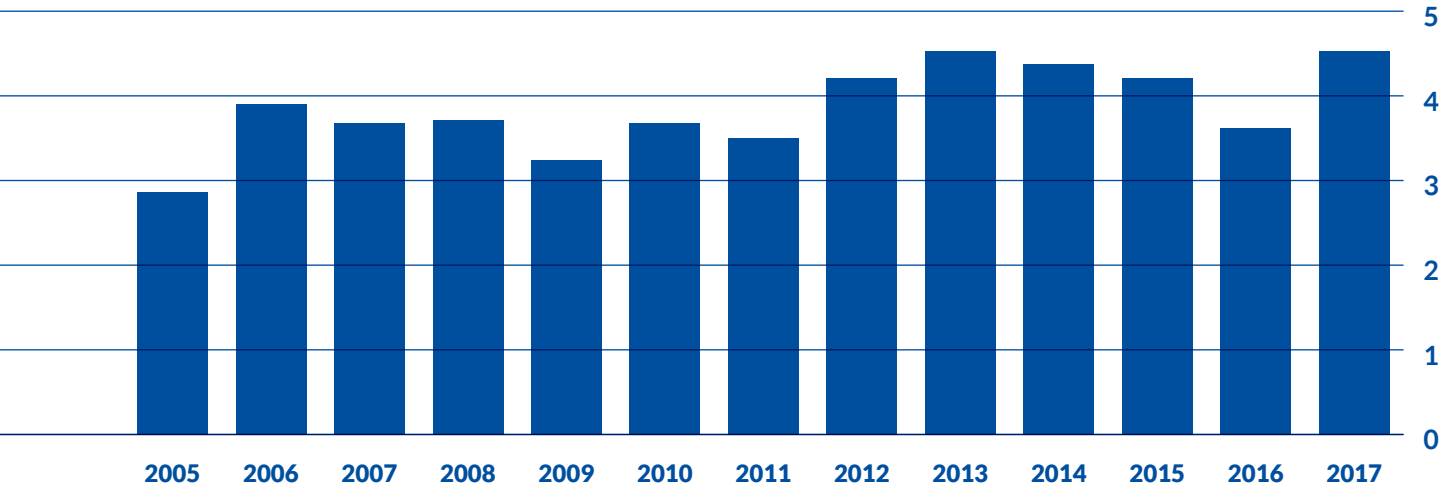


Source: German Waterway and Shipping Administration - lock of Koblenz

The Moselle runs from Lorraine (France) to Rhineland-Palatinate (Germany), and inland navigation transport mainly relies on agricultural products, raw materials for the steel industry and more and more on container transport. Even though volumes are still limited compared to other rivers, container traffic has been growing constantly since 2014 on the Moselle. With 21,685 TEU transported over the year, an increase of almost 15% of container transport was recorded between 2016 and 2017. On the other hand, coal and steel segments are partly affected by the decline of steel production in Lorraine. This explains the decreasing share of these segments in total IWT on the Moselle.

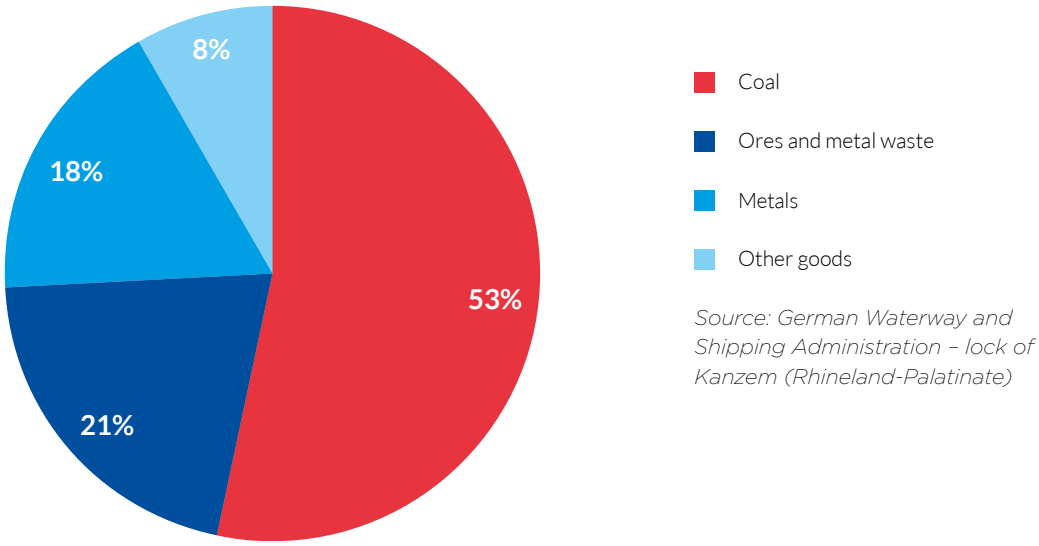
YEARLY VOLUME OF GOODS TRANSPORTED ON THE SAAR RIVER

(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis – Saar, Moselle to Völklingen

SHARE OF PRODUCTS TRANSPORTED ON THE SAAR RIVER (2016)

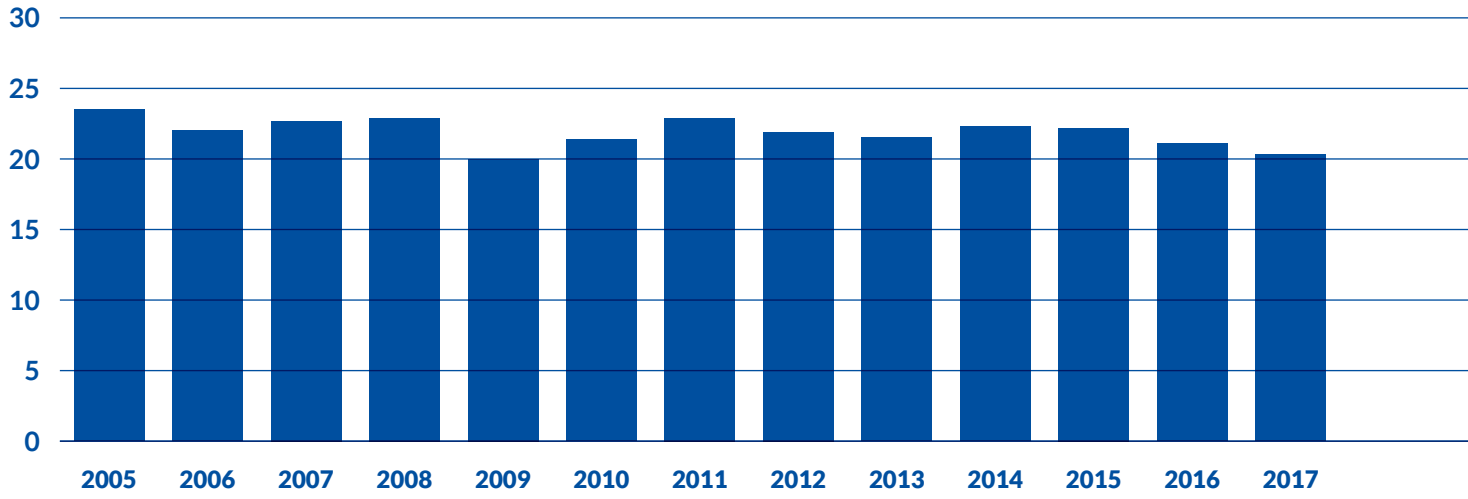


Source: German Waterway and Shipping Administration – lock of Kanzem (Rhineland-Palatinate)

The Saar river is the largest tributary of the Moselle and has been navigable for 104 km since 1988. It rises in the Vosges mountains in Lorraine (France) and flows northwards into the Moselle near Trier (Germany). It is intensively used by the steel industry in Saarland (Germany). Despite its lesser importance in terms of volume transported, the Saar is very useful for the steel industry for importing raw materials and exporting metals.

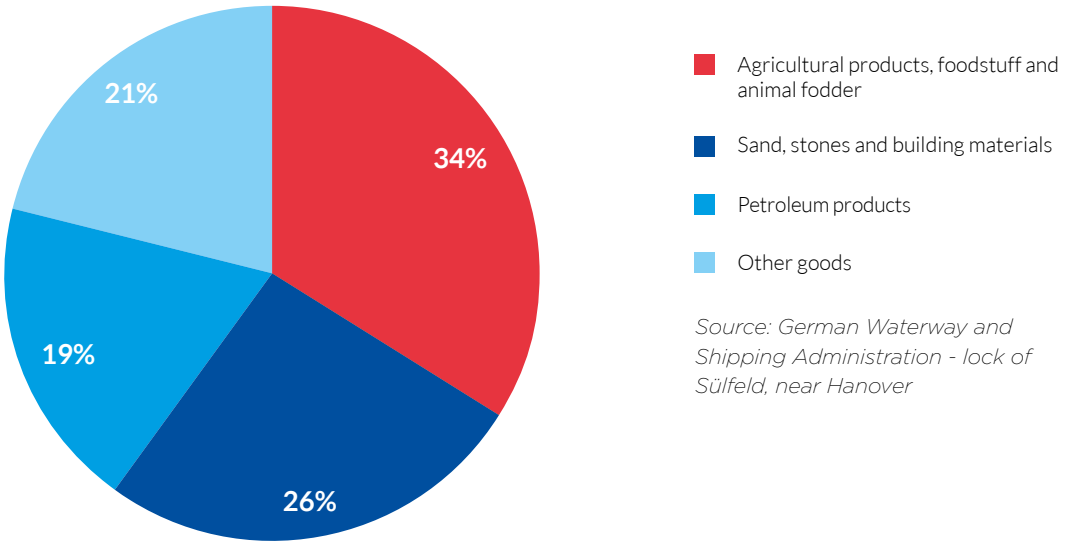
YEARLY VOLUME OF GOODS TRANSPORTED ON THE MITTELLAND CANAL

(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis, CCNR

SHARE OF PRODUCTS TRANSPORTED ON THE MITTELLAND CANAL (2016)



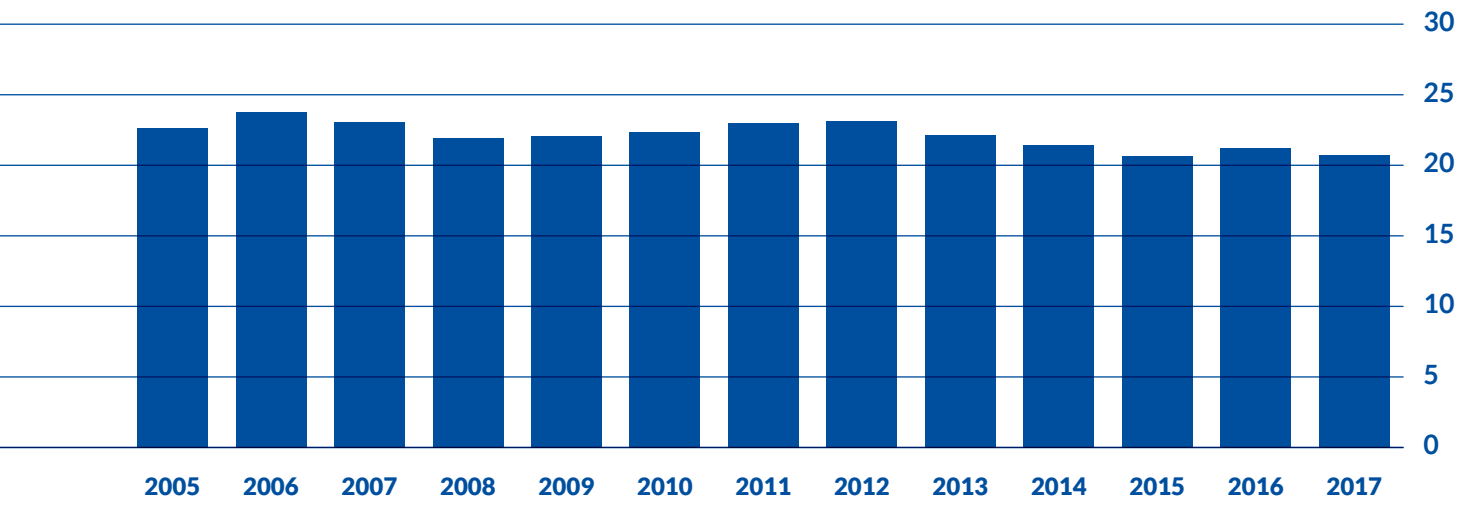
Source: German Waterway and Shipping Administration - lock of Sülfeld, near Hanover

The 325.3 km long Mittelland Canal is the longest artificial waterway in Germany. It connects east and west in northern Germany, from the Rhine region to the Oder region. At the European level, the canal provides a link between the Netherlands, Belgium, Luxembourg, France and Switzerland, on the one hand, and Poland and the Czech Republic on the other.

Its construction started in 1906 and was aimed at providing a low-cost transportation mode for agricultural products from the surplus production region east of Berlin to very populated regions of west Germany. Agricultural products are still the main segment in terms of freight transport on the Mittelland Canal with more than 1/3 of total freight. Besides, the diversification of the utility that linked industrial regions and main northern Europe sea ports accounts for the importance of building materials and petroleum products transport.

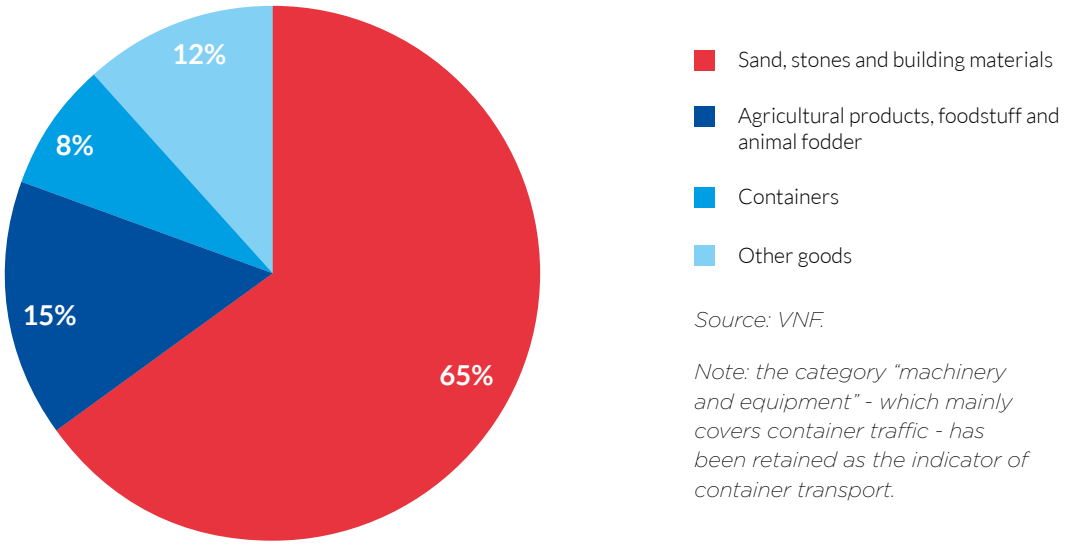
YEARLY VOLUME OF GOODS TRANSPORTED ON THE SEINE BASIN

(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: VNF

SHARE OF PRODUCTS TRANSPORTED ON THE SEINE RIVER BASIN (2017)



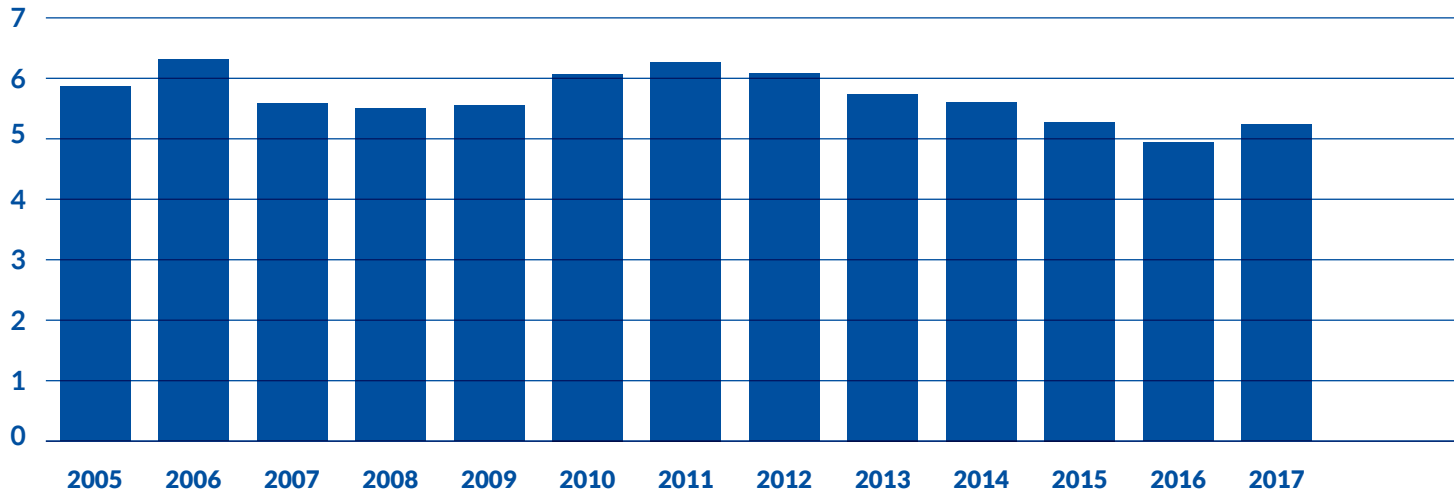
Source: VNF.

Note: the category "machinery and equipment" - which mainly covers container traffic - has been retained as the indicator of container transport.

With more than 20 million tonnes of goods transported every year, the Seine river basin is the main river basin in France in terms of freight transport. Linked to major sea ports such as Le Havre and Rouen and many inland ports, it represents approximately 25% of the French inland waterway network and 40% of the national traffic in terms of volume transported.

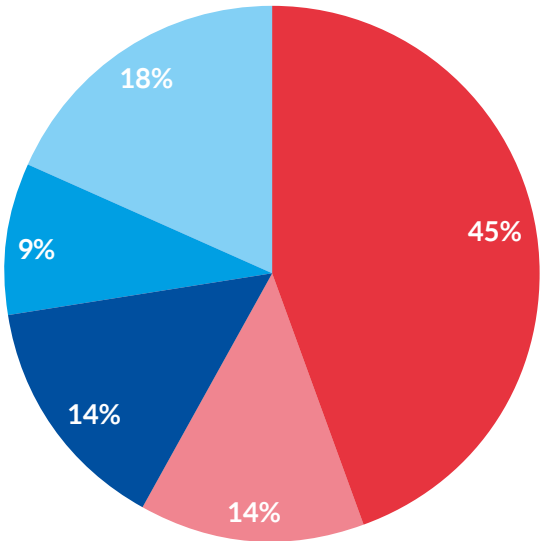
The poor harvests of 2016 had a negative impact on agricultural products transport in the first semester of 2017 but this was partially compensated by the dynamism of the building materials segment. The expansion of the construction industry in the Ile-de-France region - namely due to the "Grand Paris" project - is beneficial for inland shipping on the Seine. Besides, the agricultural sector has regained its usual level of production so that the level of export is expected to increase in 2018.

YEARLY VOLUME OF GOODS TRANSPORTED ON THE RHÔNE-SAÔNE RIVER BASIN
(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: VNF

SHARE OF PRODUCTS TRANSPORTED ON THE RHÔNE-SAÔNE RIVER BASIN (2017)



- Sand, stones and building materials
- Petroleum products
- Containers
- Agricultural products, foodstuff and animal fodder
- Other goods

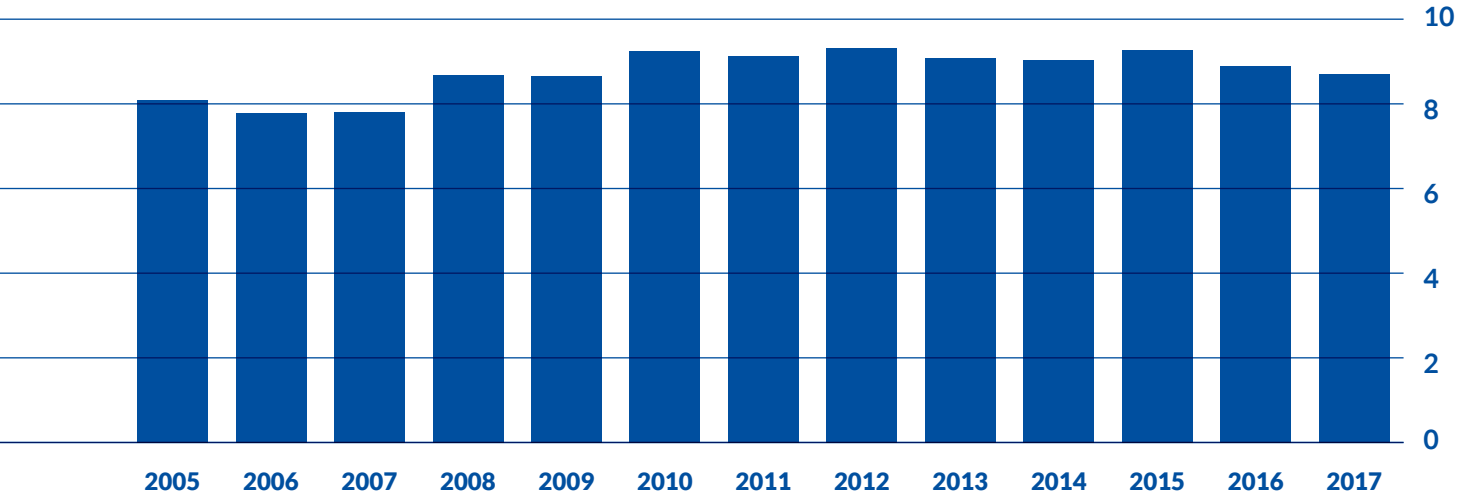
Source: VNF

Note: the category "machinery and equipment" - which mainly covers container traffic - has been retained as the indicator of container transport.

The Rhône-Saône basin connects the region of Burgundy with south-eastern France and the Mediterranean Sea.

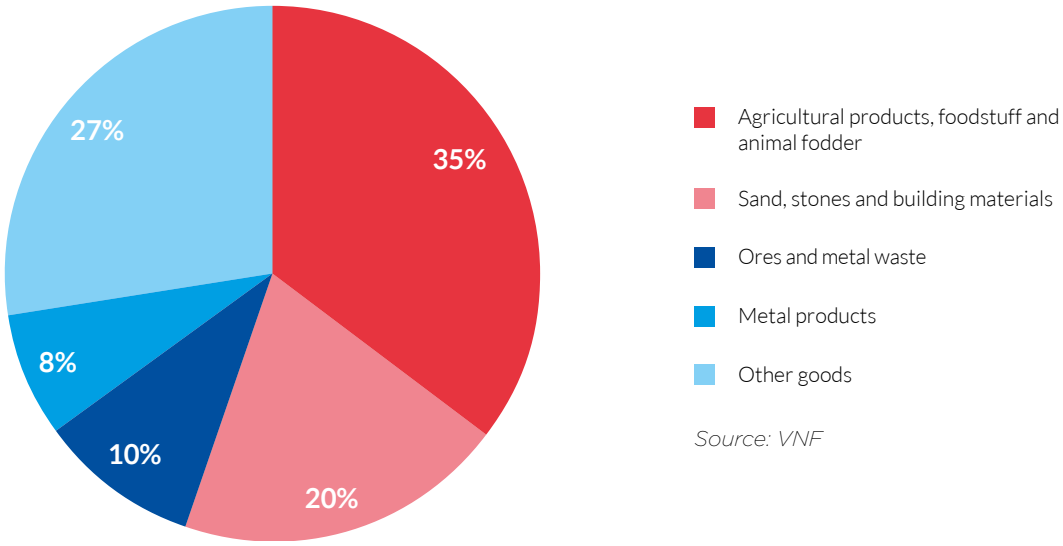
Despite the difficulties of the agricultural products segment and the decrease of petroleum products transport, total freight transport was 6.2% higher in 2017 than in 2016. This increase in volume transported is largely due to the significant growth of the segment of sand, stones and building materials driven by the expansion of the construction sector in Europe. As a result of the deterioration of the quality of services in the maritime terminals (new maritime alliances) that affected regular inland waterway lines, container traffic on the Rhône has been decreasing for two consecutive years.

YEARLY VOLUME OF GOODS TRANSPORTED ON THE NORD-PAS-DE-CALAIS RIVER BASIN
(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: VNF

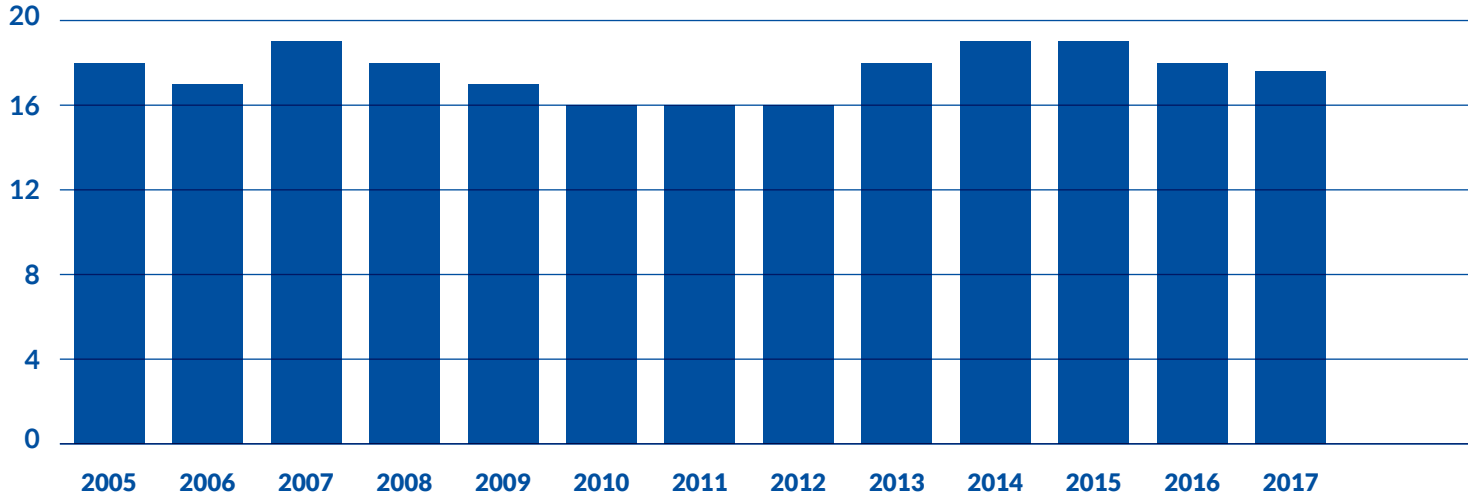
SHARE OF PRODUCTS TRANSPORTED IN THE NORD-PAS-DE-CALAIS RIVER BASIN (2017)



Source: VNF

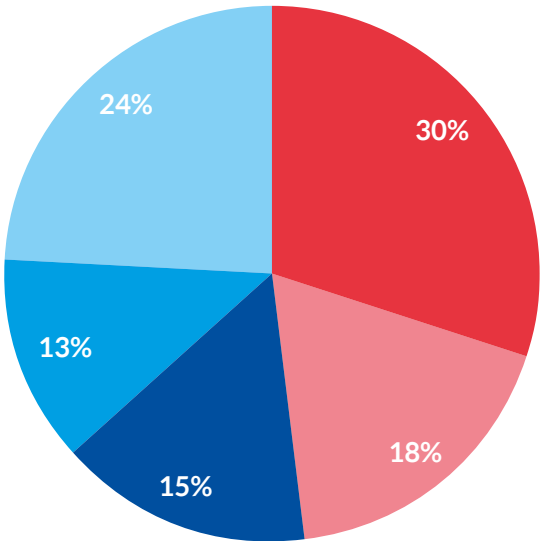
The Nord-Pas-de-Calais river basin is important as it represents 10% of the French inland waterway network. The decrease of 2% in total traffic between 2016 and 2017 is explained by the strong decline (-15.2%) of the agro-food segment. Besides, the downturn of the energy resources sector particularly affected IWT in the north basin with a 12% decrease of coal transport and nearly 3% decrease of petroleum products transport. Nevertheless, the recovery of the agricultural sector and the expansion of container traffic will allow for a higher performance of the activity on the basin in 2018.

YEARLY VOLUME OF GOODS TRANSPORTED ON THE ELBE
(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis

SHARE OF PRODUCTS TRANSPORTED ON THE ELBE (2016)

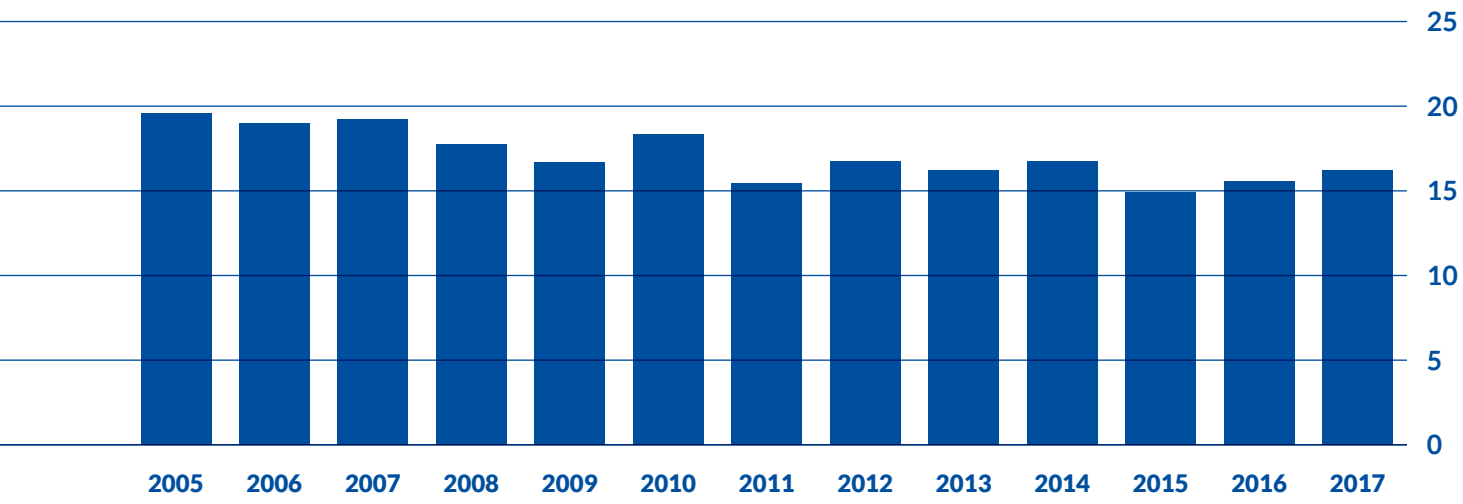


- Petroleum products
- Coal
- Agricultural products
- Containers
- Other goods

Source: German Waterway and Shipping Administration - lock of Geesthacht, near Hamburg.

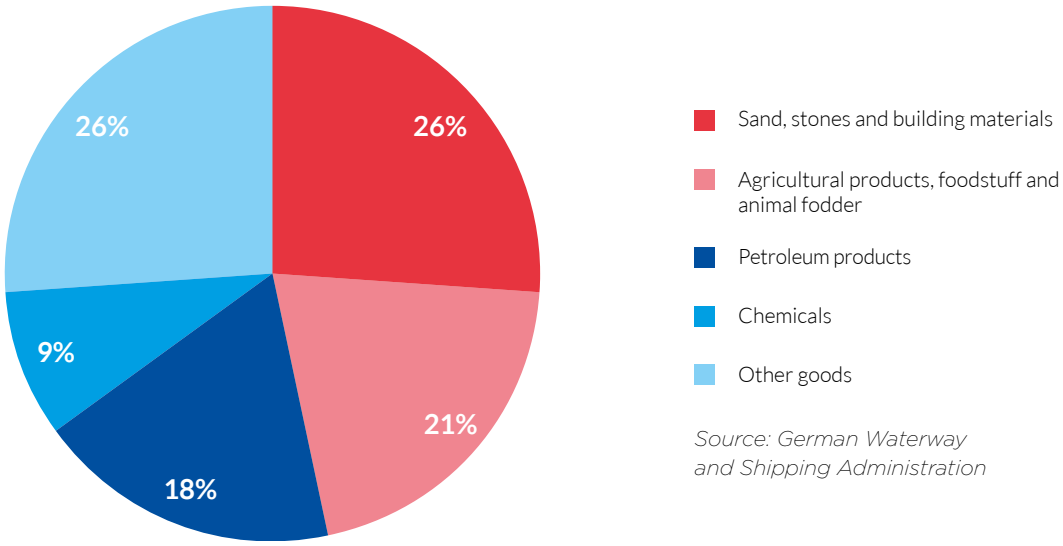
The Elbe river runs from the Czech Republic to eastern and northern Germany, and flows into the North Sea, around 100 km downstream from Hamburg. The Elbe is also linked to Berlin, via the Havel river. By far the largest part of transport volumes are currently observed on the Lower Elbe, which is the stretch of the Elbe in the vicinity of the port of Hamburg. Inland shipping on the Elbe strongly relies on progressively declining industries. Indeed, petroleum products and coal segments -which represent 1/2 of the total freight transported – are decreasing, as well as agricultural products transport.

YEARLY VOLUME OF GOODS TRANSPORTED ON THE MAIN
(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis

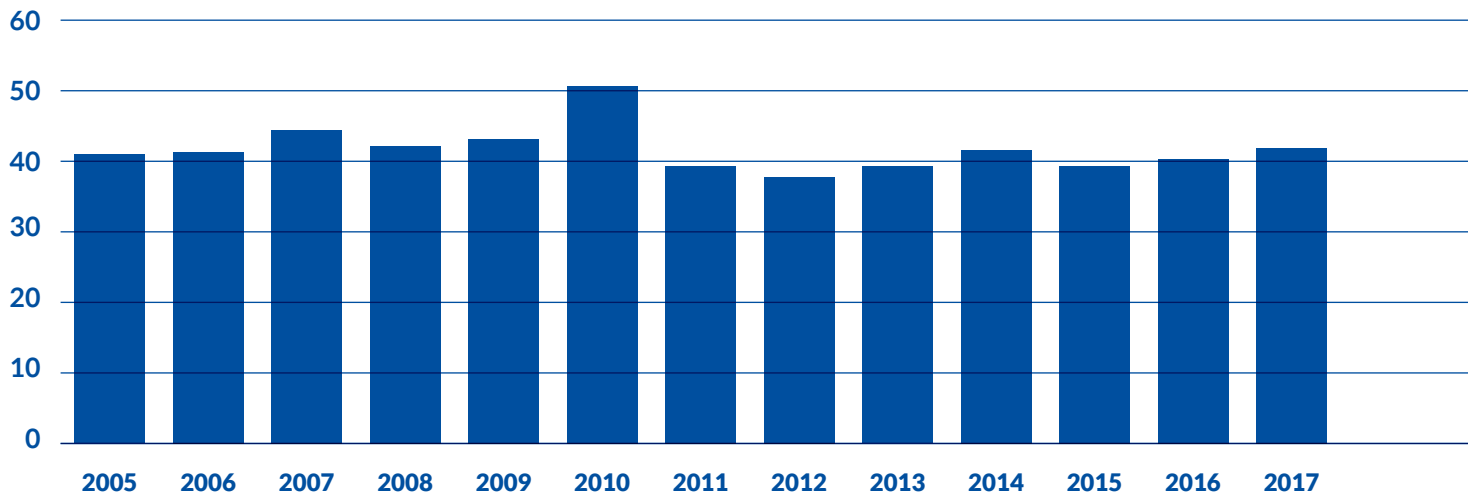
SHARE OF PRODUCTS TRANSPORTED ON THE MAIN (2016)



Source: German Waterway and Shipping Administration

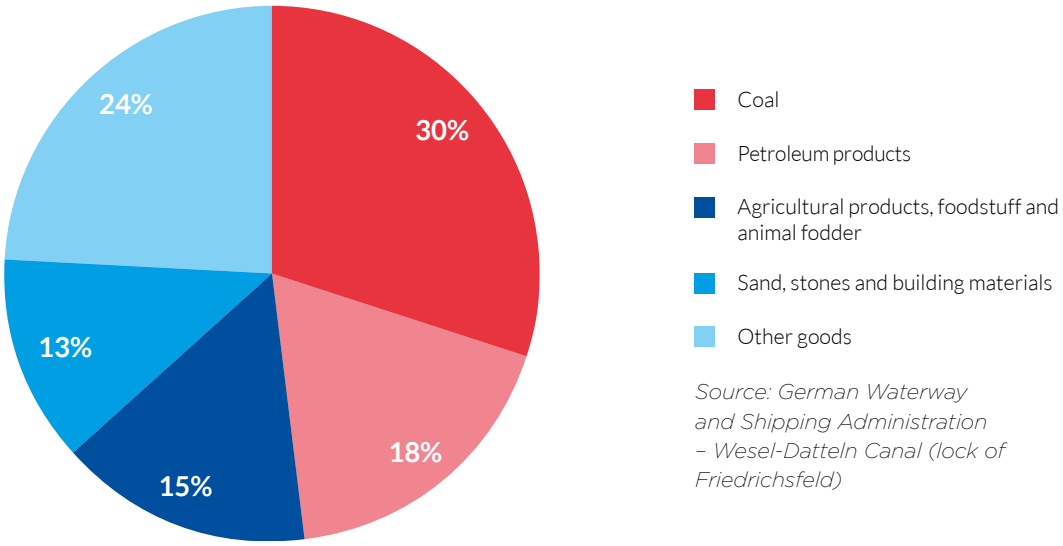
The Main river is the union of two small rivers: the Red Main which rises in the hills of Franconian Switzerland and the White Main which takes its source in the Fichtel mountains in northeastern Bavaria. Since 1992, the river has been connected to the Danube and forms part of the Rhine-Main-Danube canal, which links the North Sea to the Black Sea. As many other rivers, structural changes related to the economic and financial crisis of 2008 deeply affected IWT on the Main. With more than 15 million tonnes of freight traffic, the volumes transported on the Main are still lower than before the crisis (around 20 million tonnes transported in 2007).

YEARLY VOLUME OF GOODS TRANSPORTED ON THE WEST GERMAN CANAL NETWORK
(TOTAL VOLUME IN MILLIONS OF TONNES)



Source: Destatis

SHARE OF PRODUCTS TRANSPORTED ON THE WEST GERMAN CANAL NETWORK (2016)

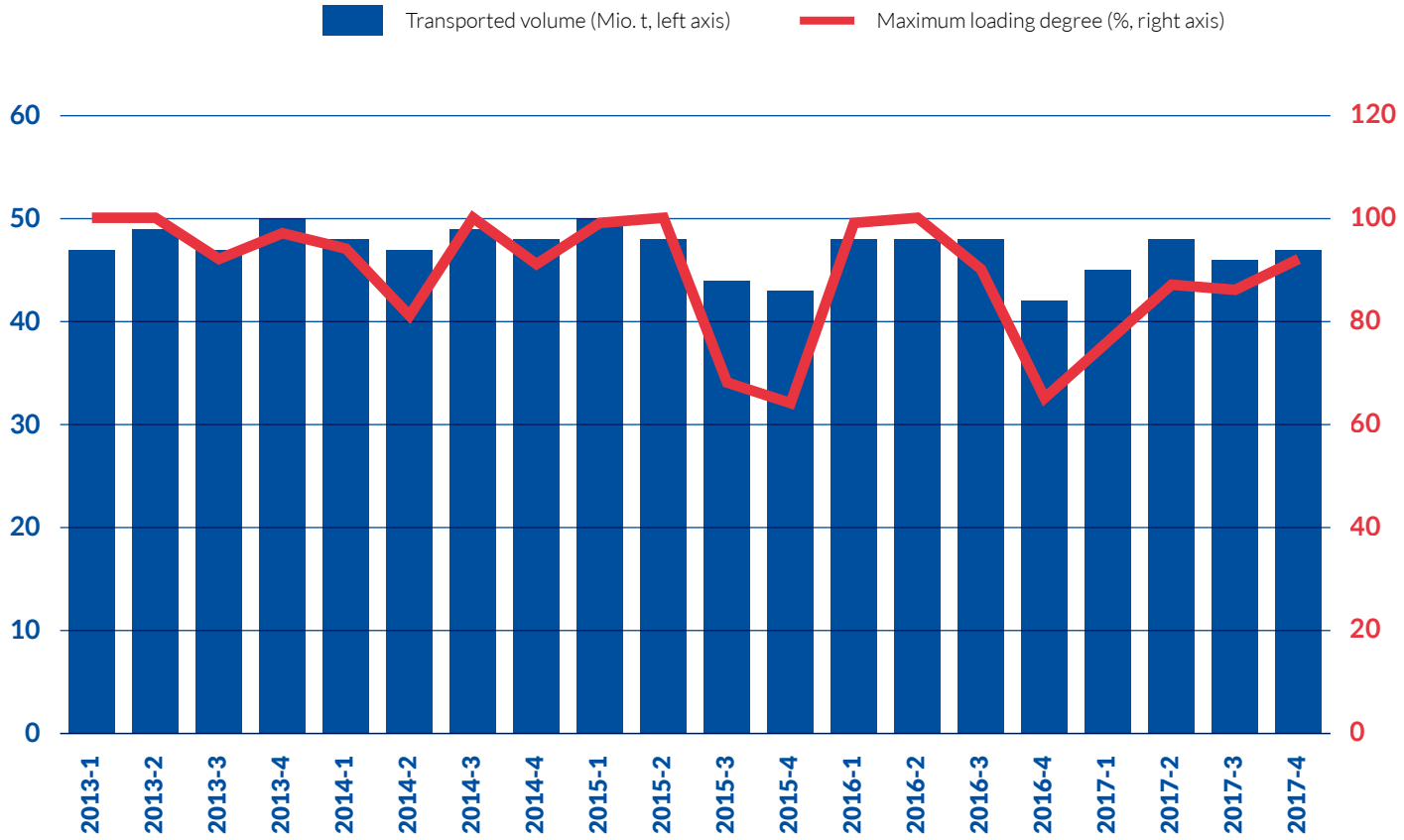


Source: German Waterway and Shipping Administration – Wesel-Datteln Canal (lock of Friedrichsfeld)

The west German canal network is located in the Ruhr area and composed of six interconnected canals. These canals create the link between the German North Sea ports, their hinterland and the Rhine river basin. They also connect the rivers Rhine, Ems, Weser und Elbe which may explain the high volumes of transport (around 40 million tonnes per year) on the basin. Freight transport on the west German basin is largely dominated by the energy sector which represents almost 50% of the total volume transported.

IWW TRANSPORT
PER TYPE OF GOODS IN THE RHINE AREA

QUARTERLY TRANSPORT VOLUME ON THE RHINE AND MAXIMUM LOADING DEGREE FOR VESSELS WITH A DRAUGHT OF 3 METERS AT KAUB / MIDDLE RHINE



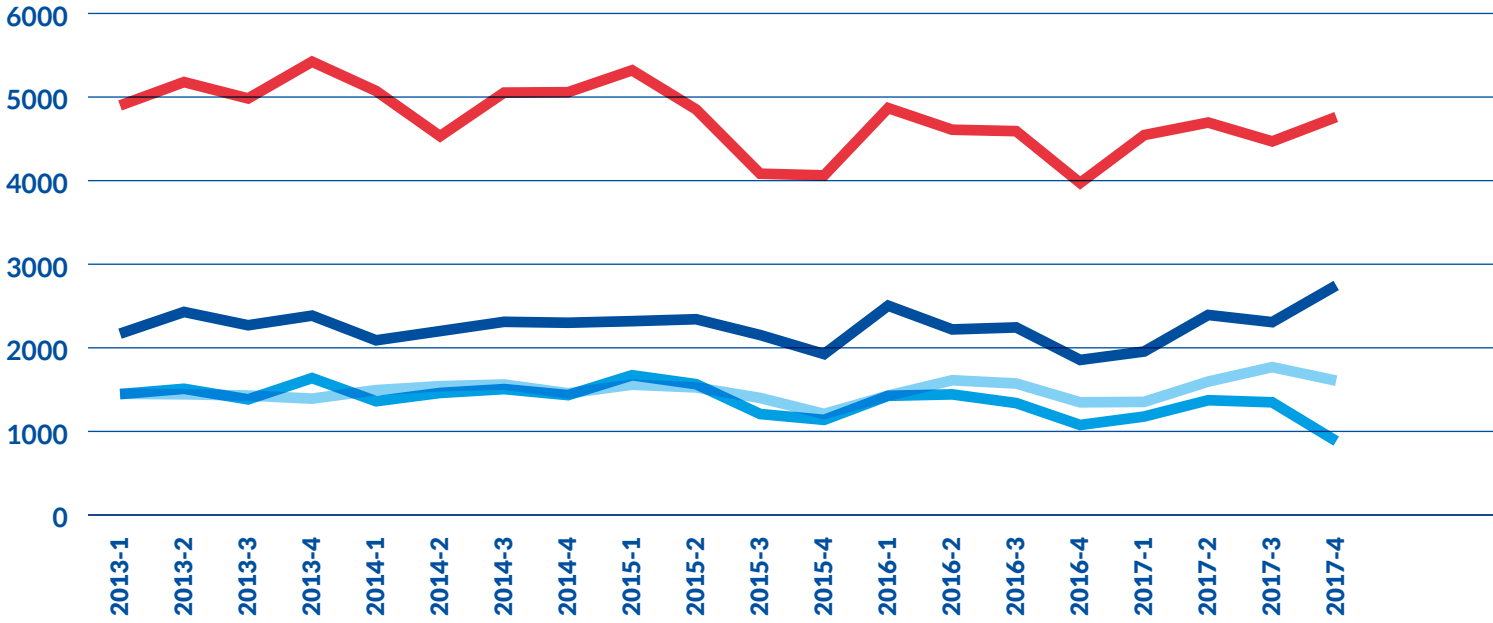
Source: Destatis, calculation CCNR based on German Federal Office of Hydrology

Periods of low water levels fall together with a decrease in transport activity, and hydraulicity is obviously the determining factor.

Over the total year 2017, transport volumes on the traditional Rhine were more or less at the same level as in the previous year (+ 0.3 %), while transport performance was 2.3% higher than in 2016.

In the course of the year 2017, the recovery in water levels helped to create an upward trend for the transport of almost all types of cargo.

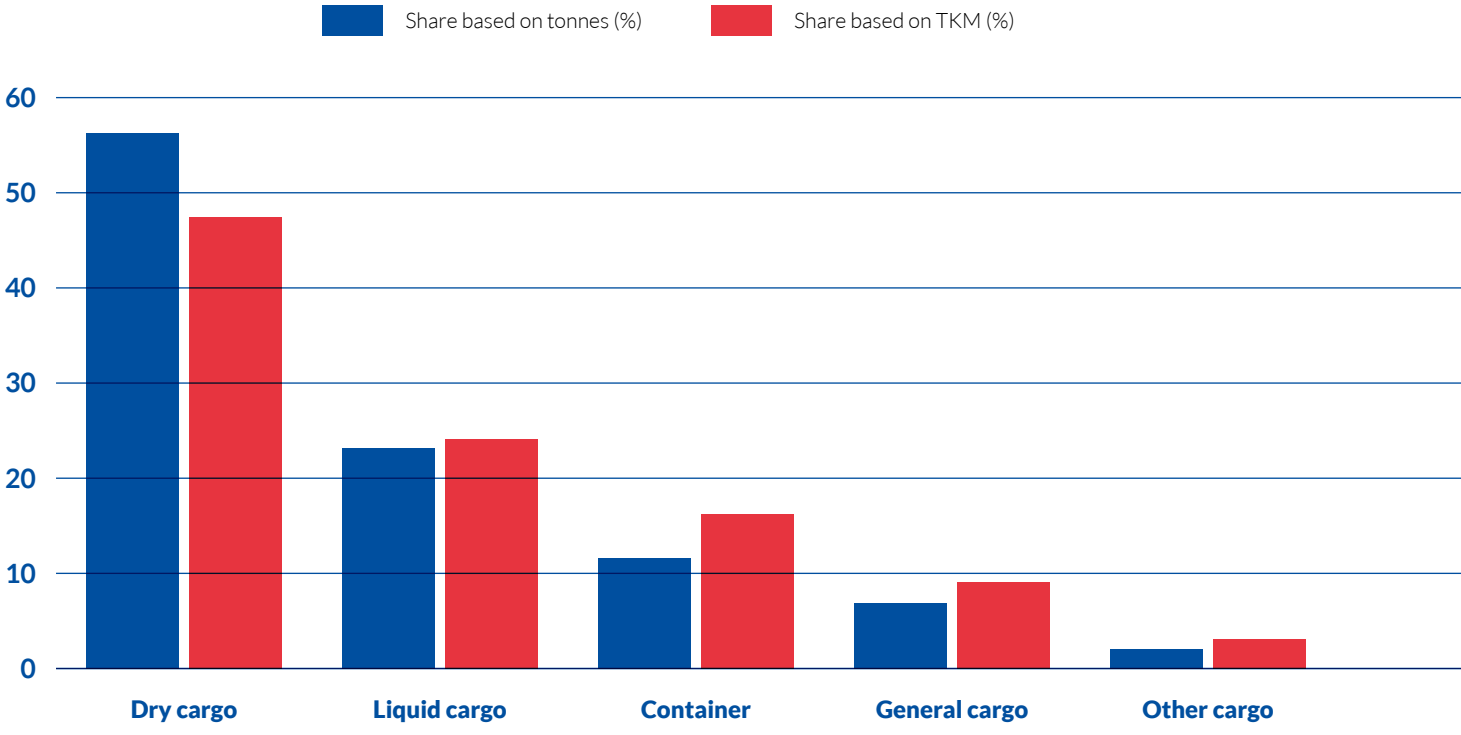
QUARTERLY IWT TRANSPORT PERFORMANCE ON THE TRADITIONAL RHINE PER TYPE OF CARGO (MILLION TKM)



Source: Destatis

Dry cargo still has the largest share in overall Rhine traffic. But the share of container traffic is growing and stands at 16% within total transport performance, compared to 12% within total transport volume.

SHARE OF DIFFERENT CARGO TYPES ON THE TRADITIONAL RHINE (2017, IN %)



Source: CCNR analysis based on Destatis

A further split into goods segments reveals that the two largest segments in Rhine traffic are both energy-based (coal and mineral oil products), and that both of these energy-related segments followed a downward trend in the recent past. These decreasing trends are due to structural changes in the energy sector, such as the reduction of coal being used in power plants, and the reduction of heating oil in households.

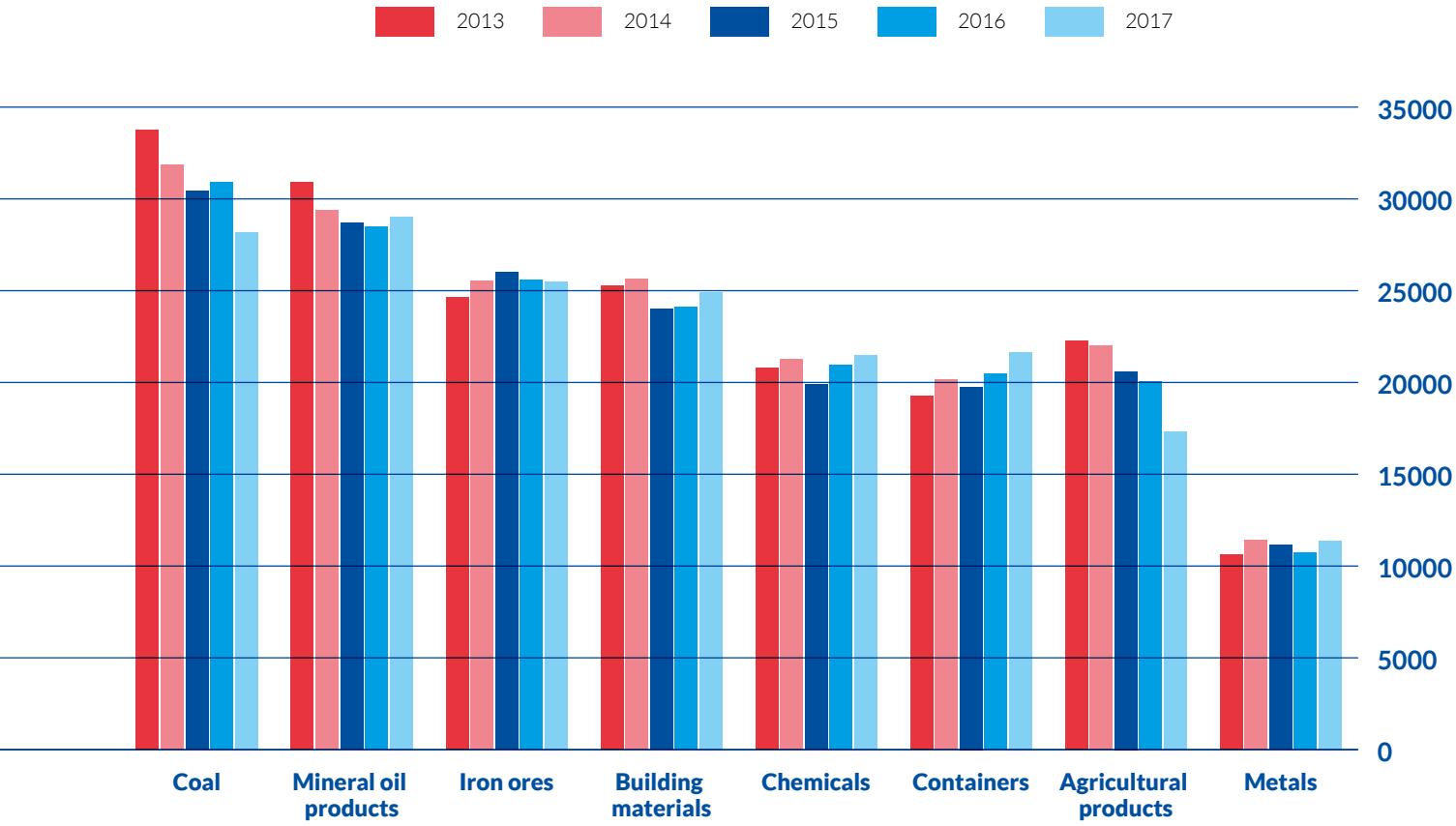
Iron ore traffic is relatively stable with a very limited upward trend. The main driving force, the steel industry in Germany, has until now managed to maintain its important position, being the seventh biggest steel producer worldwide.

The influencing factor for the transport of sands, stones and building materials is the construction activity, and there are certainly positive trends ahead, due to a rising population and more industrial facilities.

Chemical transport also has a positive evolution, not only on the Rhine, but on nearly all European waterways (see following chapters). Regarding container traffic, its presence is still a particular feature of the Rhine and the Rhine countries, where it has the highest growth rates of all goods segments.

Agricultural products traffic was negatively impacted by bad harvest results in 2016. This explains the decrease in 2016 and also in 2017. Apart from this, the long-term trends are rather positive.

YEARLY EVOLUTION OF VOLUME OF GOODS TRANSPORTED ON THE TRADITIONAL RHINE BY TYPE OF GOODS (YEARLY VOLUME IN THOUSAND TONNES)



Source: CCNR analysis based on national statistic offices data

VOLUME OF GOODS TRANSPORTED ON THE TRADITIONAL RHINE
(IN THOUSAND TONNES)

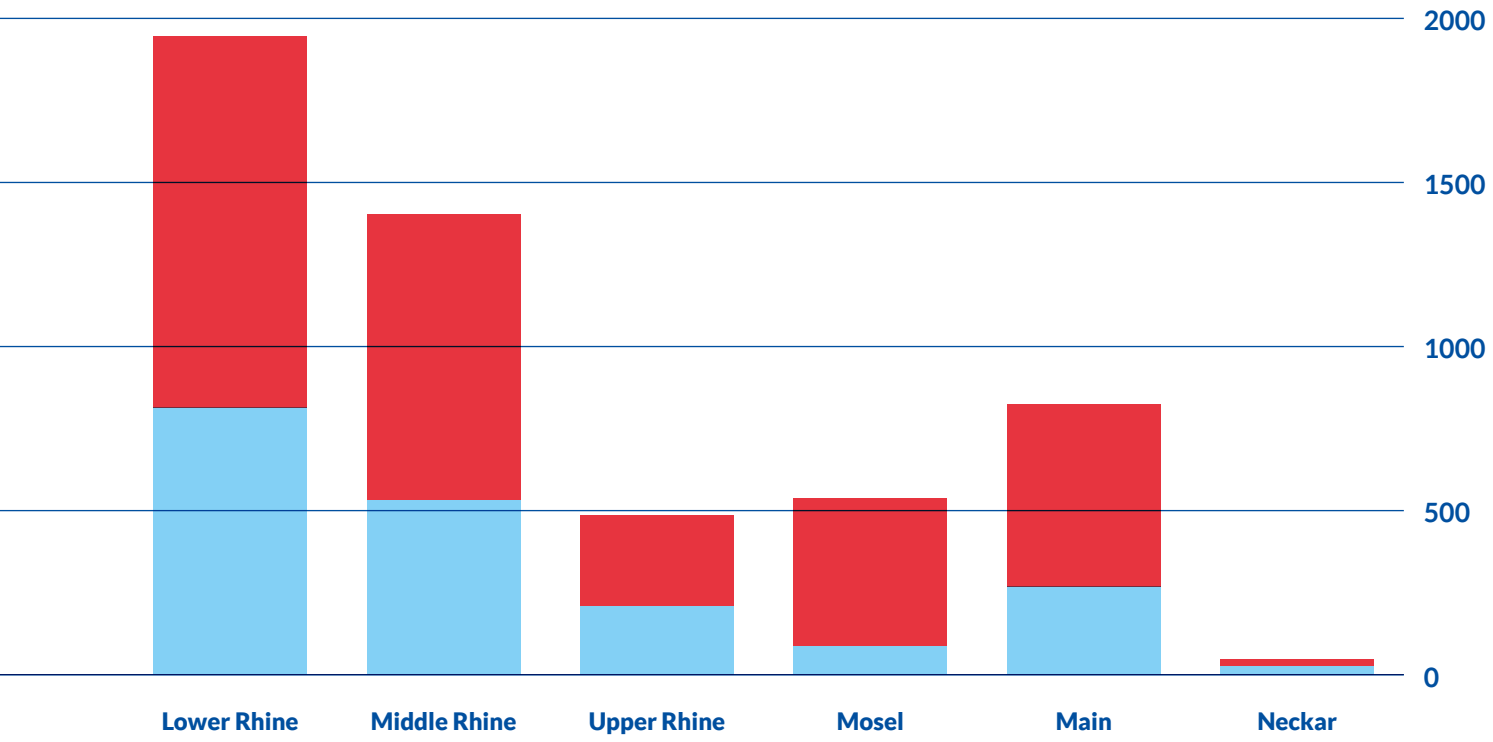
	2016 (1000 t)	2017 (1000 t)	Variation 2017 vs 2016	Variation 2016 vs 2015
Coal	30,925	28,152	-9%	2%
Mineral oil products	28,467	28,999	2%	-1%
Ores	25,516	25,479	0%	-2%
Building materials	24,107	24,889	3%	0%
Chemicals	20,940	21,451	2%	5%
Containers	20,475	21,609	6%	4%
Agricultural products	20,057	17,323	-14%	-3%
Metals	10,726	11,345	6%	-4%
Other	4,681	7,158		
Total	185,894	186,404	+0.3%	1%

Source: CCNR analysis based on Destatis

Further statistical analysis is able to reveal some geographical-economic dimensions of Rhine shipping. The following figure shows the transport performance for agricultural products and foodstuffs on the three different parts of the Rhine, and on its tributaries, per direction of transport. This goods segment has a high share of downstream traffic, as grain and other agricultural products are mostly export-orientated (transport in direction to seaports), and also because the foodstuff industry is often located in the Lower Rhine region and in the Netherlands.

The Mosel and Main are two tributaries flowing in regions with a high level of agricultural production. Analysis shows that 98% of the agricultural products on the German part of the Mosel come from France, with their destinations being the Netherlands (52%), Germany (38%), and Belgium (9%).

TRANSPORT PERFORMANCE FOR AGRICULTURAL PRODUCTS AND FOODSTUFFS ON THE TRADITIONAL RHINE AND ITS TRIBUTARIES PER DIRECTION OF TRANSPORT
(2017, IN MIO. TKM)

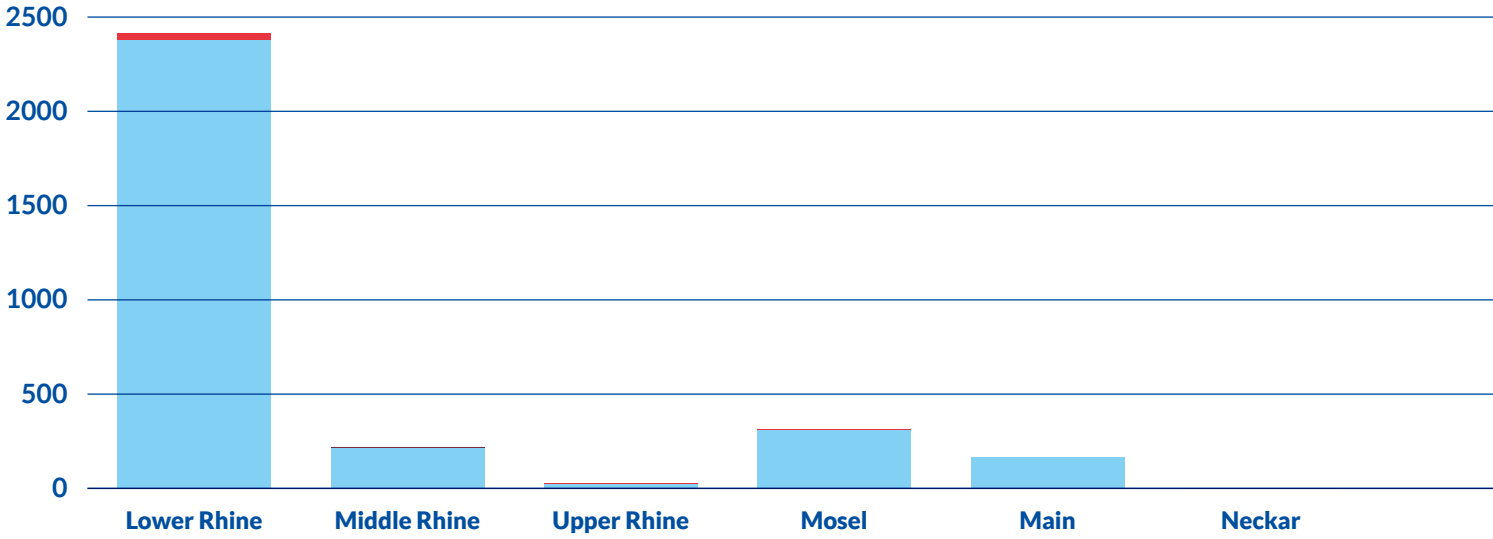


Source: CCNR analysis based on Destatis

A large share of agricultural products transported on the Main come from Germany itself (2/3), but 21.3% come from Hungary, 5.4% from Austria, and 5.0% from Slovakia, Croatia or Serbia. Their destinations are Germany (38.3%), the Netherlands (33.0%), Belgium (24.6%), France and Switzerland (2.3%) and other Danube countries (1.9%). This shows the linkages between the Danube basin and the Rhine basin via the Main-Danube canal and the river Main.

The picture becomes very different regarding iron ore transport. 98.5% of iron ore transport on the Rhine is upstream traffic – from the port of Rotterdam to the steel industry in the Ruhr area, and also to the steel industry in the Saar region via the Rhine, Mosel and Saar. The Lower Rhine has by far the largest share of iron ore transport in the Rhine basin.

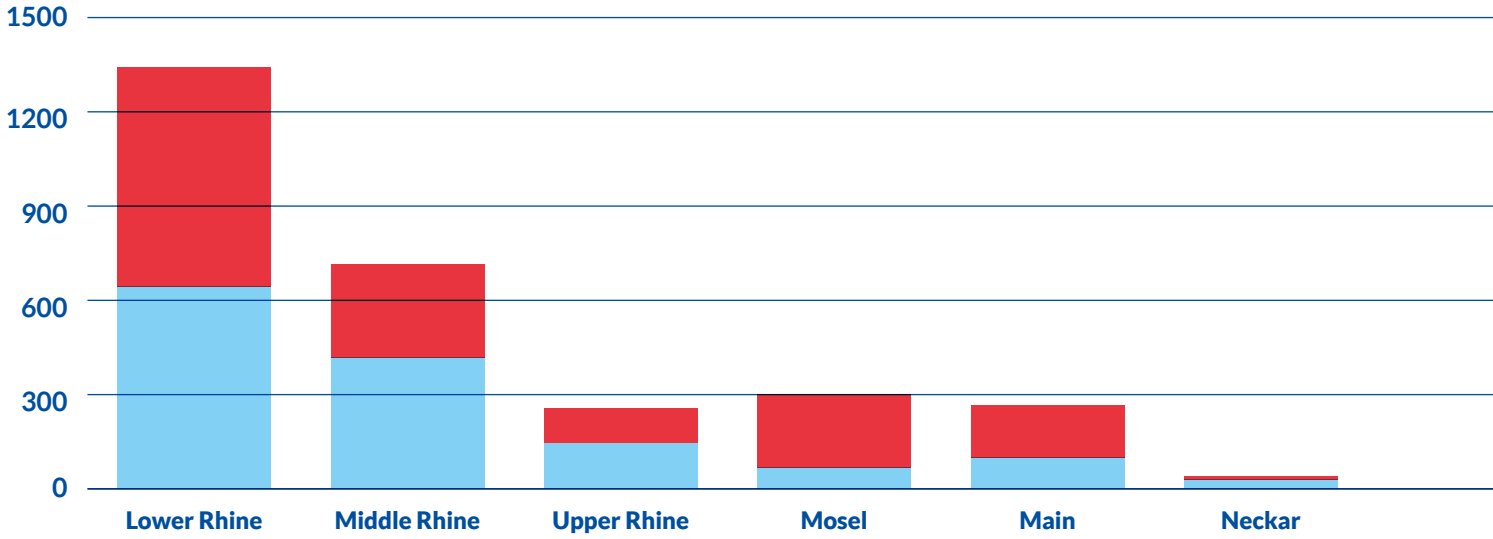
TRANSPORT PERFORMANCE FOR IRON ORES ON THE TRADITIONAL RHINE AND ITS TRIBUTARIES PER DIRECTION OF TRANSPORT (2017, IN MIO. TKM)



Source: CCNR analysis based on Destatis

Metals - the final products of the steel industry in the Ruhr area - are transported in both directions (upstream and downstream). Those from the Saar region are delivered predominantly downstream, via the Saar and Moselle further towards the Rhine.

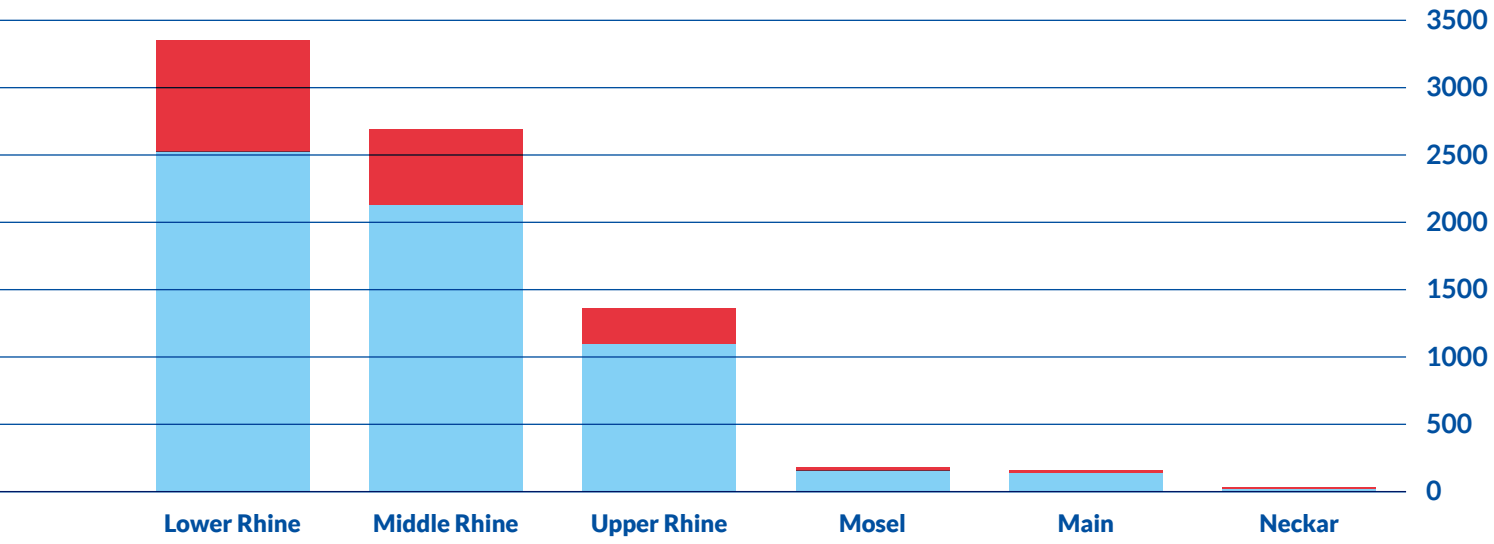
TRANSPORT PERFORMANCE FOR METALS AND METAL PRODUCTS ON THE TRADITIONAL RHINE AND ITS TRIBUTARIES PER DIRECTION OF TRANSPORT (2017, IN MIO. TKM)



Source: CCNR analysis based on Destatis

A goods segment with a predominance of upstream traffic is, besides iron ores, also the mineral oil product segment. This is explained by the provision of heating oil for households in the hinterland, and the origin of the petroleum products in the ARA region. Compared to the other goods segments, the transport of petroleum products is far more concentrated on the Rhine itself, so transport on tributaries is relatively small.

TRANSPORT PERFORMANCE FOR PETROLEUM PRODUCTS ON THE TRADITIONAL RHINE AND ITS TRIBUTARIES PER DIRECTION OF TRANSPORT (2017, IN MIO. TKM)

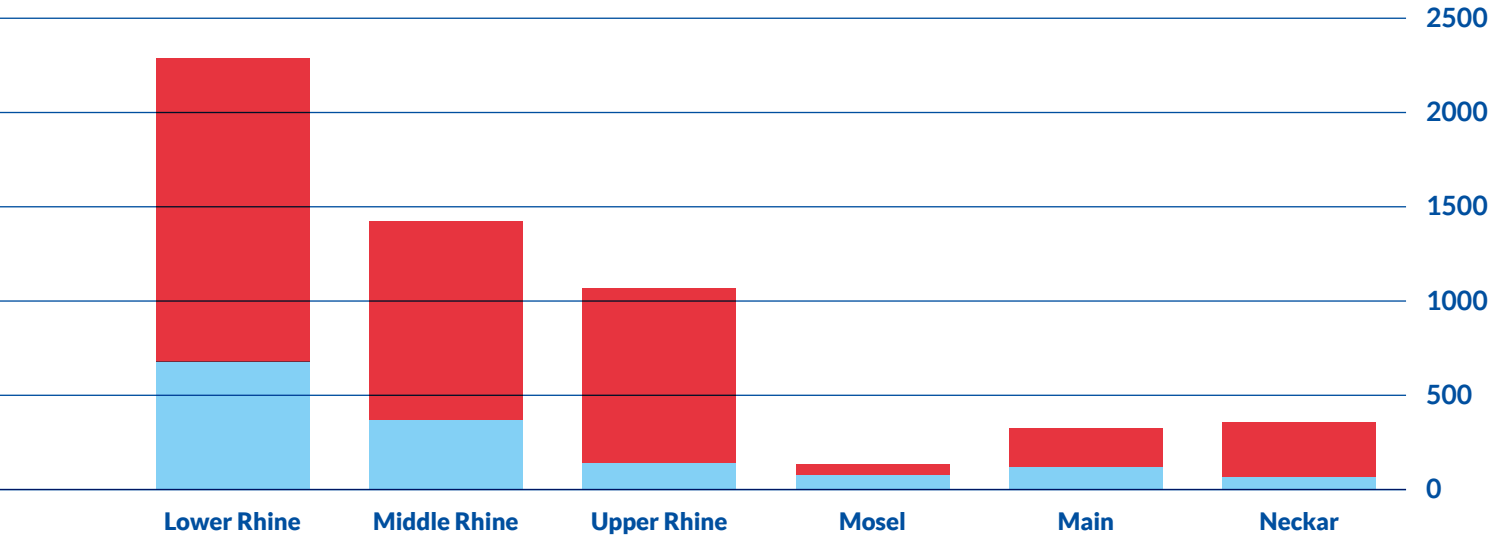


Downstream
Upstream

Source: CCNR analysis based on Destatis

The transport of sands, stones, gravel, and building materials has a very high share of downstream traffic. This is due to natural factors, such as the high abundance of gravel in the upper Rhine area, from where it is exported towards the building industry in north-western Germany and the Netherlands.

TRANSPORT PERFORMANCE FOR SANDS, STONES, GRAVEL AND BUILDING MATERIALS ON THE TRADITIONAL RHINE AND ITS TRIBUTARIES PER DIRECTION OF TRANSPORT (2017, IN MIO. TKM)



Downstream
Upstream

Source: CCNR analysis based on Destatis

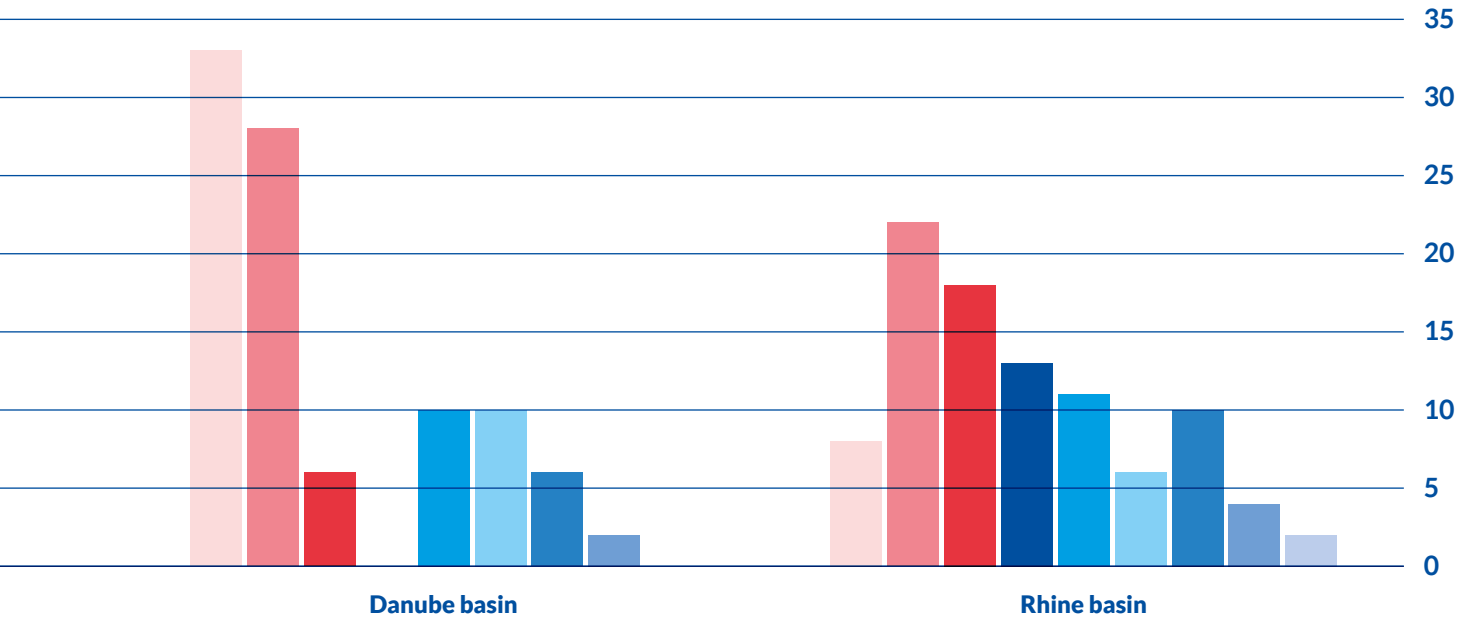

Netherlands
Germany
Rotterdam
LOWER RHINE
Duisburg
Cologne
Belgium
Bonn
Koblenz
MIDDLE RHINE
Kaub
Main
Mayence
Moselle
Mannheim
Neckar
UPPER RHINE
Main-Danube
Canal
France
Strasbourg
Basel
Switzerland

IWW TRANSPORT
PER TYPE OF GOODS IN THE DANUBE AREA

The two main pillars of Danube shipping are the steel industry and the agricultural sector. Agricultural products, especially grain, enjoy a share of one third of total transport performance in Danube countries (without foodstuffs). Agriculture and foodstuff production plays a big role, especially in the middle Danube region (Slovakia, Hungary, Croatia, Serbia), and is strongly tied with inland shipping, although it stands in competition with road transport.

The second pillar, the steel segment, needs iron ores in large volumes, which are imported from overseas and transshipped at the Black Sea ports. Iron ore transport has a share of around 20% of total transport performance in Danube countries.[1] In the Danube region, five steel production sites are located, with a production potential of 10.5 mio. tonnes. An important event in recent times was the reopening of the steel plant of Smederovo in Serbia which was bought by a Chinese company that started again to produce steel. The associated volumes of additional iron ore traffic on the Danube will start to have an influence on transport demand in 2018.

STRUCTURE OF GOODS TRAFFIC IN DANUBE AND IN RHINE COUNTRIES
(IN %, BASED ON TKM) *



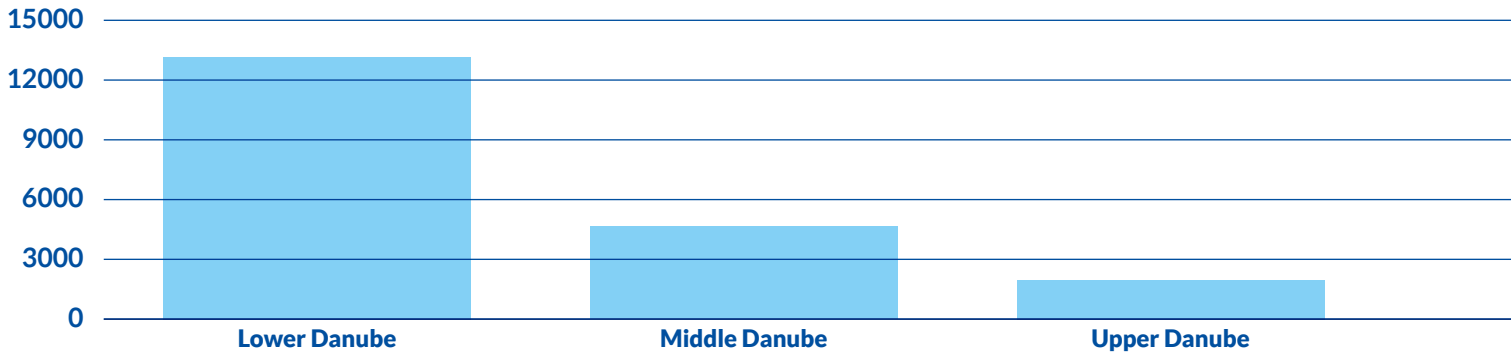
Source: Analysis CCNR based on Eurostat [iww_go_atygo] Danube countries = Austria, Bulgaria, Croatia, Hungary, Romania, Slovakia; Rhine countries = Belgium, France, Germany, Luxembourg, the Netherlands.

[1] *Source: Calculation CCNR based on Eurostat data [iww_go_atygo], and data from the Statistical Office of the Republic of Serbia.*

Comparing the Danube with the Rhine countries, it can be observed that goods transport in the Rhine region is more diversified. This diversity is partly due to container transport, which accounts for 13% in Rhine countries, while it is almost inexistent in the Danube region. The large share of agricultural products in Danube shipping makes it quite vulnerable to bad harvest results. It should also be noted that navigation on both, the Danube and the Rhine, is vulnerable to low water periods, affecting strongly the overall transport performance in both river basins.

As in the Rhine region, Danube traffic is more intense near the sea, and in this case near the Black Sea. This is certainly due to better navigation conditions in the lower Danube region compared to the middle and upper Danube.

TRANSPORT PERFORMANCE IN THE DANUBE AREA (MIO. TKM) *



*Source: Eurostat [iww_go_atygo] and Statistical Office of the Republic of Serbia. * Lower Danube = Romania; Middle Danube: Slovakia, Hungary, Croatia, Serbia; Upper Danube: Austria. Values for 2016*

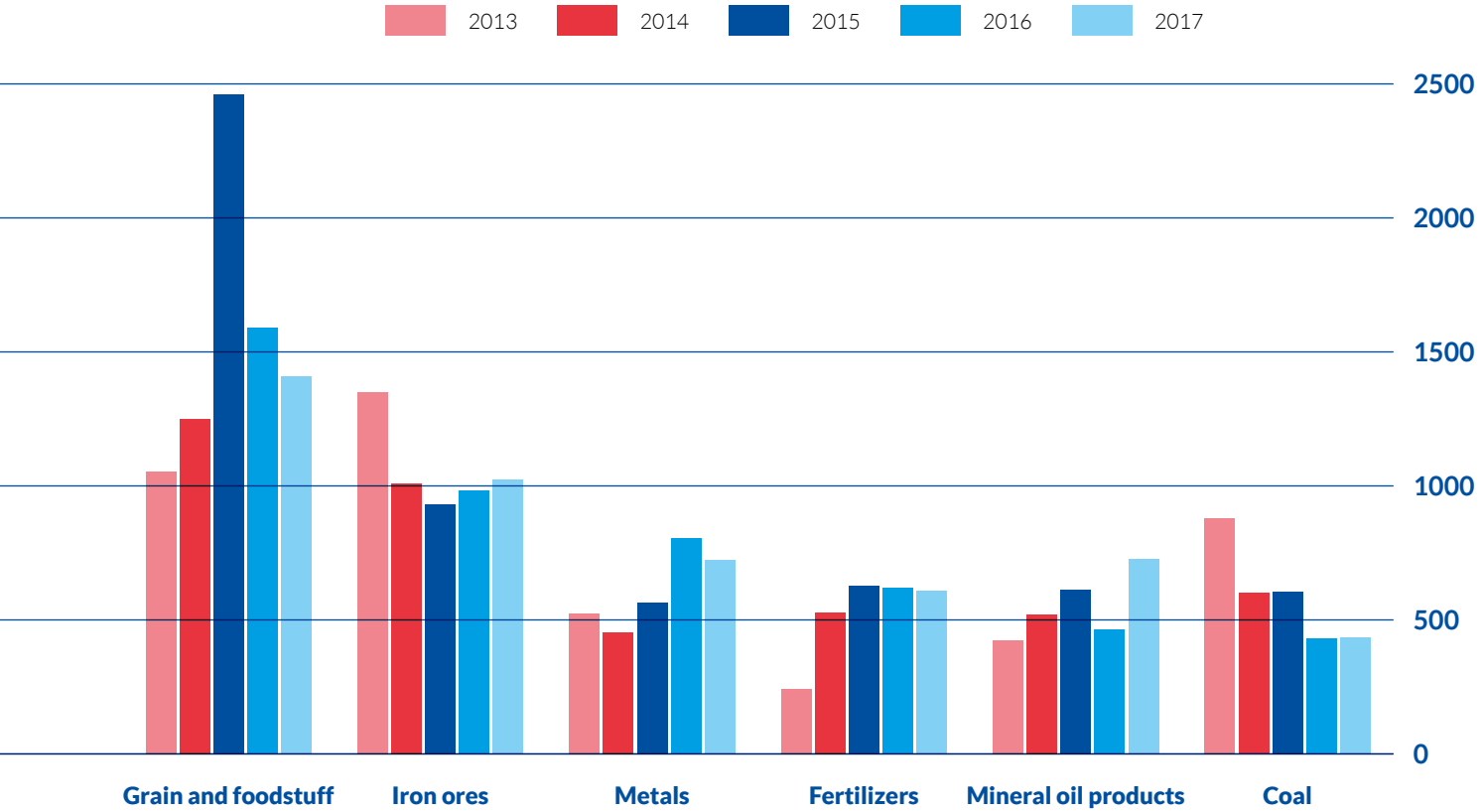
In 2017, transport activity on the Danube did not have an easy start. In January and February, harsh winter conditions created ice and low water levels on large parts of the river. Navigation was even suspended for a certain time, and ports were closed. The consequences were of course strong losses of cargo traffic. According to the Danube Commission, in January and February, transport activity on the upper Danube represented only 41% of the level noted during the same time period in 2016. The decrease was particularly notable for heavy mass cargo such as iron ore. Transport activity on the middle Danube dropped to only 37% of the level in January and February 2016.

Despite these problematic conditions at the beginning of the year, Danube traffic caught up and reached, by the end of 2017, a higher level than in 2016.

Thus, a positive driver was certainly the recovery on the steel market. Mixed signals came from the grain market. The agricultural market started very well in the year 2017. Large inventories of grain were available in the first half of 2017, thanks to an above average grain harvest level in 2016 in the Danube region. But unfavourable weather conditions in January, April and May contributed to a rather bad harvest result in 2017.[2] Grain and foodstuff transport were therefore below the level of 2016. Forecasts for 2018 point to a higher harvest result than in 2017.

The following figure shows the transport volume at the middle Danube during the period 2013-2017. The volumes are registered at the town of Mohacs in southern Hungary, near to the border triangle of Hungary, Croatia and Serbia.

YEARLY EVOLUTION OF VOLUME OF GOODS TRANSPORTED BY IWT BY TYPE OF GOODS IN THE DANUBE AREA
(YEARLY VOLUME IN 1000 TONNES ON MIDDLE DANUBE – HUNGARY/CROATIA/SERBIA BORDER AREA*)

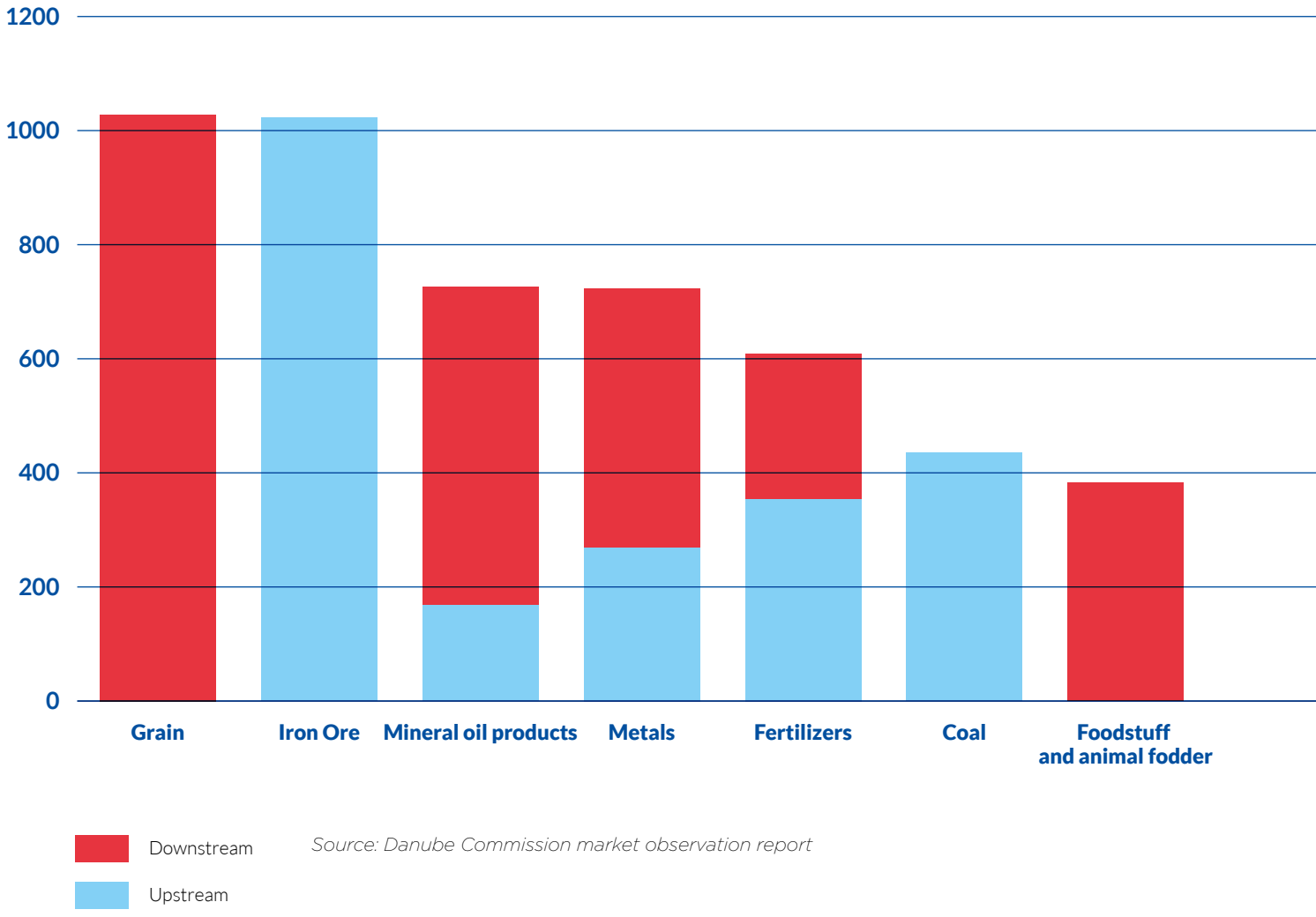


*Source: Danube Commission market observation report. *Mohacs*

[2] *Source: Danube Commission market observation report and Eurostat [apro_cpsh1]. See also chapter "Outlook" in this report.*

Grain and iron ores were the largest product segments in 2017, with almost equally high volumes, but with total opposite patterns when it comes to the direction of transport. Grain is indeed transported from the fertile lands in Hungary and Serbia downstream to the seaports at the Black Sea, to be exported to countries such as Italy and Spain, and to northern Africa. The same applies to foodstuffs. Iron ores and coal are delivered upstream to the steel industry in Hungary and Austria, coming from overseas and being transshipped to the seaports of the Black Sea (especially Constanța).

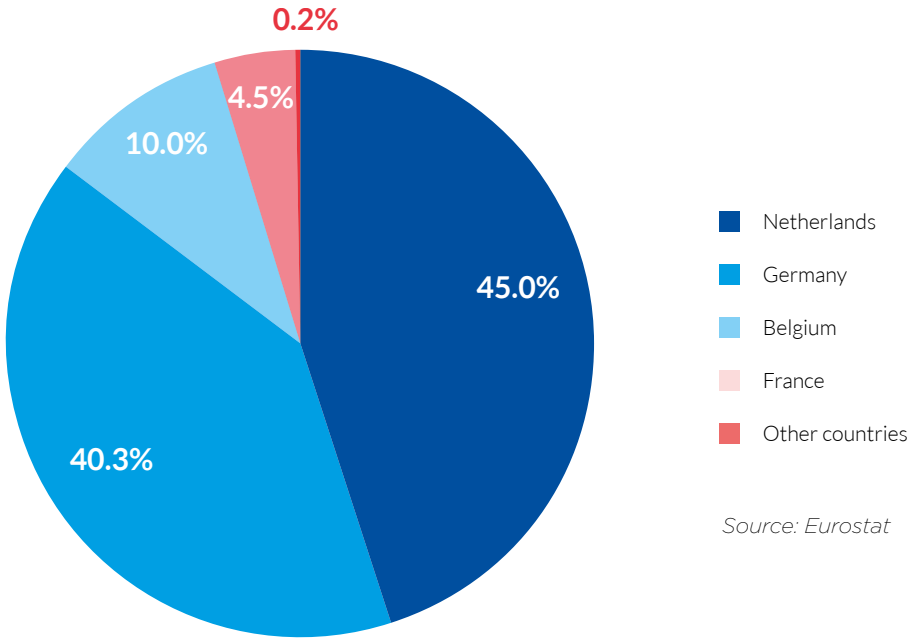
GOODS TRANSPORT ON THE DANUBE IN THE BORDER AREA BETWEEN HUNGARY, CROATIA AND SERBIA IN 2017 (IN 1000 TONNES)



Source: Danube Commission market observation report

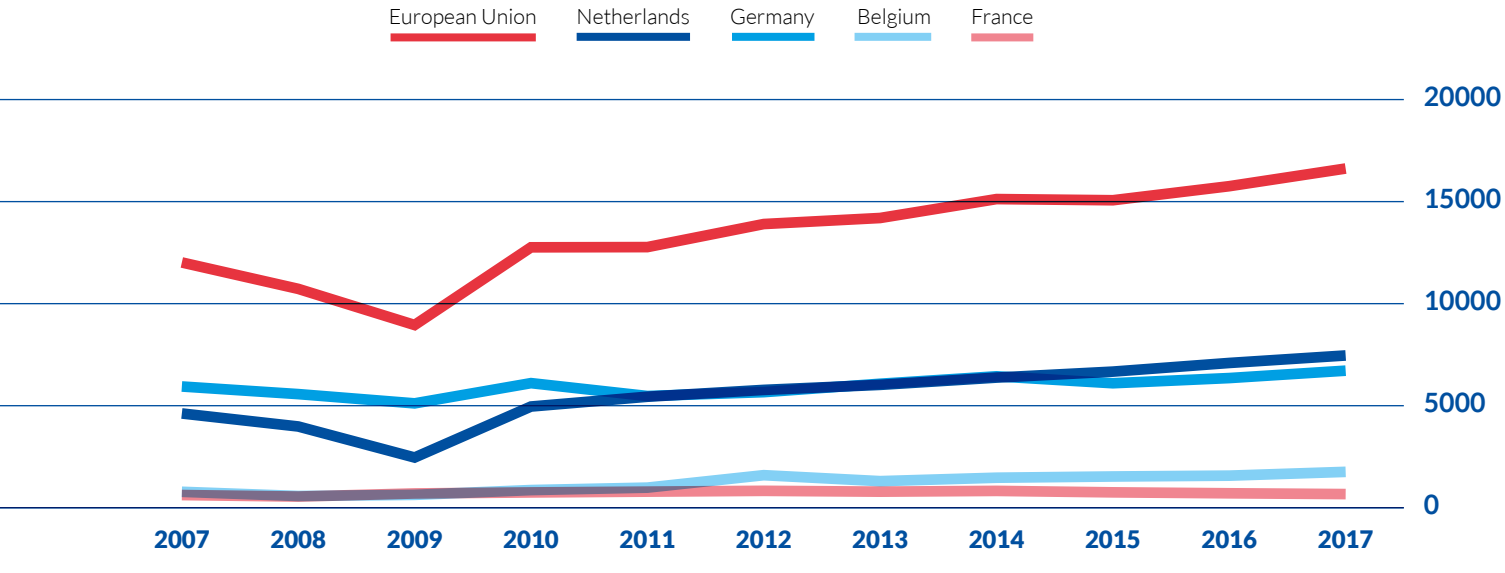
INLAND NAVIGATION
CONTAINER TRANSPORT IN EUROPE

DISTRIBUTION OF CONTAINER TRANSPORT PERFORMANCE ON INLAND WATERWAYS IN 2017 IN THE EUROPEAN UNION



Source: Eurostat

CONTAINER TRANSPORT PERFORMANCE ON INLAND WATERWAYS IN EUROPE
(TRANSPORT PERFORMANCE IN MILLION TKM)



Source: Eurostat [iww_go_actygo]

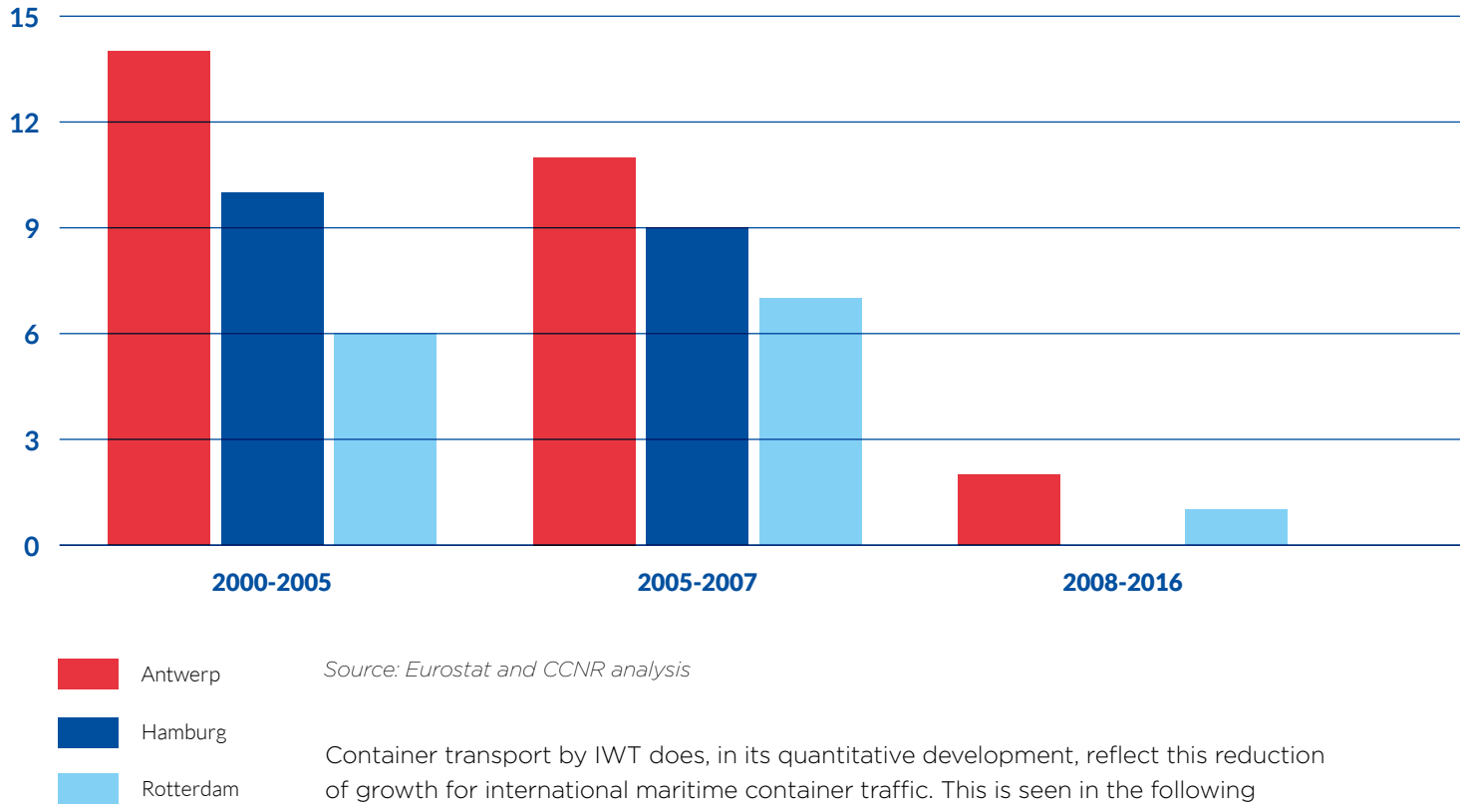
Container transport on inland waterways in Europe amounted to 16.6 million tonne-kilometres in 2017. More than 99% of this container transport takes place in only four European countries – Belgium, France, Germany, and the Netherlands.

The volume of goods transported in containers in 2017 was: Belgium (37 mio. t), Germany (23.6 mio. t), the Netherlands (52 mio. t), and France (4.2 mio. t), and the growth rates compared to 2016 were: Belgium (+6%), Germany (+4%), the Netherlands (+6%), France (+0%).

Between 2007 and 2017, container transport volumes (tonnes) grew by 38% in Belgium, by 18% in Germany, by 47% in the Netherlands, and by 19% in France.

Container transport is strongly linked with maritime container traffic in seaports. This is especially true of the ARA seaports (Amsterdam, Antwerp, Rotterdam) that are gateways for container shipping on the North-South axis and on the Rhine. This part of container traffic is considered as international traffic, reflecting international transport chains between overseas countries and Europe. However, with the financial crisis in 2008/2009, the growth curve for maritime trade and maritime container traffic was influenced quite strongly. Growth rates are not the same as they had been previously (see figure below).

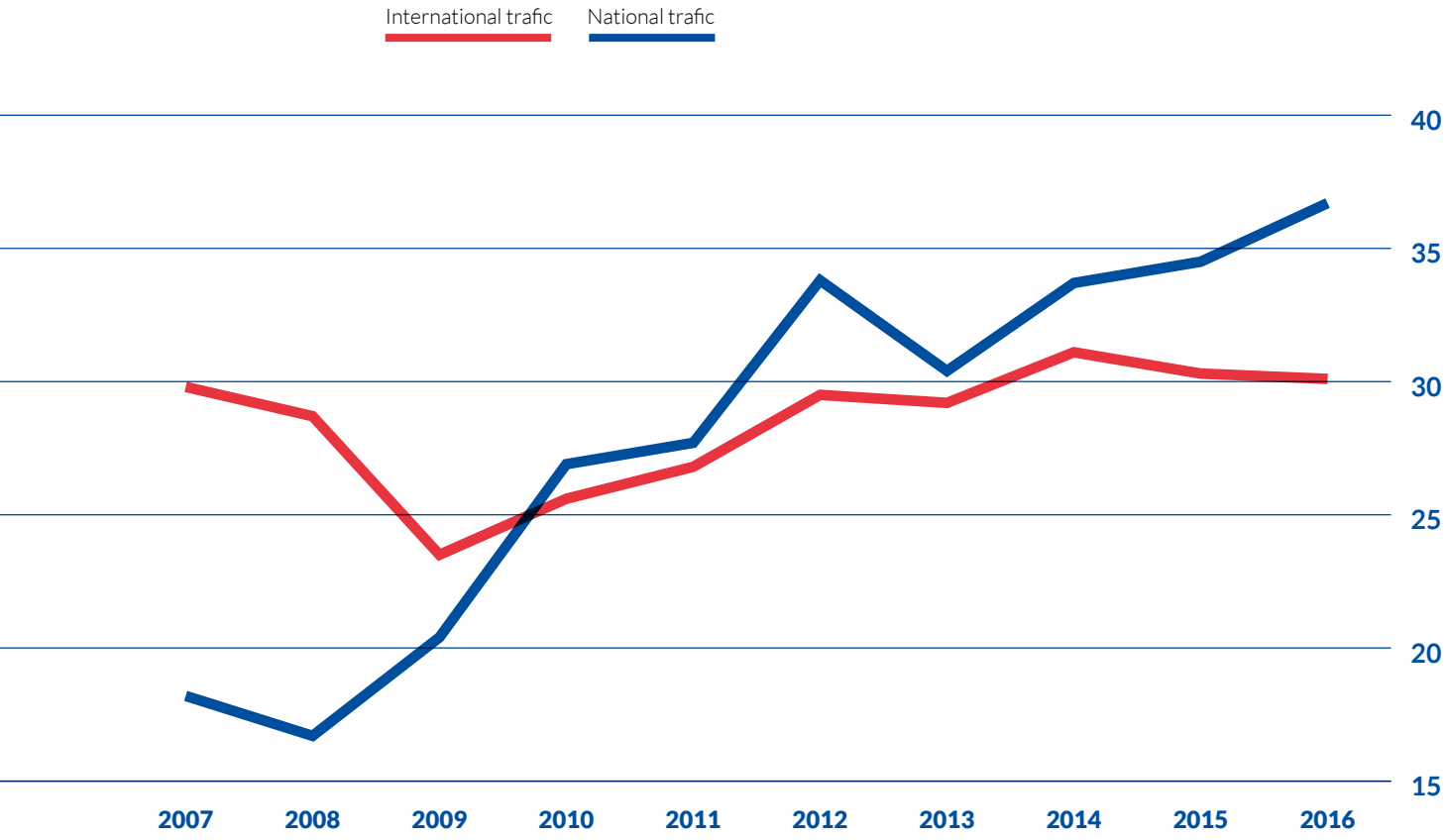
AVERAGE QUARTERLY GROWTH RATES OF MARITIME CONTAINER TRAFFIC IN MAIN EUROPEAN SEAPORTS (%, BASED ON TEUs)



Source: Eurostat and CCNR analysis

Container transport by IWT does, in its quantitative development, reflect this reduction of growth for international maritime container traffic. This is seen in the following figures, where a distinction is made between national and international container traffic on inland waterways. As can be seen, since 2007, national traffic has increased more strongly than international traffic. The difference is also clear since 2013. This relative weakness in international transport can also be explained by congestion problems in seaports. This congestion has a negative impact on IWT container transport, as barges are often handled on the same quaysides as seagoing vessels, and seagoing vessels have priority in goods handling.

DIVISION OF CONTAINER TRANSPORT ON INLAND WATERWAYS IN EUROPE BY TYPE OF TRANSPORT (MILLION TONNES)



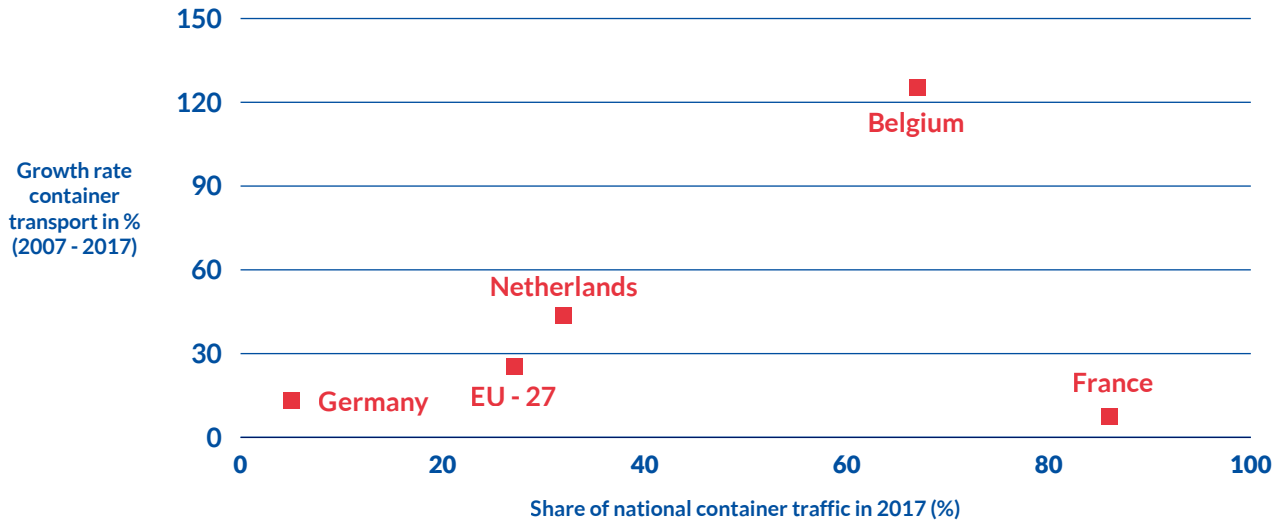
Source: Eurostat [iww_go_actygo]

National container traffic is less vulnerable to macroeconomic recessions and to seaport congestion problems than international container traffic, as it reflects more the logistical chains within certain countries in the further hinterland and is not so dependent on international trade.

The main four countries for container transport in Europe have very different shares of national and international container transport:

- Germany has the highest share of international container transport. This is due to the river Rhine, where container transport is strongly connected with the maritime container traffic in ARA seaports. Besides, the Rhine has a share of 94% of total container transport performance in Germany.
- France has the highest share of national container transport of all four countries. One reason for the low share of international transport is the sub-optimal connection to seaports - in particular the missing link between northern France and the Belgian seaports (Seine-Nord) plays a role.
- Belgium and the Netherlands have an intermediary position between France and Germany. At the same time, they show higher overall growth rates for container transport than the two larger countries.

SHARE OF NATIONAL CONTAINER TRANSPORT AND GROWTH RATE OF TOTAL IWT CONTAINER TRANSPORT (IN %)



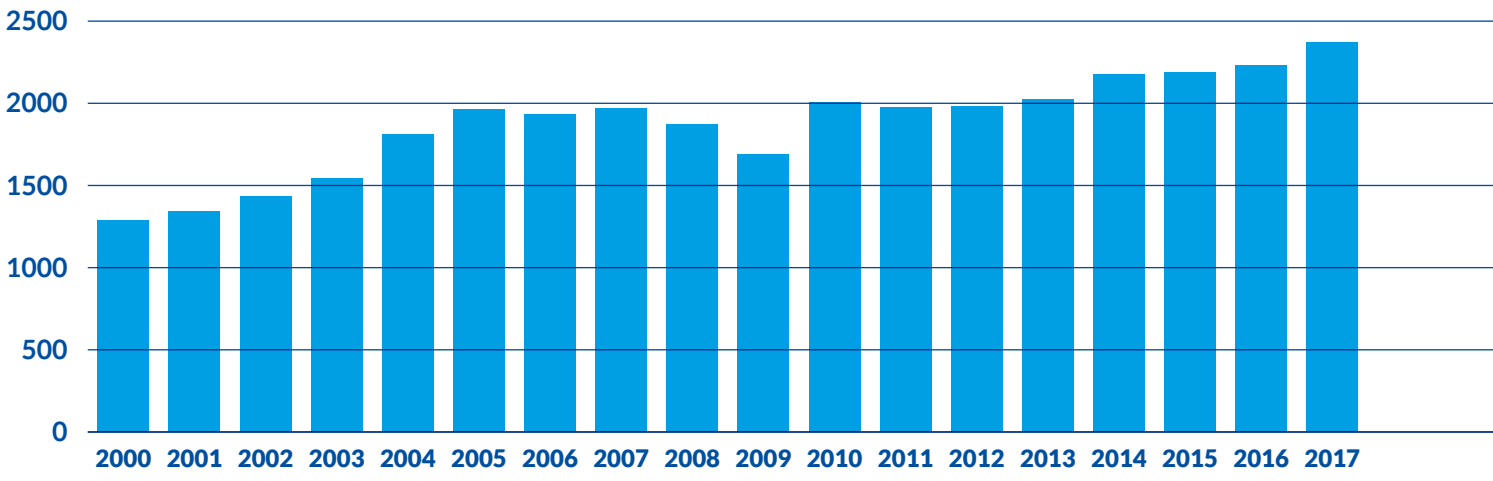
Source: Eurostat [iww_go_actygo], CCNR analysis

Container transport per river basin

After a relatively weak growth in previous years, container traffic on the Rhine increased strongly (by 6%) in 2017. This can be partly explained by better water conditions compared to the years 2016 and 2015; another reason was certainly the special effect due to the Rastatt event. The collapse of a tunnel near the German town of Rastatt in summer 2017 made rail traffic along the Rhine axis impossible for several weeks. The resulting modal shift from rail to the Rhine was also felt by a strong increase in containers being shipped to Switzerland.

Between the years 2000 and 2017, container traffic - measured in TEU - grew by 84% on the Rhine. When comparing 1999 with 2017, it can be seen that container traffic more than doubled during that time.

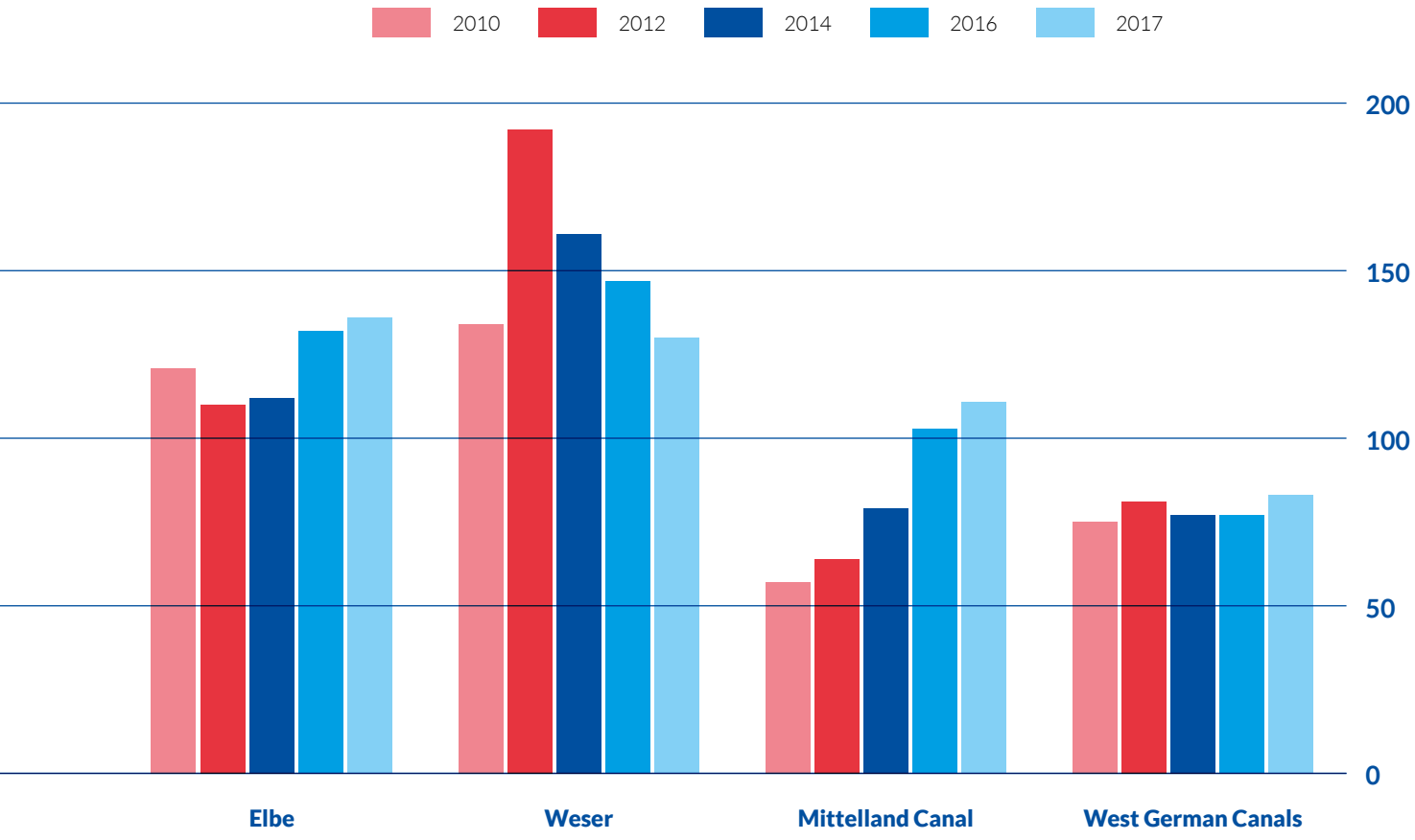
CONTAINER TRANSPORT ON THE TRADITIONAL RHINE (IN 1000 TEU) **IN THE PERIOD 2000-2017**



Source: Destatis and calculation CCNR

In other German regions, container transport is, compared with the Rhine, still quite limited. The only regions where it has a significant level are the Elbe, the Weser, the Mittelland Canal and the west German canal network (Ruhr area). The trend on the Elbe and the Mittelland Canal is upward orientated, whereas it is downward orientated on the Weser. The reasons for this are limitations in the infrastructure, and particularly the size of certain locks in the hinterland of seaport of Bremen. In the west German canal network, container traffic is quite stable.

CONTAINER TRANSPORT IN BASINS IN GERMANY OUTSIDE THE RHINE (IN 1000 TEU)

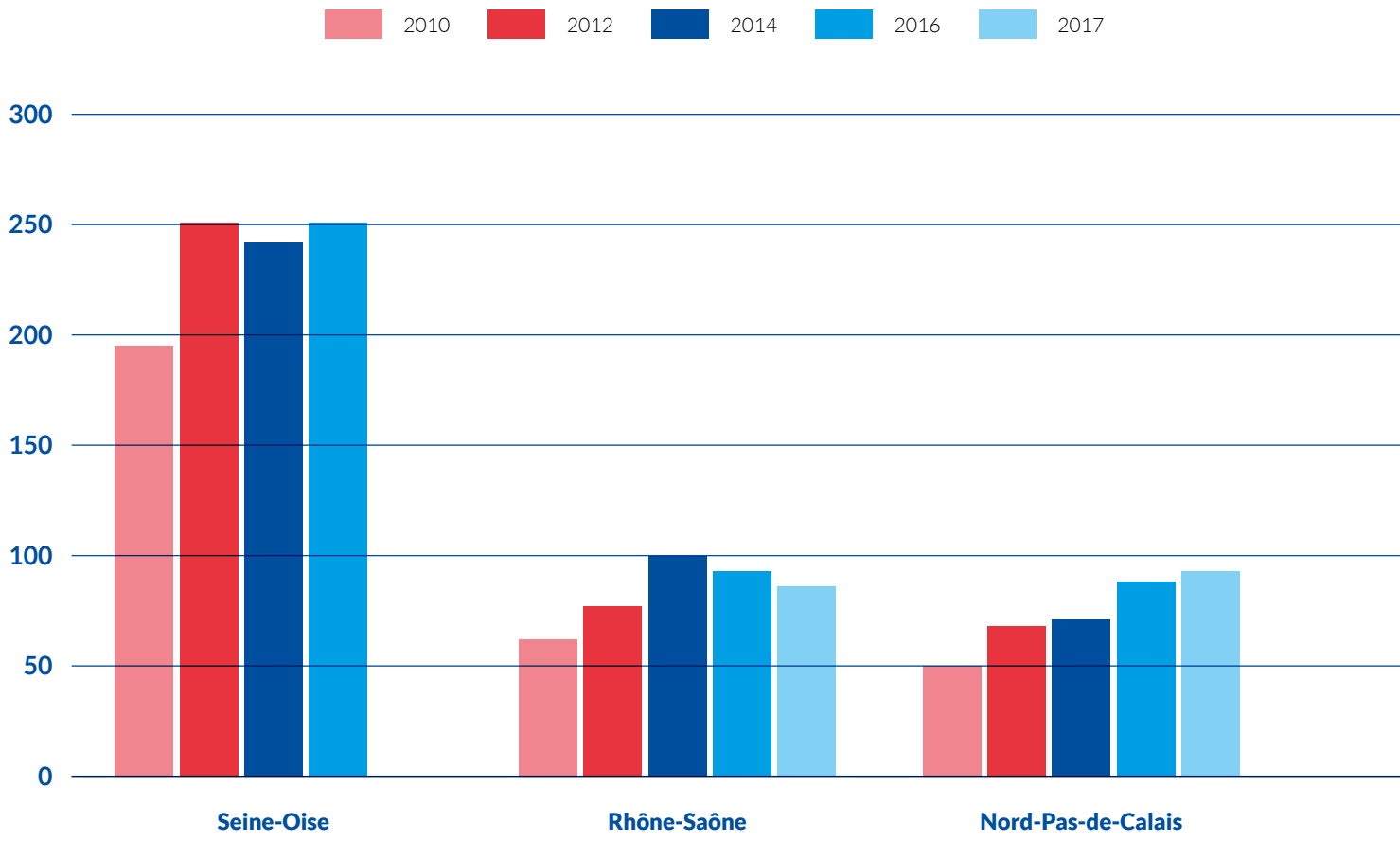


Source: Destatis

Container traffic on the Danube in Germany amounted to 1,615 TEU in 2017, compared to 602 in 2016 and 75 TEU in 2015. These figures may still be very small, but they show that an increase on the Danube is possible. The region of Berlin and its surroundings (Brandenburg) had a traffic level of 742 TEU in 2017. This meant a decrease compared to 2016 by 25%. Overall, container traffic on German inland waterways is still heavily concentrated in the western and northern parts of the country.

In France, there is also a regional concentration of container transport by IWT, and here it is the northern and eastern parts of the country where this concentration applies. The river Seine leads the way, and its container traffic of course links the capital Paris with the seaport of Le Havre. While container traffic is also progressing in the region of Nord-Pas-de-Calais, it has lost some of its traffic on the Rhône.

CONTAINER TRANSPORT PER BASIN IN FRANCE (IN 1000 TEU)



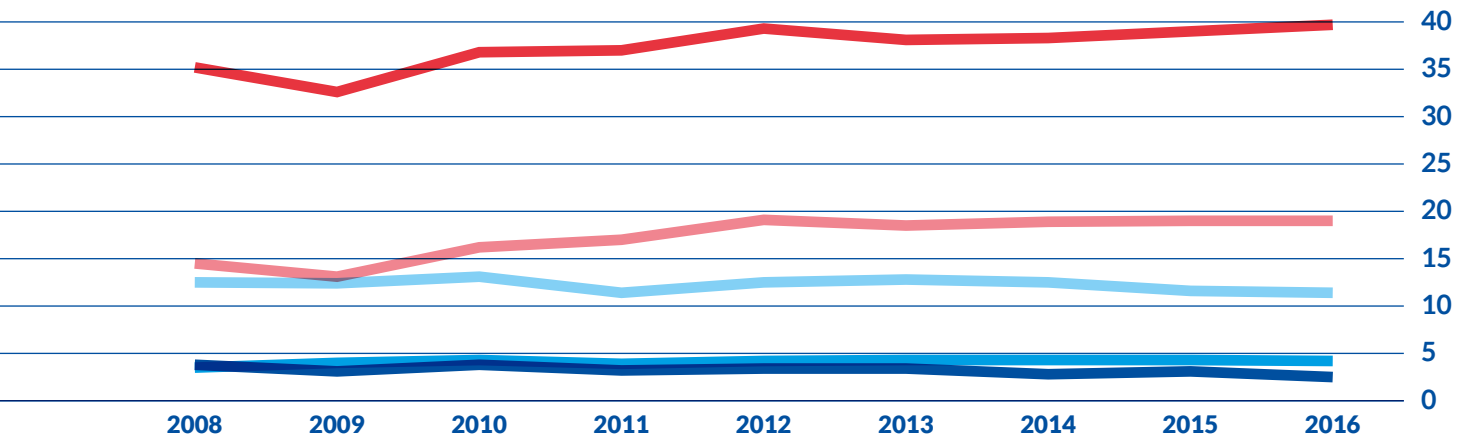
Source: VNF

The reasons for the slowdown on the Rhône are related to evolutions in the seaport of Marseille. New maritime alliances, and the disruptions that they brought with them, led to less reliability of the container lines on the river Rhône in 2016 and 2017.

INLAND NAVIGATION
AND OTHER MODES OF TRANSPORT

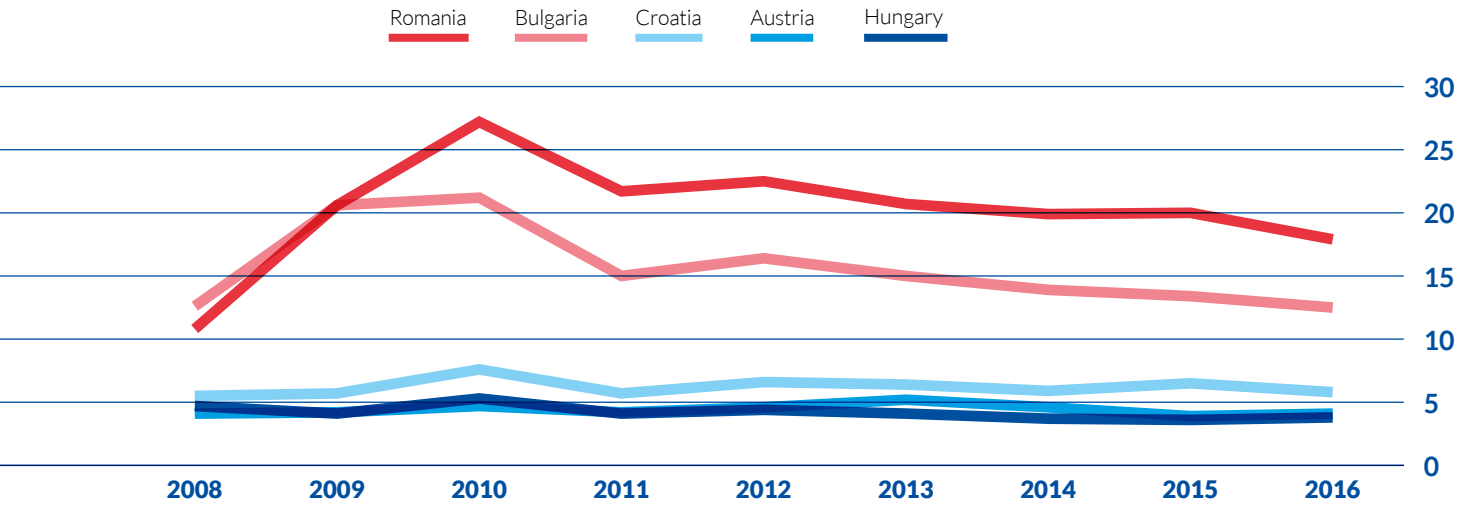
Modal shares for goods transport in the European Union

MODAL SPLIT SHARE EVOLUTION IN RHINE COUNTRIES
(%, BASED ON TRANSPORT PERFORMANCE)*



*Source: Eurostat. * share of inland waterway transport performance in total (IWT + Road + Rail) transport performance*

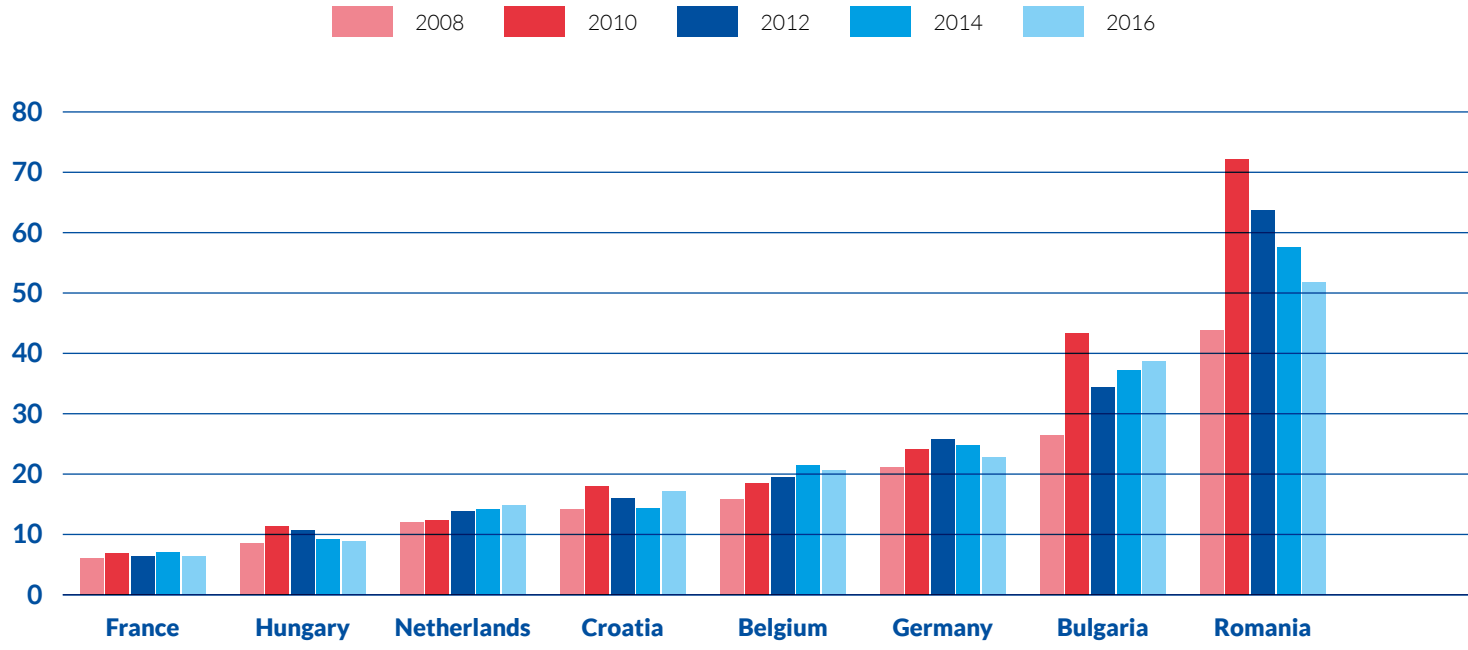
MODAL SPLIT SHARE EVOLUTION IN DANUBE COUNTRIES
(%, BASED ON TRANSPORT PERFORMANCE)*



*Source: Eurostat. *share of inland waterway transport performance in total (IWT + Road + Rail) transport performance*

Overall modal split figures are in a certain fashion statistical averages. The underlying reasons for modal share evolutions can only be revealed by going deeper into the intermodal data, by looking at certain goods segments. In carrying out this exercise, it is important to keep in mind that IWT has a relatively high market share for mass cargo, but that modern economies are also highly dependent on the just-in-time distribution of food products, machines, equipment, etc.

MODAL SPLIT SHARE EVOLUTION FOR AGRICULTURAL PRODUCTS
(%, BASED ON TRANSPORT PERFORMANCE)



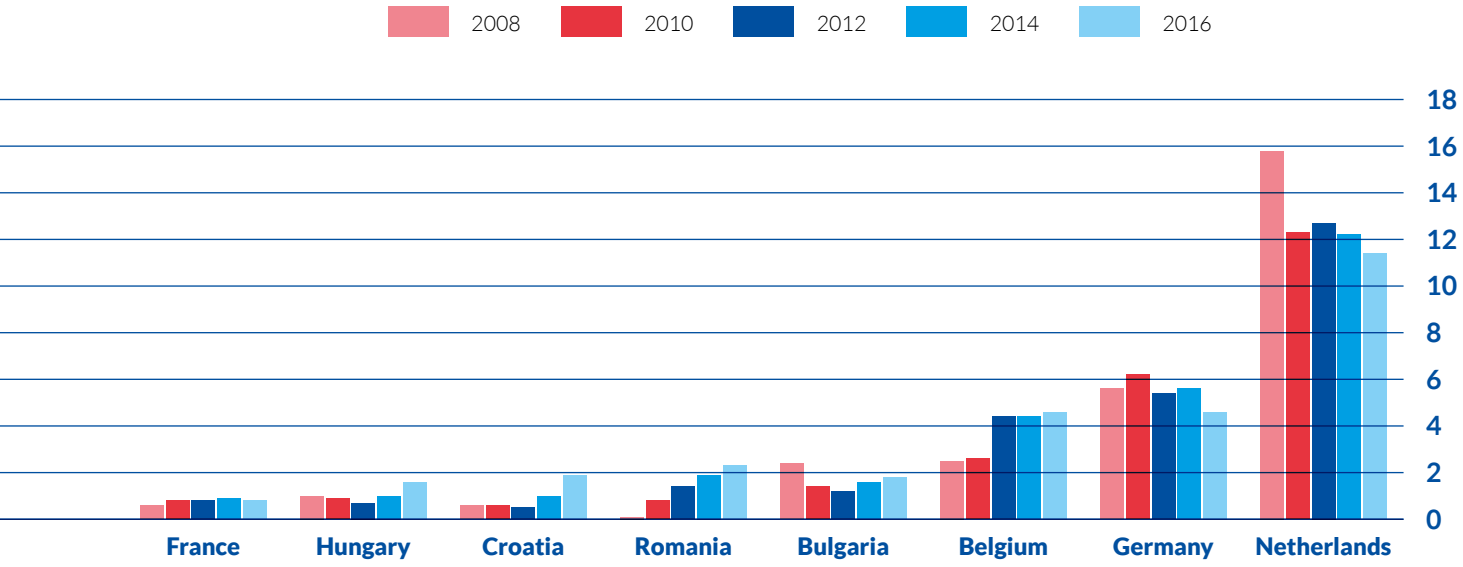
Source: Eurostat [iww_go_atygo], [road_go_ta_tg], [rail_go_grpgood], CCNR analysis

The data for Romania reveal that IWT, although it has the highest transport performance of all three modes, stands in strong competition with road transport in this segment. For the period 2008-2016, whenever a decrease in the transport of agricultural products on the Danube occurred, road transport of agricultural products increased.

In Bulgaria, road transport is higher than Danube transport. But from 2013 onwards, transport on the Danube increased very strongly, while road transport stagnated and rail traffic almost vanished. This explains the modal split gains for agricultural products in Bulgaria.

It is difficult to explain why in France, with its high agricultural production and its many seaports and inland waterways, IWT has such a low modal split share. Road transport has a high and relatively stable share of 80% - 85%. Rail transport is even lower than IWT. One possible explanation could be the decline in the number of inland vessels for dry cargo transport in France, especially as the French vessels are rather small and could be used for transporting agricultural products in the hinterland.

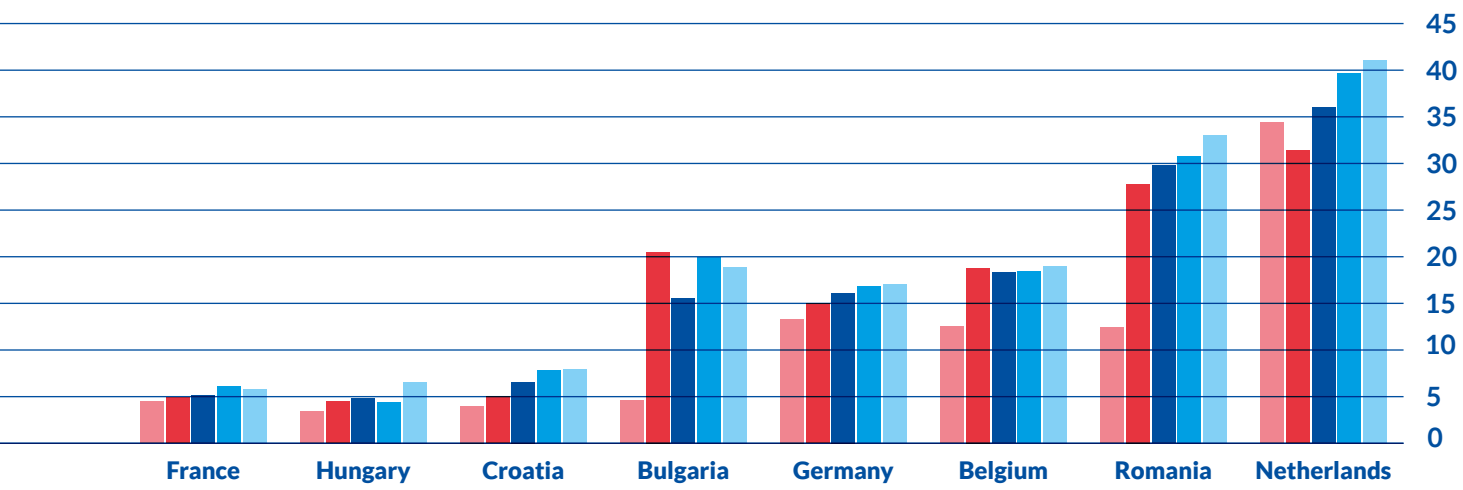
MODAL SPLIT SHARE EVOLUTION FOR FOOD PRODUCTS
(%, BASED ON TRANSPORT PERFORMANCE)



Source: Eurostat [iww_go_atygo], [road_go_ta_tg], [rail_go_grpgood], CCNR analysis

Food products are a segment with, on average, very low IWT modal shares. This is due to the fact that food products are often perishable goods, so that long transport times cause major problems in terms of quality and service. But not all parts of this segment are perishable. For example, oil made out of rapeseed is found within this segment. Here, inland shipping could gain further market shares in the future, as these products have a mass cargo character, and show a large potential as an energy resource. Besides, more urban transport chains involving inland vessels could also be a potential for increasing the food products that are transported on rivers.

MODAL SPLIT SHARE EVOLUTION FOR CHEMICAL PRODUCTS
(%, BASED ON TRANSPORT PERFORMANCE)



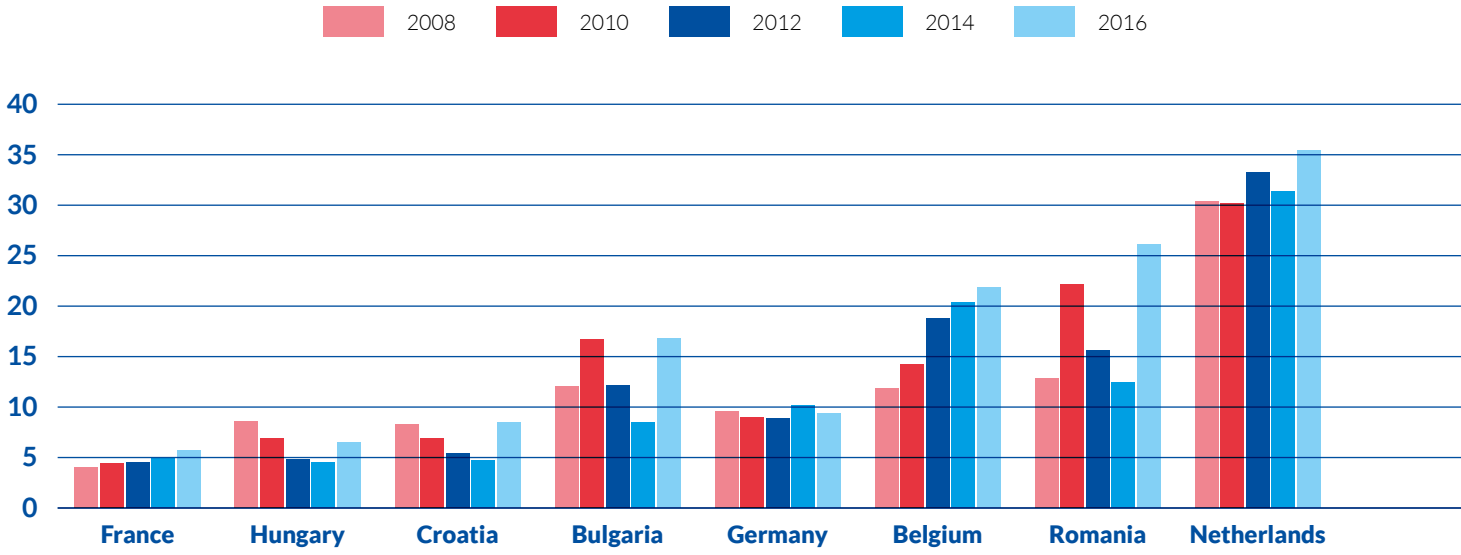
Source: Eurostat [iww_go_atygo], [road_go_ta_tg], [rail_go_grpgood], CCNR analysis

The multimodal data show that IWT gained market shares within the transport for chemicals. Detailed analysis reveals that this has different reasons.

In Rhine countries, road transport for chemicals is decreasing with a long run and quite a robust trend. For example, in Germany, road transport for chemicals fell by 28% between 2008 and 2016, and rail transport by 6%. Inland waterway transport of chemicals increased by 3% during the same time period. In Rhine countries, falling figures for road and partly for rail transport can be explained by safety issues. Indeed, today's high safety standards in tanker shipping are an advantage compared to other transport modes in this segment.

The Danube countries show different patterns. Here, road transport of chemicals shows a more or less increasing trend. The national transport sectors of these countries are overall more orientated towards road transport. The reason why IWT has nevertheless gained market share for chemicals in Danube countries is due to its absolute growth, and also because rail transport for chemicals fell in most Danube countries.

MODAL SPLIT SHARE EVOLUTION FOR METALS AND METAL PRODUCTS
(%, BASED ON TRANSPORT PERFORMANCE)



Source: Eurostat [iww_go_atygo], [road_go_ta_tg], [rail_go_grpgood], CCNR analysis

Metals and metal products is a segment where road transport still has the highest modal shares, although it has decreased since 2008, due a reduction of absolute transport performance.

Rail and inland waterway transport of metals have both shown a rather constant evolution since 2008. But due to the reduction of road transport, IWT could gain market shares in some countries. It is observed that in the Netherlands, rail transport of metals increased quite strongly in recent years, though on a lower basis than road and IWT.

03

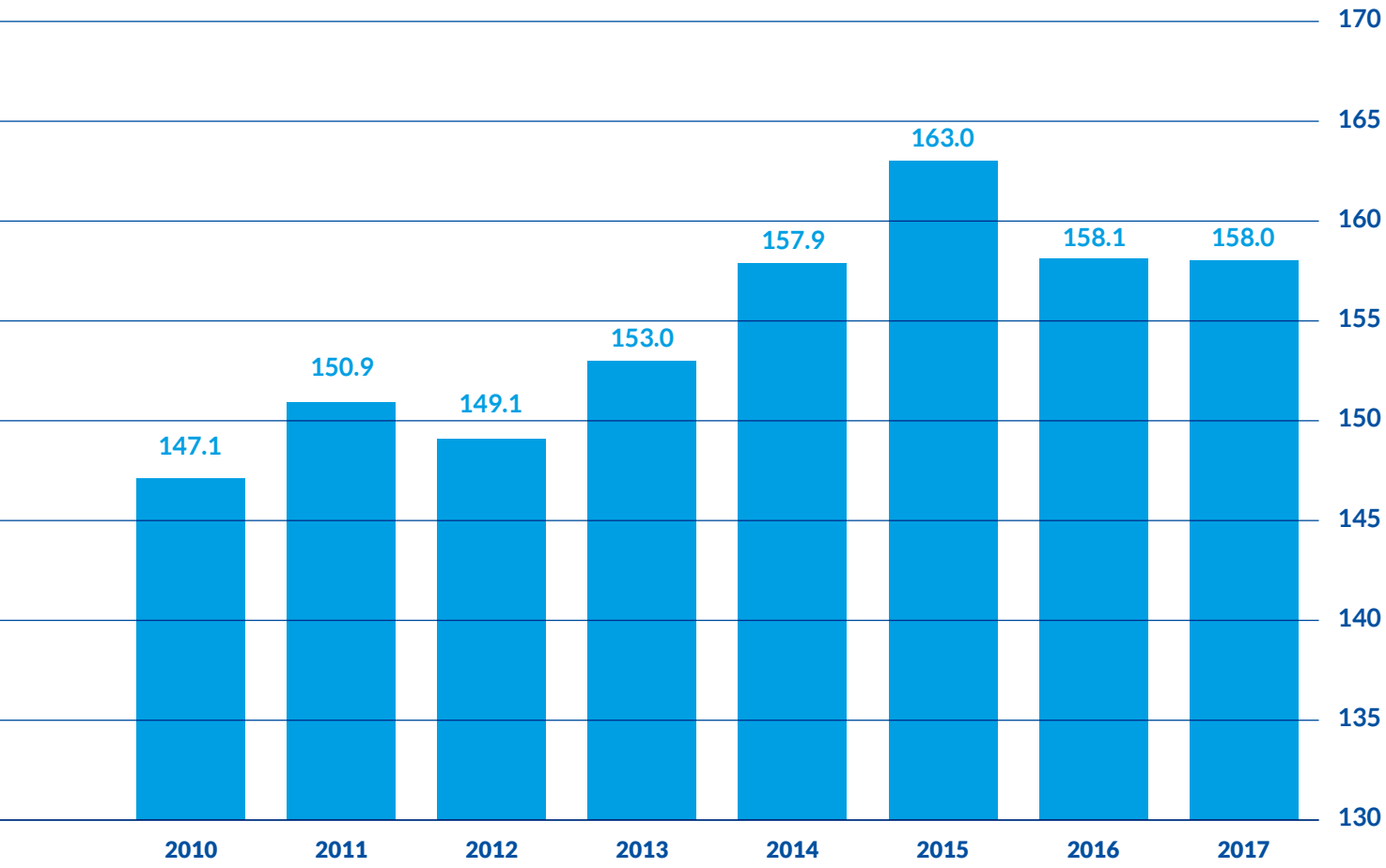
GOODS TRANSSHIPMENT IN PORTS

- The large European seaports such as Rotterdam, Antwerp, Hamburg and Constanța are also important places for inland waterway traffic to and from the hinterland. Hinterland traffic has different structures in these ports.
- The port of Rotterdam has the highest share of outgoing traffic, with 71% of all inland waterway traffic being directed to the hinterland, and 29% being directed to the seaport.
- In the port of Antwerp, inland waterway traffic in the hinterland recorded a strong increase in 2017.

INLAND WATERWAY TRAFFIC
IN FOUR MAIN EUROPEAN SEAPORTS

In **Rotterdam**, the largest European seaport, 105,000 inland vessels were loaded or unloaded in 2017. The volume of loaded cargo was 112.4 mio. tonnes, directed to the hinterland. The amount of incoming traffic amounted to 45.7 mio. tonnes. Inland waterway transport has very high shares in the hinterland traffic: 86 % for dry cargo, 40 % for liquid cargo and 36 % for containers. The port has the objective to increase this last share above the 40 % level.

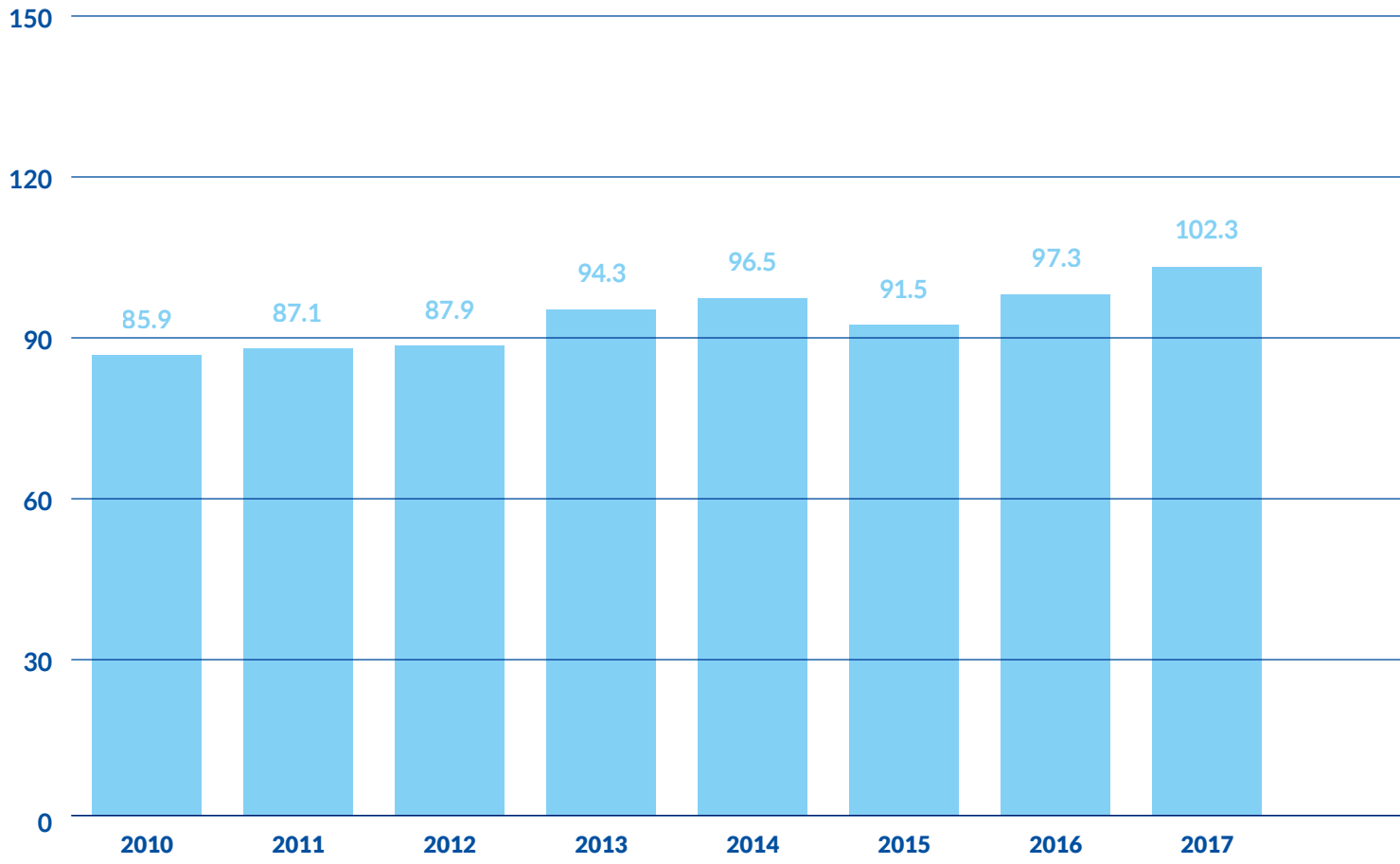
INLAND WATERWAY TRAFFIC IN THE SEAPORT OF ROTTERDAM (MILLION TONNES)



Source: Port of Rotterdam

In **Antwerp**, 59,268 inland vessels frequented the port in 2017, and the goods traffic with these vessels (102.3 mio. tonnes) passed the threshold of 100 mio. This meant an increase of 5%. There were very strong increases for iron ores, metals, sands, stones and building materials, and chemicals. The petroleum products were somewhat stagnant. Nevertheless, petroleum products with 30 mio. tonnes and chemicals with 26 mio. tonnes were by far the most important goods segments in Antwerp IWW traffic.

INLAND WATERWAY TRAFFIC IN THE SEAPORT OF ANTWERP (MILLION TONNES)

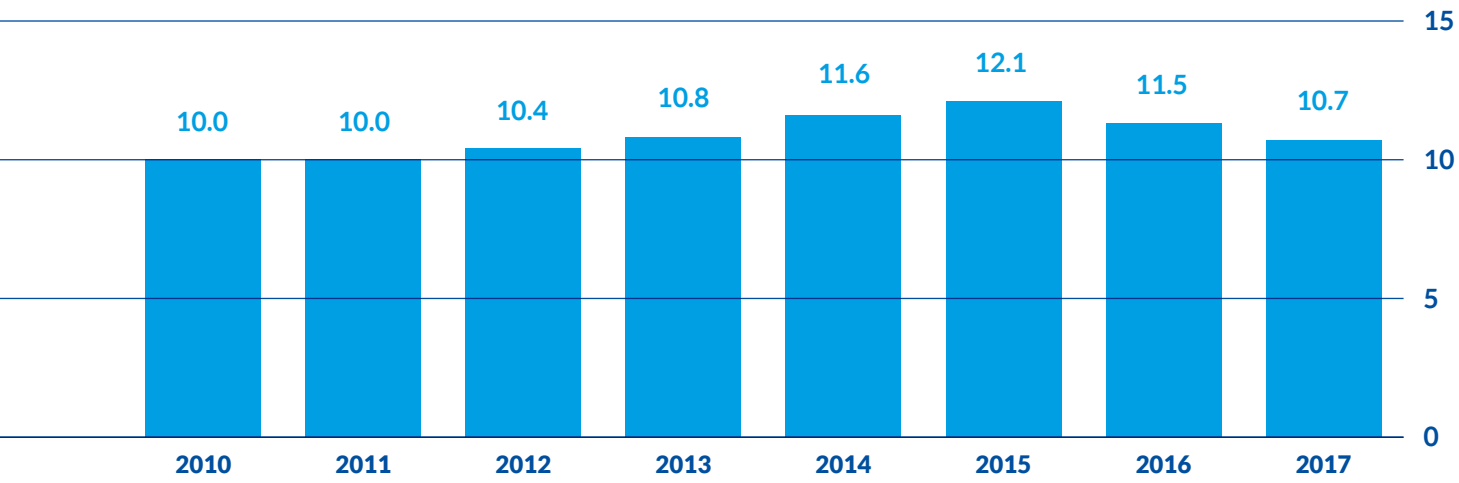


Source: Port of Antwerp

In 2017, 19 315 inland vessels were counted in the port of **Hamburg**, compared to 20,382 in 2016. The mass cargo segment has a high share of 87% in the river traffic. In particular, around 30% of total river traffic is made up of mineral oil products and coal. Container traffic's share increased from 10% in 2016 to 11% in 2017 (1.1 mio. t). In terms of TEU, the container traffic increased from 119,044 TEU to 121,051.

Incoming river traffic has a share of 46% in Hamburg, and 54% is outgoing traffic. The main regions of origin and destination between Hamburg and the hinterland are Lower Saxony (42%), Schleswig-Holstein (27%), Saxony-Anhalt (21%) and Berlin (7%). As regards Berlin, the volumes increased by 15% in 2017 compared to 2016, to a level of 0.74 million tonnes.

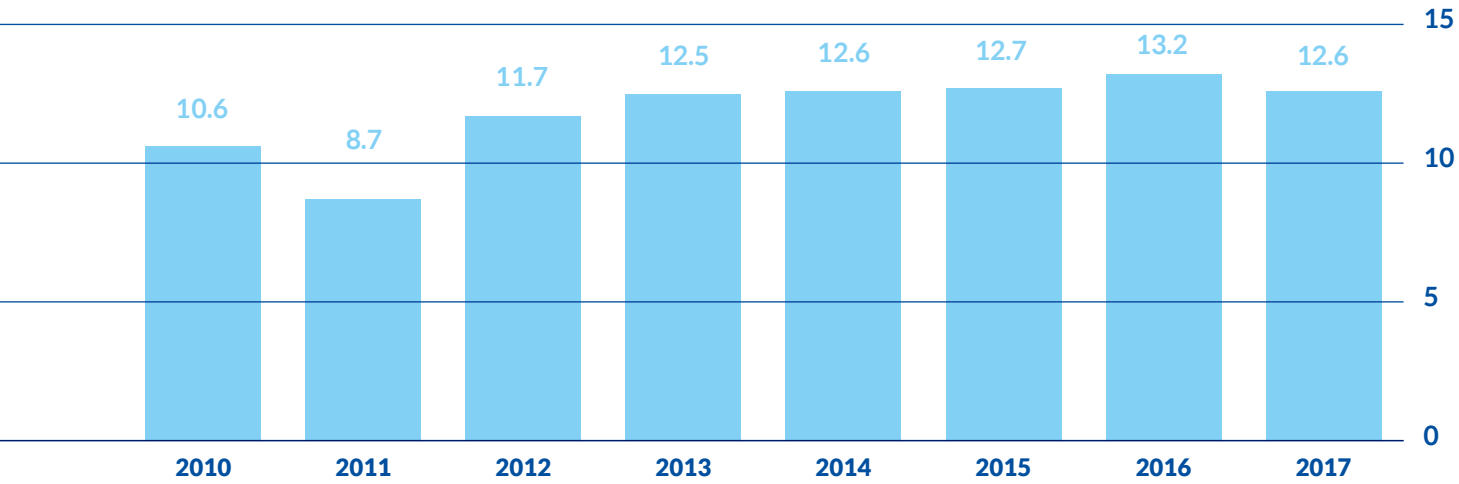
INLAND WATERWAY TRAFFIC IN THE SEAPORT OF HAMBURG (MILLION TONNES)



Source: Statistical Office of Hamburg

The port of **Constanța** is the main seaport on the Black Sea, playing an important role as the transit node for the landlocked countries in central and south-east Europe. The connection of the port with the Danube is made through the Danube-Black Sea canal, which represents one of the main key points of Constanța port. With regard to river traffic, in 2017 the incoming traffic from the hinterland represented 43%, and outgoing traffic towards the hinterland 57%.

INLAND WATERWAY TRAFFIC IN THE SEAPORT OF CONSTANȚA (MILLION TONNES)



Source: Port of Constanța / Romanian Statistical Office

Container traffic on the Danube is still relatively low and amounted to 4,849 TEU in Constanța in 2017. This traffic was entirely of an international character (country of loading or unloading were outside Romania).


AWS
CMA CGM
CONCIBA
YRAMESA
MICHEL VERSCHUEREN TRANSPORT

EVOLUTION OF GOODS TRAFFIC
IN 2017 IN EUROPEAN INLAND PORTS

RHINE PORTS

WATERSIDE GOODS TRAFFIC IN TEN MAJOR RHINE PORTS (MILLION TONNES)

	2015	2016	2017	2017/2016
Duisburg	54.1	55.6	52.2	-6%
RheinCargo*	17.4	18.1	18.5	+2%
Mannheim	8.2	8.7	9.7	+11%
Strasbourg	7.4	7.5	8.0	+6%
Ludwigshafen	7.4	6.9	5.6	-16%
Karlsruhe	6.5	6.2	7.2	+15%
Basel	6.3	5.9	5.8	-2%
Mulhouse	4.9	4.9	4.8	-1%
Kehl	3.2	3.5	3.5	+1%
Krefeld	3.0	3.2	3.4	+6%
Total	118.4	120.5	118.7	-1%

Source: Destatis, RheinCargo, Port de Strasbourg, Schweizerische Rheinhäfen, Port de Mulhouse

**RheinCargo is a multimodal port and logistics company that operates seven ports in Cologne, Neuss and Düsseldorf*

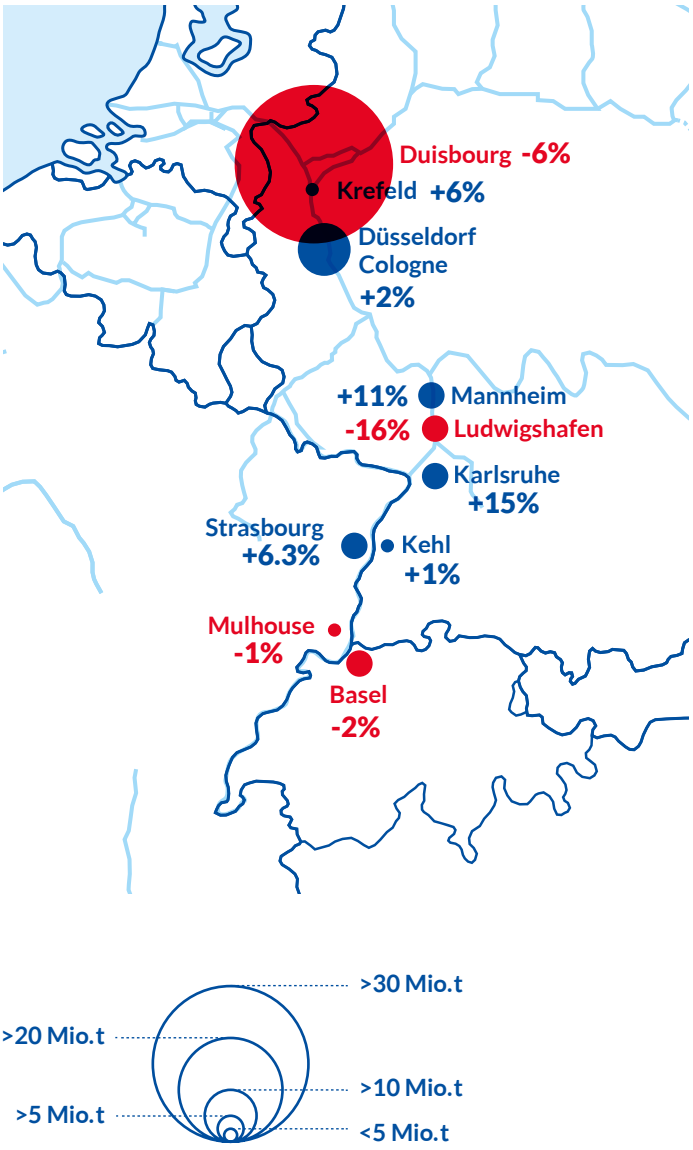
Duisburg

Of the 52.2 million tonnes in Duisburg, 15.7 million tonnes were handled by the public port in Duisburg (Duisport Group), while the remaining traffic was handled by private ports of the steel industry. Goods traffic was reduced in 2017 due to less coal transport. Railway traffic in the Duisport Group amounted to 18.8 mio. tonnes (increase of 7%), due to more trains coming via the New Silk Road from China.

RheinCargo

Despite losses in coal transport, RheinCargo realised additional waterside traffic (+2.2%) in other mass cargo segments such as agricultural products, iron ores and metals. RheinCargo's strategy is to continue focusing also on mass cargo traffic, and the positive result confirms this strategy.[3]

TOTAL YEARLY WATERSIDE TRAFFIC (MILLION TONNES)



Railway traffic via the New Silk Road from China is currently booming in Duisburg

[3] *See: Press release of RheinCargo from March 29th 2018*

FRENCH AND BELGIAN INLAND PORTS

WATERSIDE TRAFFIC IN 10 MAJOR FRENCH AND BELGIAN INLAND PORTS
(MILLION TONNES)

	2015	2016	2017	2017/2016
Paris	20.3	20.3	21.2	+4.6%
Liège	14.6	15.5	15.9	+3.1%
Strasbourg	7.4	7.5	8.0	+6.3%
Namur	5.1	5.2	5.3	+1.9%
Brussels	4.4	4.3	4.8	+8.8%
Mulhouse	4.9	4.9	4.8	-1.0%
Metz/Thionville	2.5	2.0	2.2	+8.3%
Lille	1.5	1.7	1.8	+8.3%
Lyon	1.4	1.4	1.5	+10.3%
Aproport*	0.9	1.0	1.1	+7.2%
Total	63.0	63.8	66.6	+4.5%

Source: Association des ports intérieurs français (AFPI), Port de Liège, Port de Namur
** Aproport = Ports de Chalon-sur- Saône et de Mâcon*

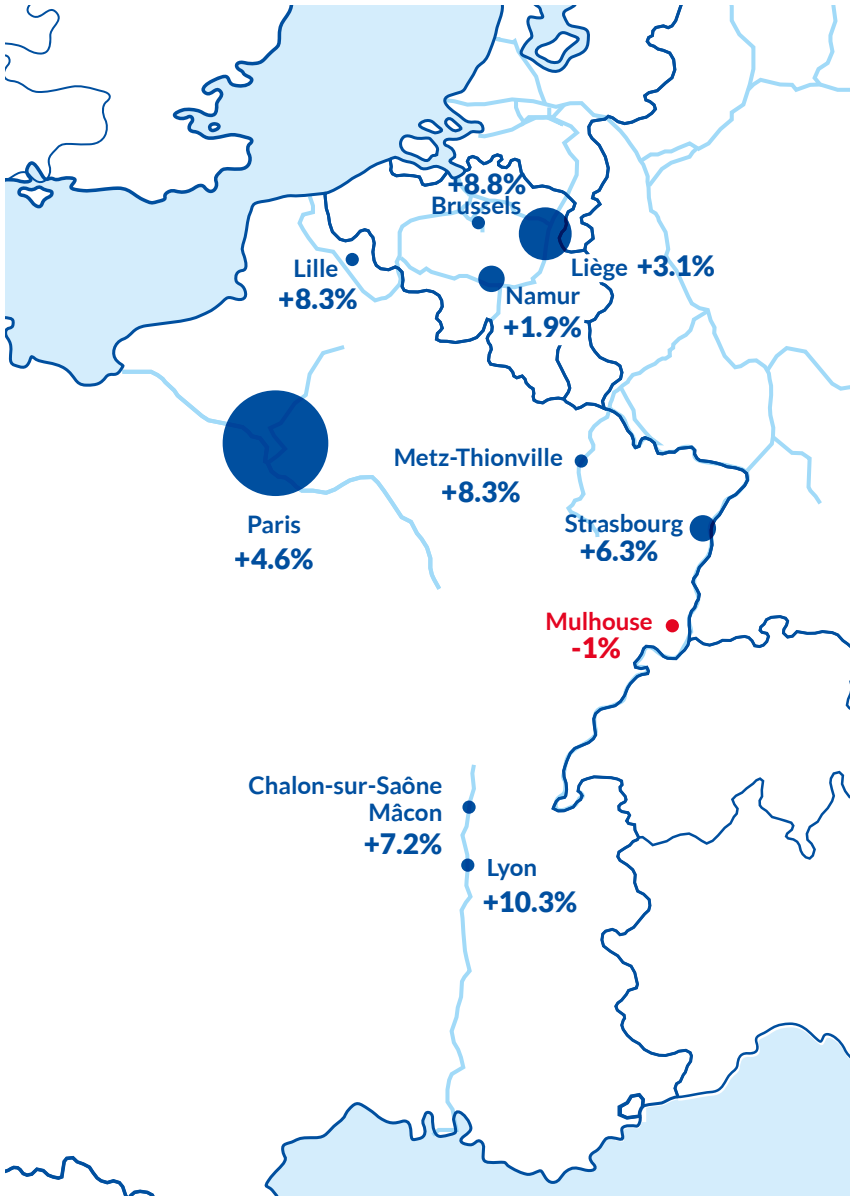
Ports of Paris

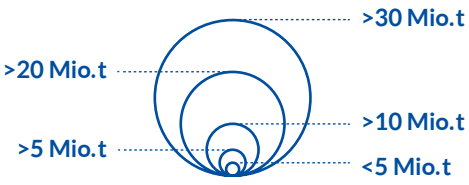
77% of waterside in 2017 was sands, stones and building materials. This segment's traffic progressed by 9.2% compared to 2016, due to additional volumes of building materials for the construction sites of new metro lines. The ports of Paris offer quaysides for these construction works, for the delivery of the construction material, and also for the transport of the excavation material.

Port of Liège

40% of waterside traffic was sands, stones and building materials, but this segment decreased slightly in Liège (-2%). Growing segments were wood products (+21%) and containers (+21%).

TOTAL YEARLY WATERSIDE TRAFFIC (MILLION TONNES)





Negative rate of change in 2017 vs 2016

Positive rate of change in 2017 vs 2016

DANUBE PORTS

WATERSIDE TRAFFIC IN TEN LARGE DANUBE PORTS (MILLION TONNES)

	2015	2016	2017	2017/2016
Galati	6.0	6.6	6.3	-4.5%
Ismail	4.8	5.7	5.1	- 10%
Linz	3.8	4.0	4.3	+10%
Smederovo	1.8	2.5	3.2	+ 28%
Bratislava	1.9	1.9	2.0	+ 8%
Tulcea	1.5	1.5	1.3	- 14%
Regensburg	1.5	1.3	1.5	+11.0%
Vienna	1.0	1.1	1.1	+/- 0%
Budapest	0.8	1.0	1.1	+7.4%
Drobeta Turnu Severin	0.9	1.0	1.1	+10%
Baja	0.7	0.5	0.6	+27.1%
Total	24.7	27.1	27.6	+ 1.8%

Source: Danube Commission Market observation report, Romanian Statistical Institute, Hungarian Statistical Office, Destatis

Port of Bratislava

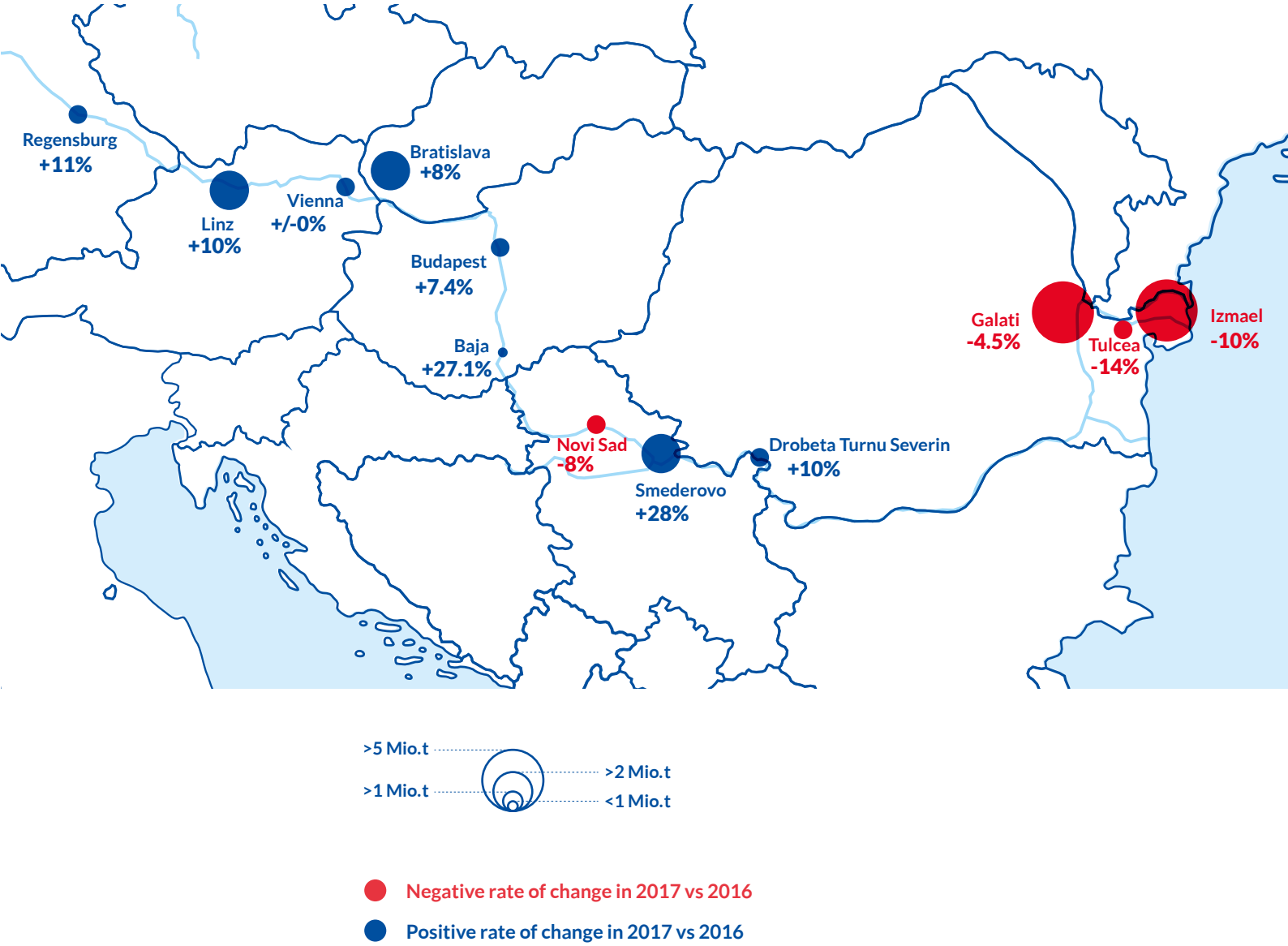
The Slovakian capital of Bratislava hosts also the largest inland port of the country. Almost 99% of its cargo traffic is for export (loaded cargo). More than 2/3 of the cargo traffic is iron ore, which is delivered to the steel industry in Austria. 1/5 of the cargo traffic is chemicals and mineral oil products, transported to Austria, Hungary and Germany.[4]

Port of Regensburg

The largest Bavarian inland port experienced a very difficult first quarter 2017, as did many other Danube ports. There were ice and low water periods on the Danube, low water periods, and with a quarterly year-on-year reduction of traffic by 38%. After the ice and the low water period vanished, transport figures doubled in the second quarter 2017 compared to the previous year. They reached a high peak in July, due to the good harvest season 2017 in Germany, so that the third quarter 2017 had a plus of 19% compared to one year previously.

[4] *Source: Danube Commission Market observation report.*

TOTAL YEARLY WATERSIDE TRAFFIC (MILLION TONNES)



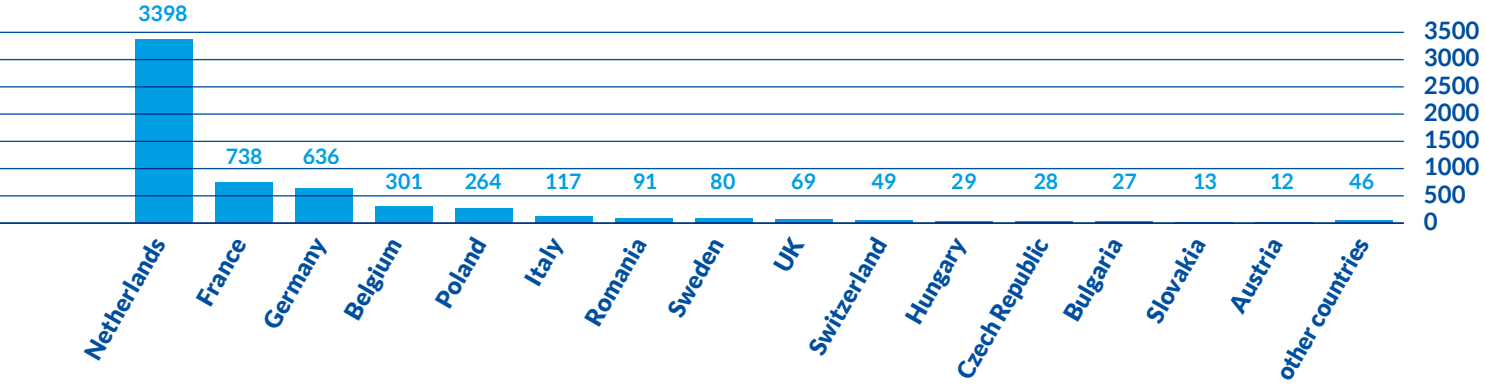
04

COMPANIES, TURNOVER, FREIGHT RATES, WATER LEVELS & OPERATING CONDITIONS

- **With around 3 400 IWT companies in goods transport, the Netherlands represents the country with the highest economic activity in the goods transport sector.**
- **Rhine countries have a share of 91% of total turnover in European IWT goods transport.**
- **In passenger transport, economic activity is spread more evenly throughout Europe.**
- **Switzerland is the country with the highest share of turnover in passenger shipping.**

IWT COMPANIES
AND ANNUAL TURNOVER IN EUROPE

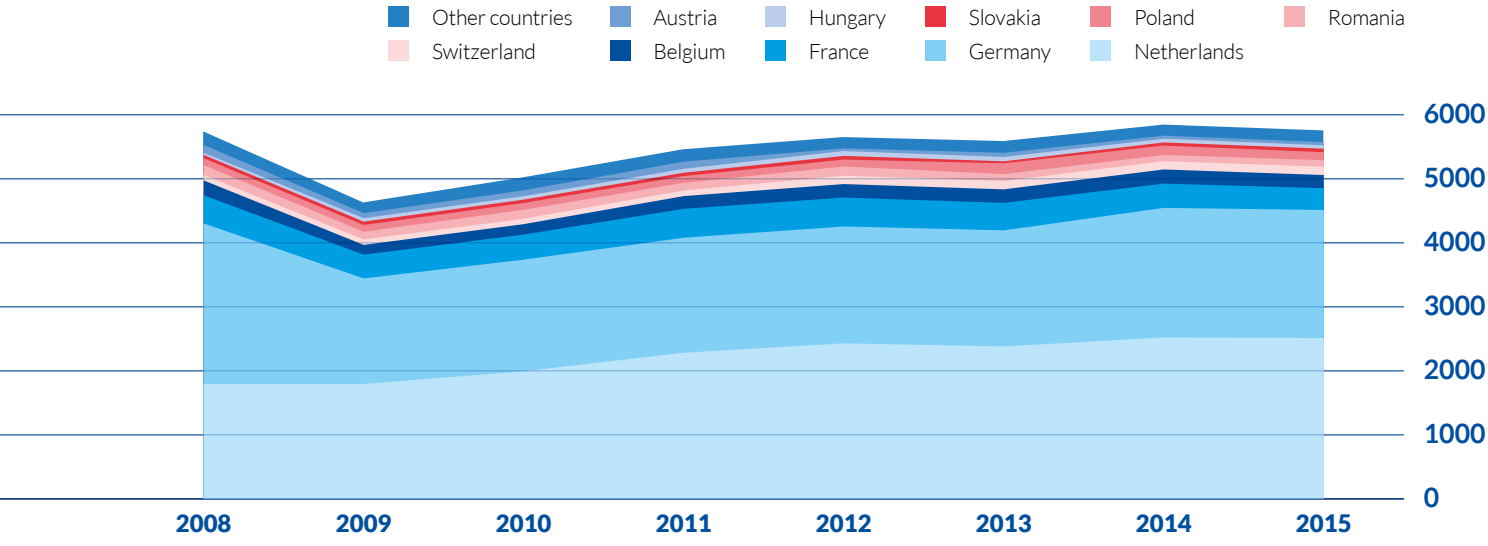
NUMBER OF IWT COMPANIES IN GOODS TRANSPORT IN EUROPE



Source: Eurostat [sbs_na_1a_se_r2] and Bundesamt für Statistik (CH)

87% of all IWT goods transport companies are in the Rhine countries (Netherlands, Germany, Belgium, France, Switzerland), only 3% are registered in Danube countries (Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria), and 10% in other countries (Poland, Italy, United Kingdom, Czech Republic, Sweden, etc.)

ANNUAL TURNOVER IN IWT GOODS TRANSPORT IN EUROPE (MIO. €)

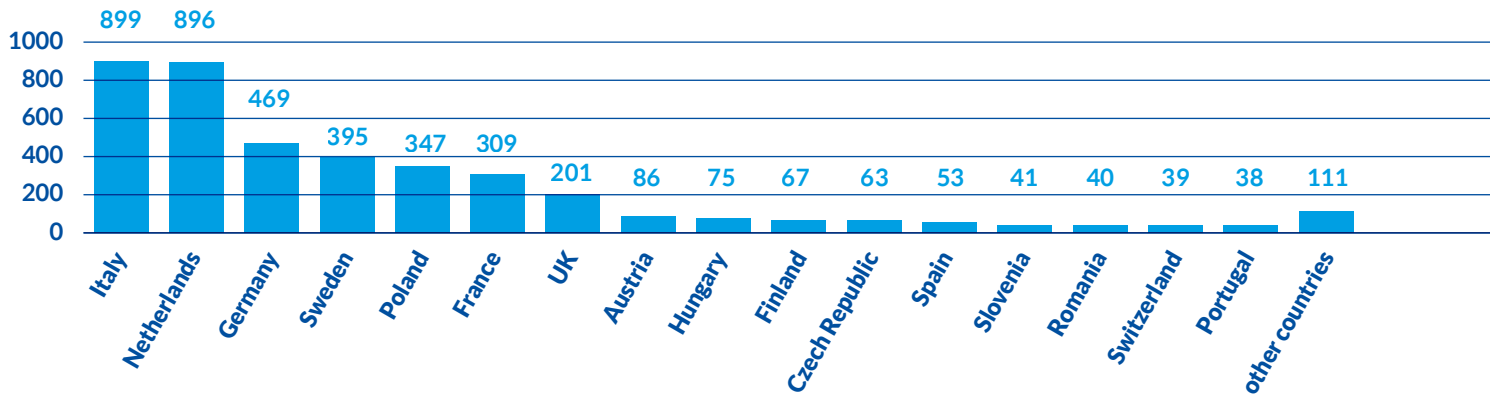


Source: Eurostat [sbs_na_1a_se_r2], Bundesamt für Statistik (CH), Centraal Bureau voor de Statistiek (NL)

The goods transport companies in the Netherlands and in Germany account for 80% of turnover in the European IWT goods transport sector. The three other Rhine

countries (Belgium, France and Switzerland) account for another 11% of European turnover. All other countries have a share of 9%.

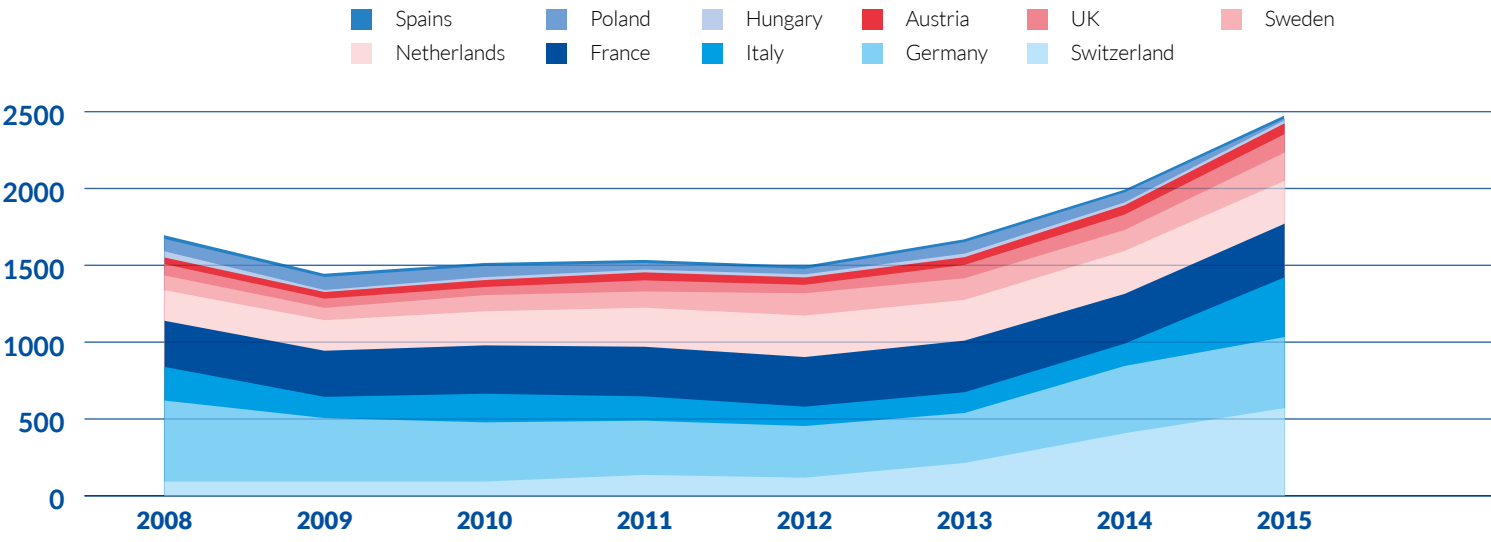
NUMBER OF IWT COMPANIES IN PASSENGER TRANSPORT IN EUROPE



Source: Eurostat [sbs_na_1a_se_r2] and Bundesamt für Statistik (CH)

Only 42% of all IWT passenger shipping companies are located in Rhine countries, 6% are registered in Danube countries and 52% in Sweden, Poland, the United Kingdom, Finland, the Czech Republic, Spain, etc. This is explained by the fact that the Eurostat definition for an IWT passenger shipping company contains companies active on rivers and lakes. Statistically there is no distinction made between river and lake passenger shipping. In particular, Italy, Switzerland, Sweden, Austria and Germany are countries with a large number of lakes and many passenger vessels that offer day trip excursions or scheduled services on these lakes.

ANNUAL TURNOVER IN IWT PASSENGER TRANSPORT IN EUROPE (MIO €)



Source: Eurostat [sbs_na_1a_se_r2], Bundesamt für Statistik (CH), Centraal Bureau voor de Statistiek (NL)

The Swiss passenger shipping companies are often active in river cruises, where the average turnover per company is much higher than in the day trip shipping sector. The sharp increase since 2012 is explained by the booming river cruises (see chapter on River cruises).

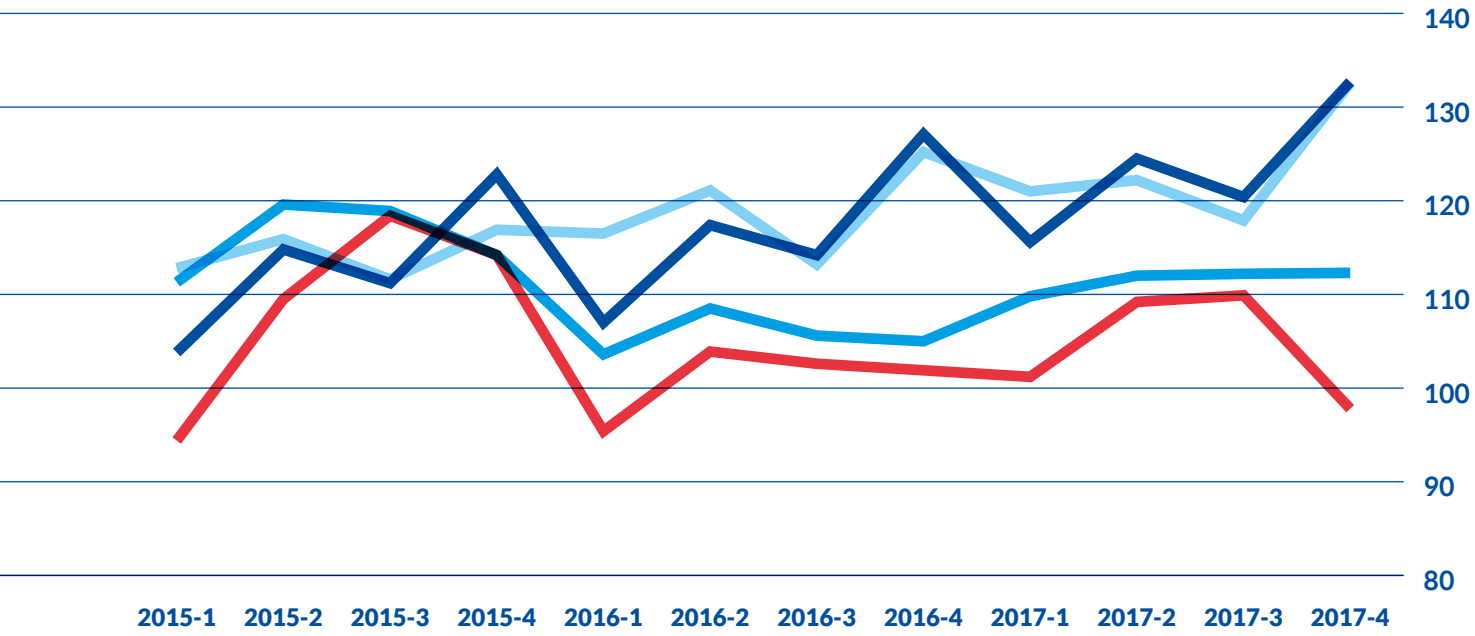
QUARTERLY TURNOVER DEVELOPMENT
IN 2015, 2016 AND 2017

Official data for turnover evolution are published by Eurostat, but recent data are available only with a considerable time-lag.[5] Therefore, infra-annual data for the years 2015, 2016 and 2017 are used, but these data are only available for a limited number of countries. Eurostat publishes infra-annual turnover data only for the NACE sector H50 (water transport), which covers maritime and IWT transport together. Based on this dataset, it is possible to identify turnover in IWT only for countries with practically no activity in maritime shipping (Austria, Hungary).

Netherlands

For the Netherlands, turnover data on a quarterly basis are provided by the national statistical office (CBS).

TURNOVER DEVELOPMENT IN THE NETHERLANDS (2010=100) **– RHINE COUNTRY WITH A HIGH SHARE OF GOODS TRANSPORT**



Source: CBS

[5] *Eurostat annual turnover data for 2017 were not yet available when this report was written.*

Turnover evolution in the transport sector in the Netherlands reveals differences between road and rail transport on the one hand, and maritime and inland shipping on the other hand. This pattern can be explained by common trends in maritime and inland navigation. These trends are related to world trade evolution, mass cargo transport of dry and liquid goods, container transport, etc. All of these goods segments are typical for sea vessels as well as for inland vessels, but not very common in road transport. Rail transport, on the other hand, is also a transport mode for mass cargo, but to a lesser degree than IWT or sea shipping.

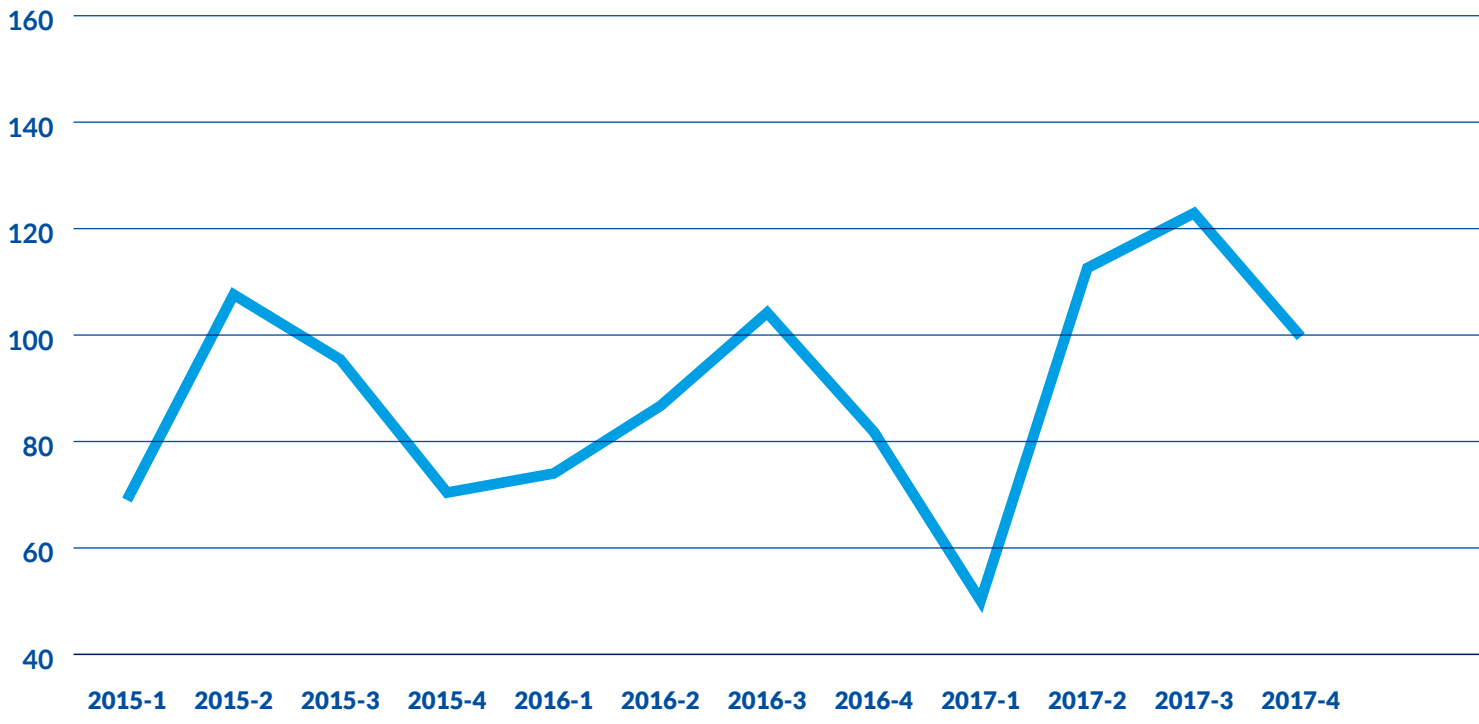
Turnover in road and rail transport developed more steadily and more positively than in IWT and maritime shipping. IWT and maritime shipping show rather strong fluctuations, due to variations in mass cargo transports, in world trade, in commodity prices, and – typical only in its own sector - changes in water levels on rivers.

Hungary and Austria

Hungary is a Middle Danube country where goods transport has a high share in IWT turnover (almost 3/4). Comparisons with the level of goods transport shows a strong relationship between transport demand and turnover evolution.

The drop of turnover in Q1 2017 was due to the restrictions of navigation on the Danube due to low water levels and ice in winter 2017/2018. The increase of turnover in Q3 2017 (+18% compared to Q3 2016) is a parallel to the strong increase of transport demand in this quarter (+11.5%), although stronger in magnitude. The uptake in Q2/17, Q3/17, Q4/17 reflects catch-up effects after the difficult navigation conditions in Q1/17.

TURNOVER DEVELOPMENT IN HUNGARY (2010=100) **– DANUBE COUNTRY WITH MAINLY GOODS TRANSPORT ACTIVITY**

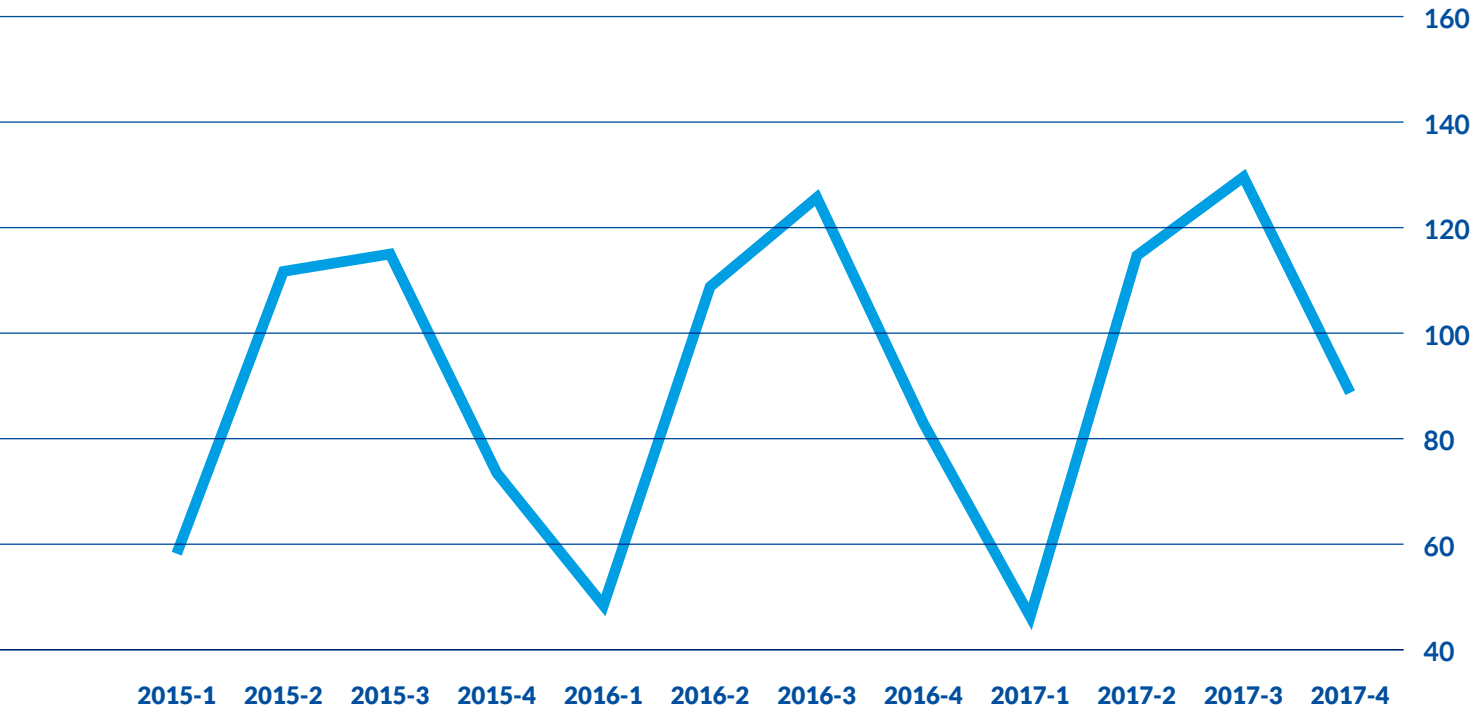


Source: Eurostat [sts_setu_q]

Austria is an Upper Danube country where passenger transport has a very high share in turnover (around 2/3). This explains the dip in every 1st quarter of a year, as cruises and day trip excursions usually do not take place in winter time. Turnover has a seasonal peak in every 3rd quarter.

Turnover in Q3 2017 was 3% higher than in the previous year. An important explanation is found in the upward trend in passenger shipping, both in terms of the number of companies and in terms of their share in turnover.

TURNOVER DEVELOPMENT IN AUSTRIA (2010=100) **– DANUBE COUNTRY WITH MAINLY PASSENGER TRANSPORT ACTIVITY**

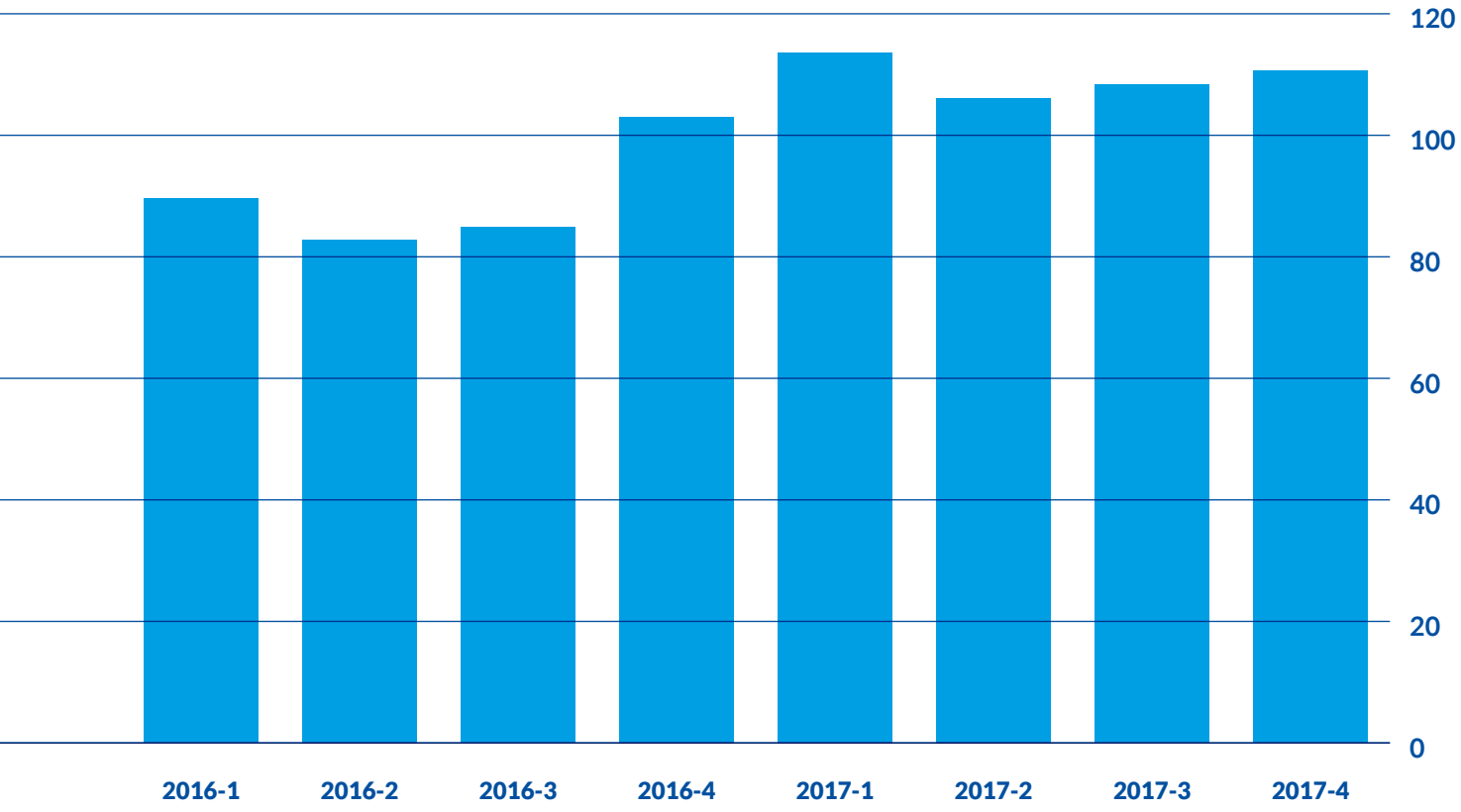


Source: Eurostat [sts_setu_q]

FREIGHT RATES AND WATER LEVELS

FREIGHT RATES

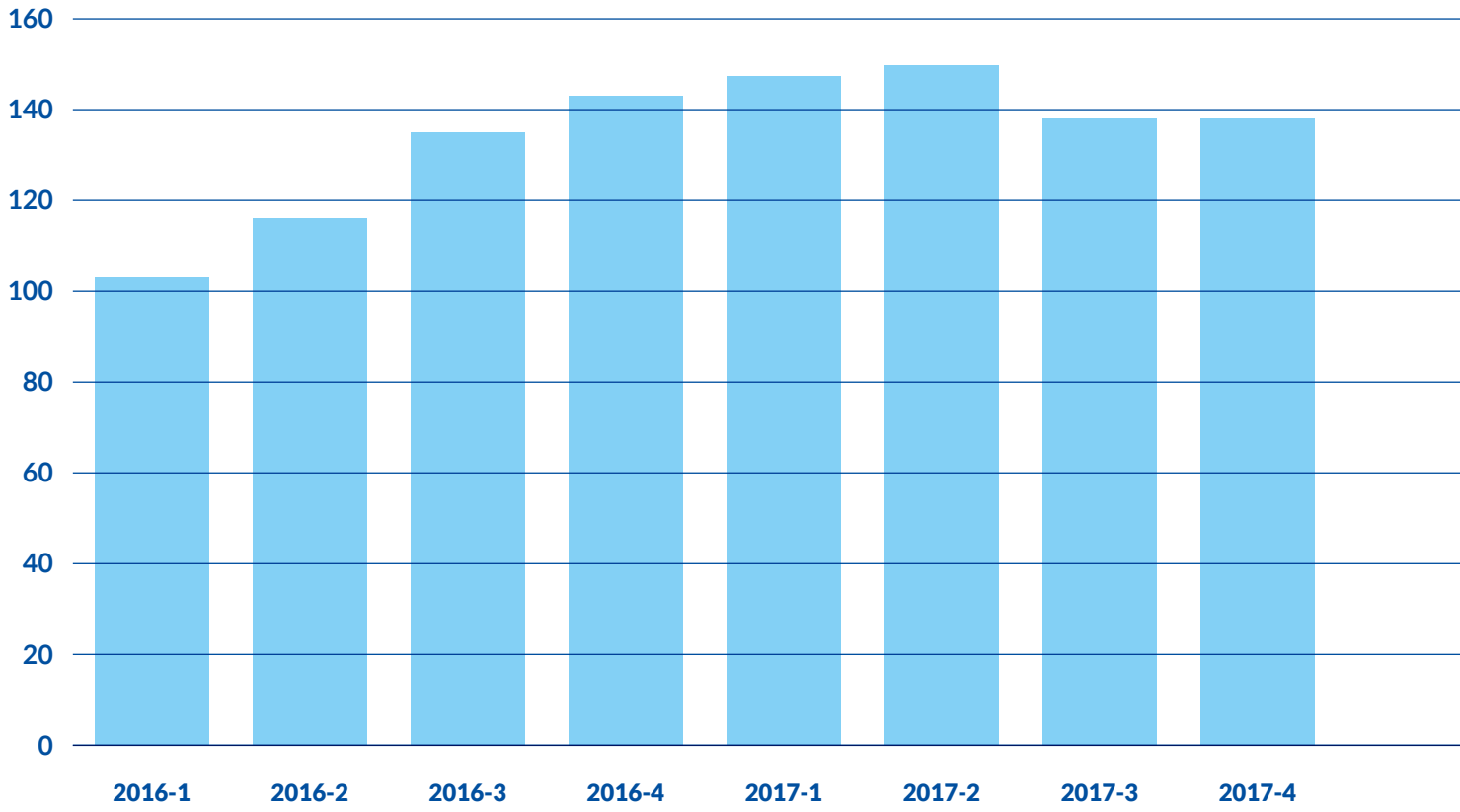
DEVELOPMENT OF FREIGHT RATES IN THE NETHERLANDS (2015 AVERAGE=100)



Source: CBS - Centraal Bureau voor de Statistiek

The average transport prices in 2017 in the Netherlands were at a higher level than in 2016. The reasons for the high level of freight rates in Q1 2017 can be seen in the low water levels on the Rhine. This led to restrictions in vessels' loading degrees and therefore to higher transport prices. The explanation for the high level in Q2/17, Q3/17 and Q4/17 is more related to economic reasons. The year 2017 brought an economic recovery in Europe and an uptake in transport demand in IWT.

DEVELOPMENT OF FREIGHT RATES IN THE DANUBE REGION (2015 AVERAGE=100)



Source: Danube Commission

On the Danube, freight rates are mainly determined by bunker fuel costs. These fuel costs represent 50-60% of total operational costs of the Danube vessels. With rising oil and fuel prices, freight rates in 2017 were on average about 15% higher than in 2016.

FREIGHT RATES IN TANKER SHIPPING AND VESSELS' LOADING DEGREES ON THE RHINE

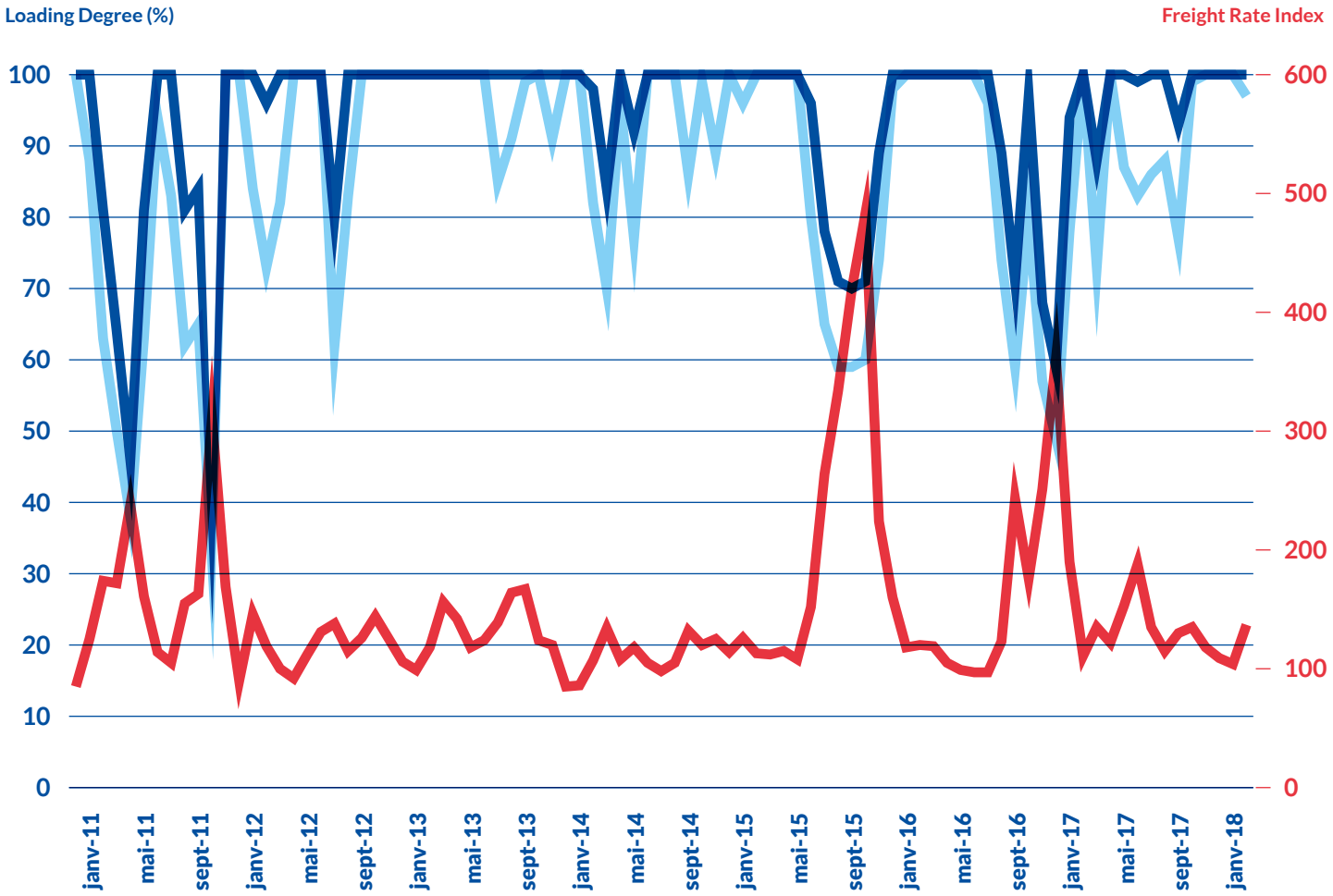
On the Rhine, water levels were very low in January 2017, therefore increasing freight rates. Due to this increase, traders on the spot market bought only the absolute necessary volumes and liquid cargo transports mainly came from contractual obligations. In February, freight rates fell back to a normal level, in the wake of recovering water levels. Hence, spot market business picked up again.

In June and July, maintenance works in German and Swiss refineries led to more German and Swiss imports from ARA seaports via the Rhine. As the maintenance works included refineries in northern Germany, there was also more national traffic of mineral oil products in that part of the country. Overall, this had a positive effect on freight rates. Temporarily falling water levels in July thus played an additional role.

Between August and September, traded volumes of mineral oil products and freight rates fell. First of all, rising water levels played a role. Secondly, conditions on the future oil market were orientated towards "backwardation", a situation where future oil prices are expected to be lower than current prices. This market situation presents no commercial opportunities for transporting oil products into storage depots and brings no upward movement on freight rates.

The backwardation situation on the future oil market continued through autumn and winter, and the combination with relatively high-water levels and loading degrees of vessels, meant that tanker freight rates on the Rhine were on a multiannual average level.

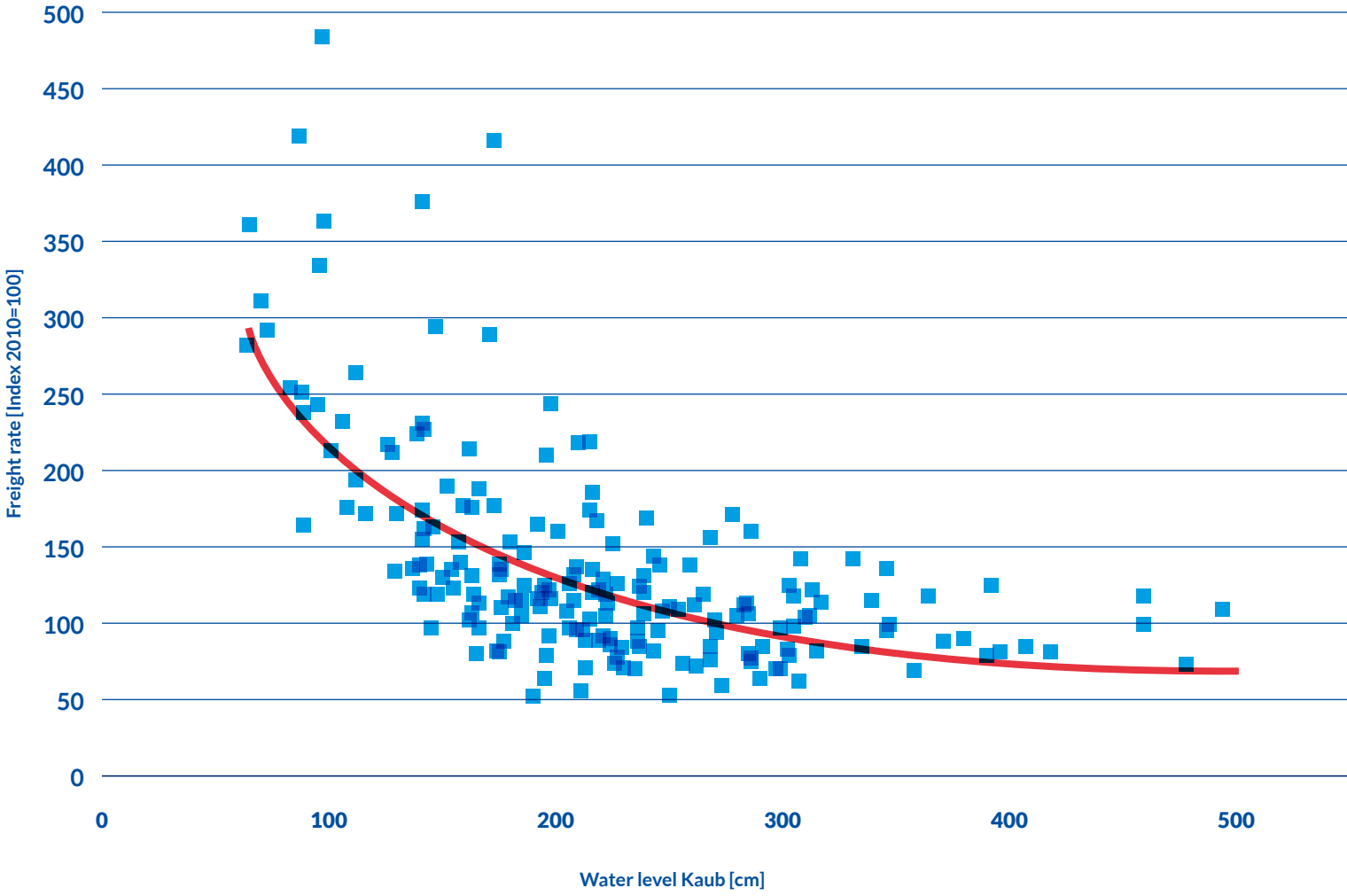
MAXIMUM LOADING DEGREES AT KAUB / MIDDLE RHINE FOR VESSELS WITH A DRAUGHT OF 2.5 AND 3 METERS, COMPARED WITH FREIGHT RATE INDEX*



*Source: CCNR analysis based on data from the German Federal Office of Hydrology and PJK International. * Freight rates in tanker shipping*

Water levels, vessels' loading degrees and freight rates are quite strongly interconnected. This connection also exists when data over a long time period are analysed. The following figure shows monthly data between January 2002 and March 2018. The relationship appears to be non-linear, and can be described by a power function as a trend curve: If water levels fall under a certain threshold, freight rates will increase more strongly than they would increase otherwise.

WATER LEVELS AT KAUB / MIDDLE RHINE COMPARED WITH FREIGHT RATE INDEX FOR TANKER SHIPPING ON THE RHINE (MONTHLY DATA, 1/2002-3/2018)

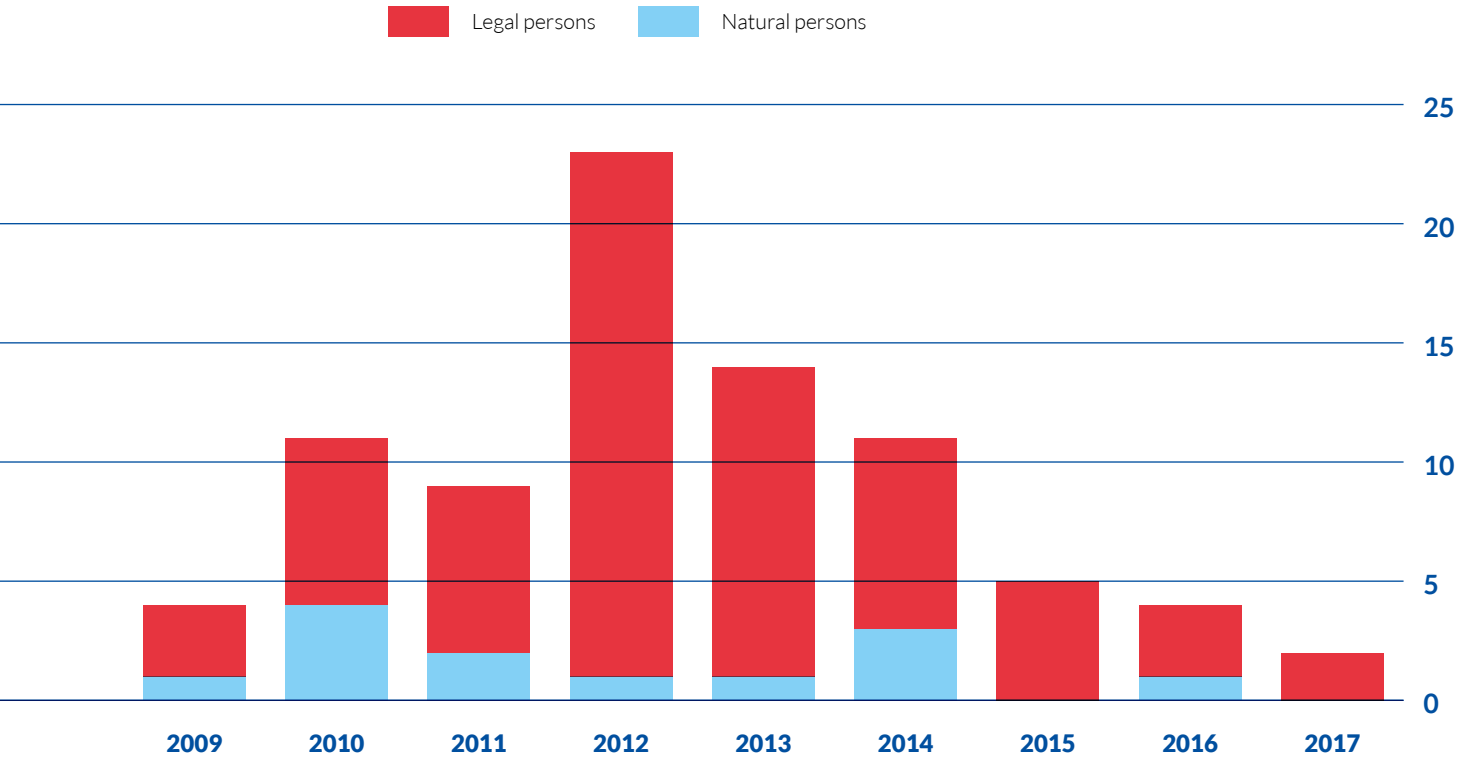


Source: CCNR analysis based on data from the German Federal Office of Hydrology and PJK International.

BANKRUPTCIES
AND CREATION OF NEW ENTERPRISES

The figure on the evolution of bankruptcies in IWT in the Netherlands (goods transport) shows a strong decrease of bankruptcies from 2012 onwards. The high number of enterprises that left the market in 2012 was a consequence of the financial crisis in 2009, which only came after a certain time delay. Overall, the figure shows that operating conditions in the sector are on an upwards path since 2012.

EVOLUTION OF THE NUMBER OF BANKRUPTCIES IN FREIGHT TRANSPORT IN THE NETHERLANDS*

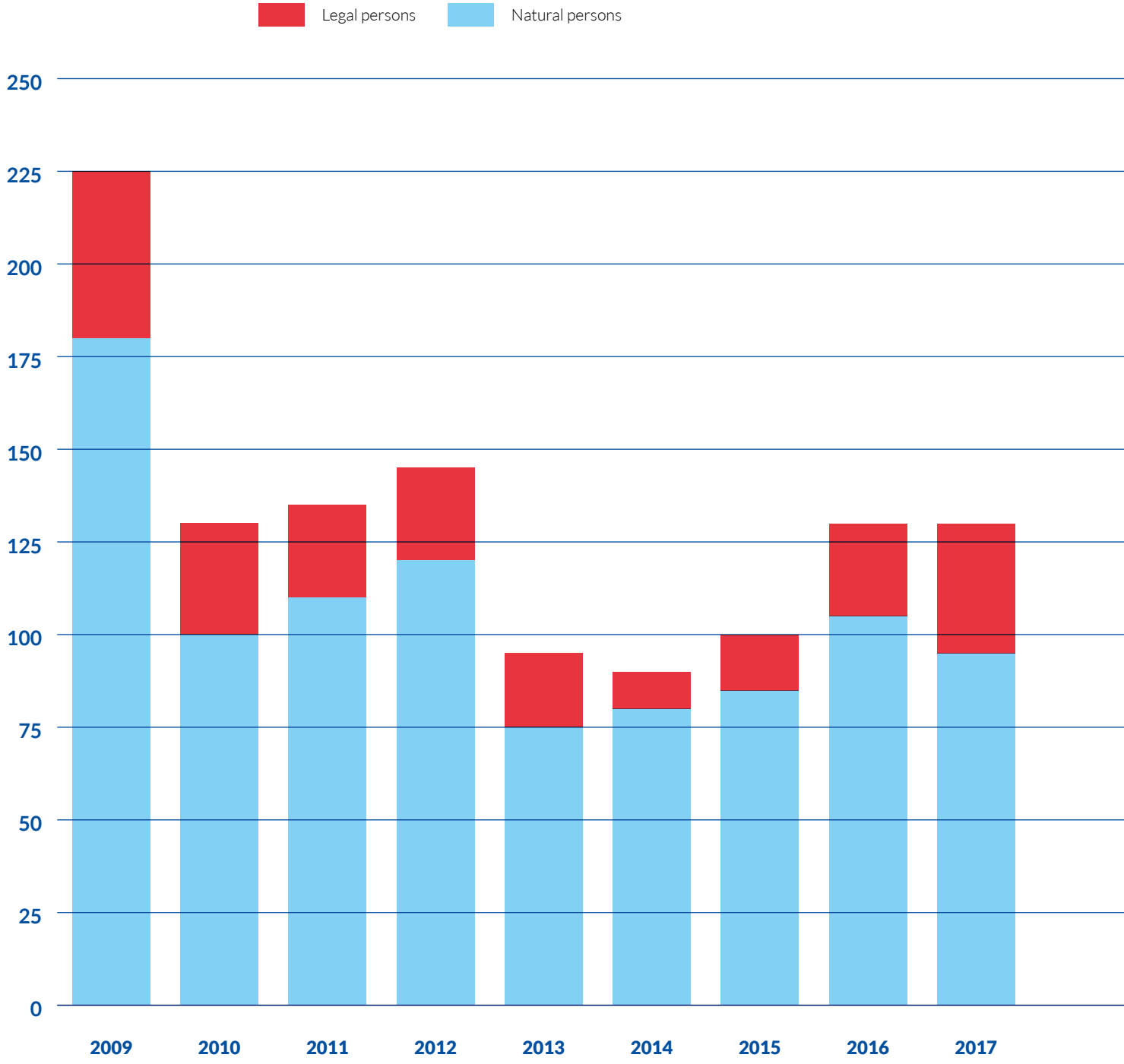


*Source: CBS *Bankruptcies in goods transport. Natural persons are single vessel owners.*

Although the majority of Dutch IWT owners are natural persons (and therefore single vessel owners), they only account for a small part of bankruptcies.

The high amount of new enterprises created in 2009 was still the result of the favourable economic conditions before the financial crisis breakout. In the years after 2009, new creation stabilised at a lower level and in 2016 and 2017, the numbers were higher than in 2013 and 2014. Also here, natural persons form the majority.

EVOLUTION OF THE NUMBER OF NEWLY CREATED ENTERPRISES IN FREIGHT TRANSPORT IN THE NETHERLANDS*



*Source: CBS *New enterprises in goods transport. Natural persons are single vessel owners.*

05

FLEET

- The size of the European fleet remained rather stable in 2017, although the newbuilding rate picked up.
- The Rhine fleet accounts for almost 10,000 vessels for goods traffic, and the Danube fleet for around 3,000 vessels.
- The Netherlands has the largest fleet within the Rhine fleet overall, with a share of around 50% of all tanker, dry cargo and push & tug vessels. Within the Danube countries, Romania accounts for a similar high share of all vessels.

FLEET SIZE EVOLUTION

More than **13,000** inland vessels were registered as active vessels in the Rhine and Danube basins in 2016/2017. The Rhine fleet dominates with a global share of **75%**.

In 2017, the size of the European fleet remained practically stable compared to 2016.

In Europe, there are around 10,000 inland vessels in Rhine countries, and more than 3,000 vessels in Danube countries. In Rhine countries, 72% of all vessels are dry cargo vessels (self-propelled units or dumb barges). Tanker vessels account for 15% and push & tug boats for 13%. In Danube countries, the share of dry cargo vessels is 75%, tanker vessels account for 7% and push & tug boats for 18%.

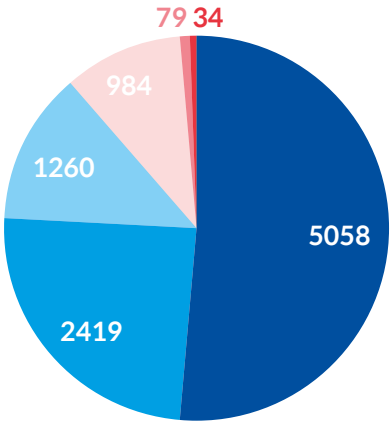
RHINE COUNTRIES

In 2017, 51% of all active vessels registered in Rhine countries flew a Dutch flag; 25% were vessels with a German flag, and the other 24% vessels were from Belgium, France, Luxembourg and Switzerland.

The majority of vessels operate in the dry cargo sector. Within the Dutch fleet, 70% of all vessels are self-propelled dry cargo vessels or dry cargo dumb barges. Within the Belgian and French fleets, the share of dry cargo vessels is even higher, with 82% and 95% respectively. The German fleet has relatively more tanker vessels, and the dry cargo share is “only” 66%. Switzerland and Luxembourg are countries where the share of tanker vessels reaches values above 50%: the share of tanker vessels is 86% for the Swiss fleet and 82% for the Luxembourg fleet.

EVOLUTION OF THE FLEET IN RHINE COUNTRIES

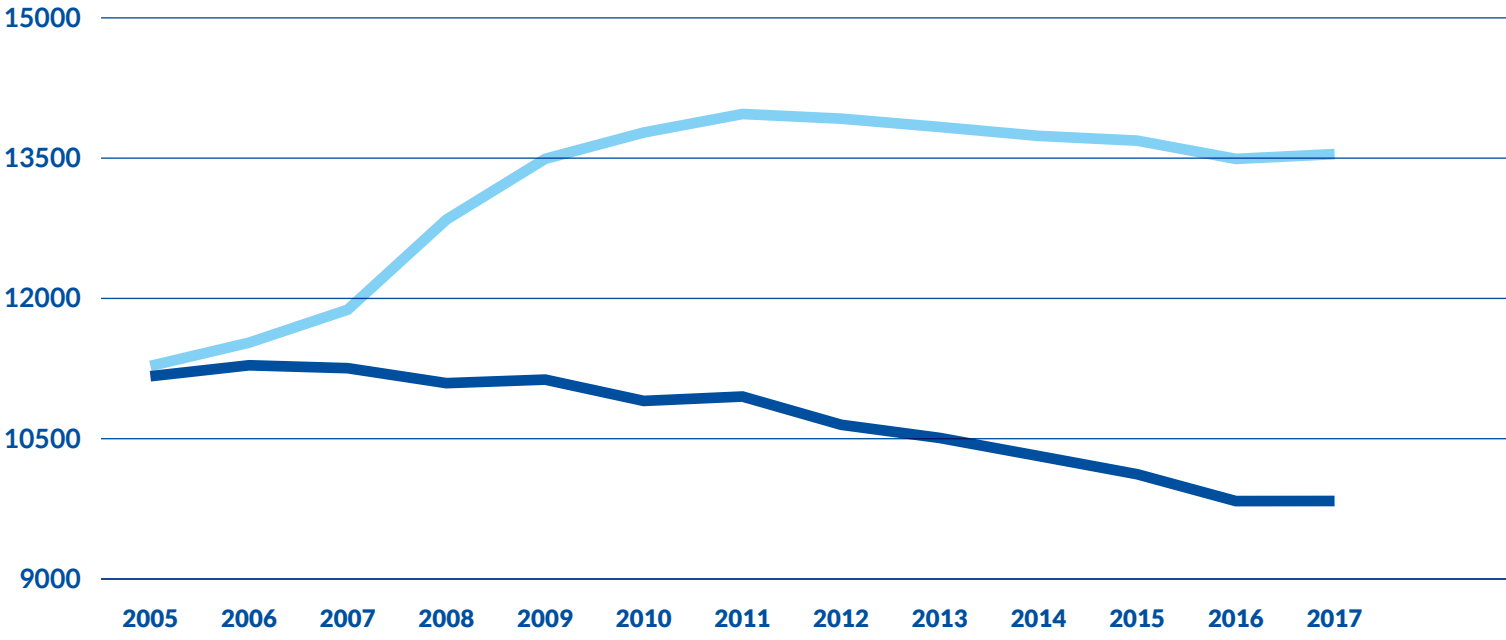
(NUMBER OF DRY CARGO, TANKER CARGO AND PUSH & TUG VESSELS)



*Source: CCNR analysis based on national administrations. *figures for Germany are for 2016*

EVOLUTION OF THE FLEET IN RHINE COUNTRIES

(NUMBER OF DRY CARGO, TANKER CARGO AND PUSH & TUG VESSELS)



Number of vessels

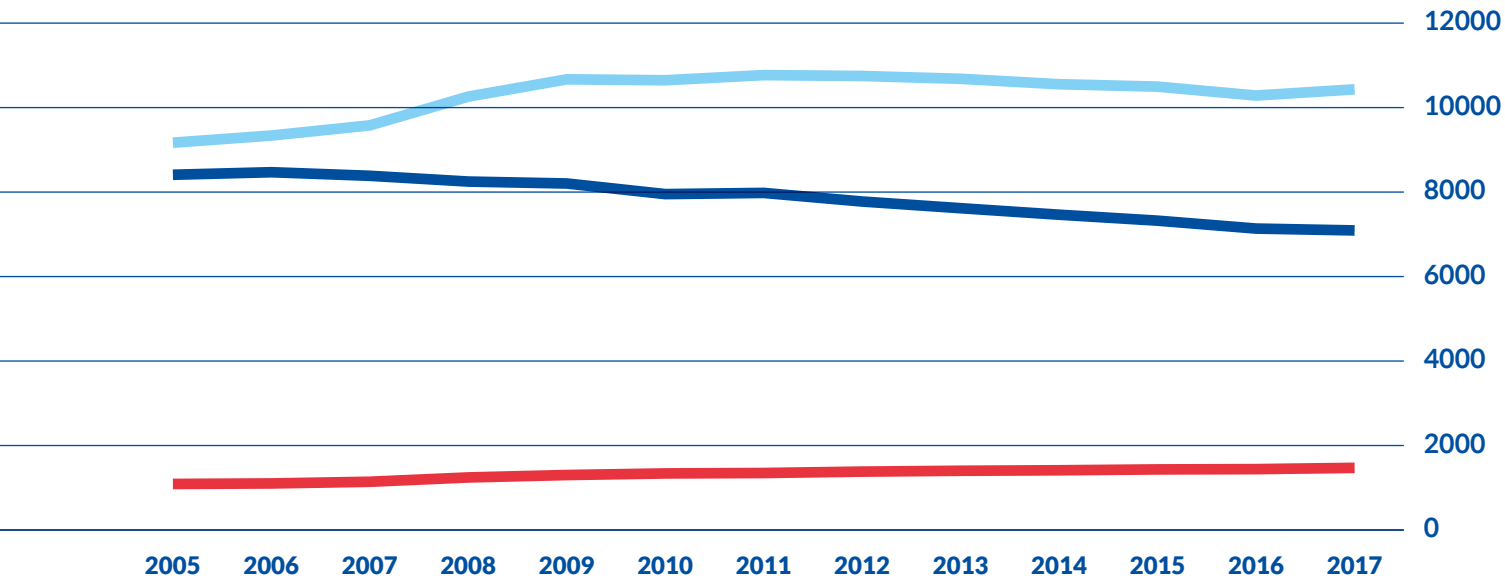
Total loading capacity (1000 t)

Source: CCNR analysis based on data from national administrations.
Note: For Germany, data indicated for 2017 are from 2016.

The number of vessels followed a declining trend during the last decade. But in the years 2016 and 2017 there was an increase in the newbuilding rate, which was able to bring the decline of the Rhine fleet to a halt. Concerning the total loading capacity, it was not reduced during the last decade, unlike the number of vessels. The reasons are that smaller vessels left the market and vessels with a higher loading capacity were added to the market, especially prior to 2010.

In 2017, the loading capacity of dry cargo and liquid cargo units in Rhine countries amounted to 13.5 million tonnes. The number of vessels (including push & tug boats) amounted to more than 9,800 units.

EVOLUTION OF THE DRY CARGO FLEET IN RHINE COUNTRIES



Loading capacity (1000 t)

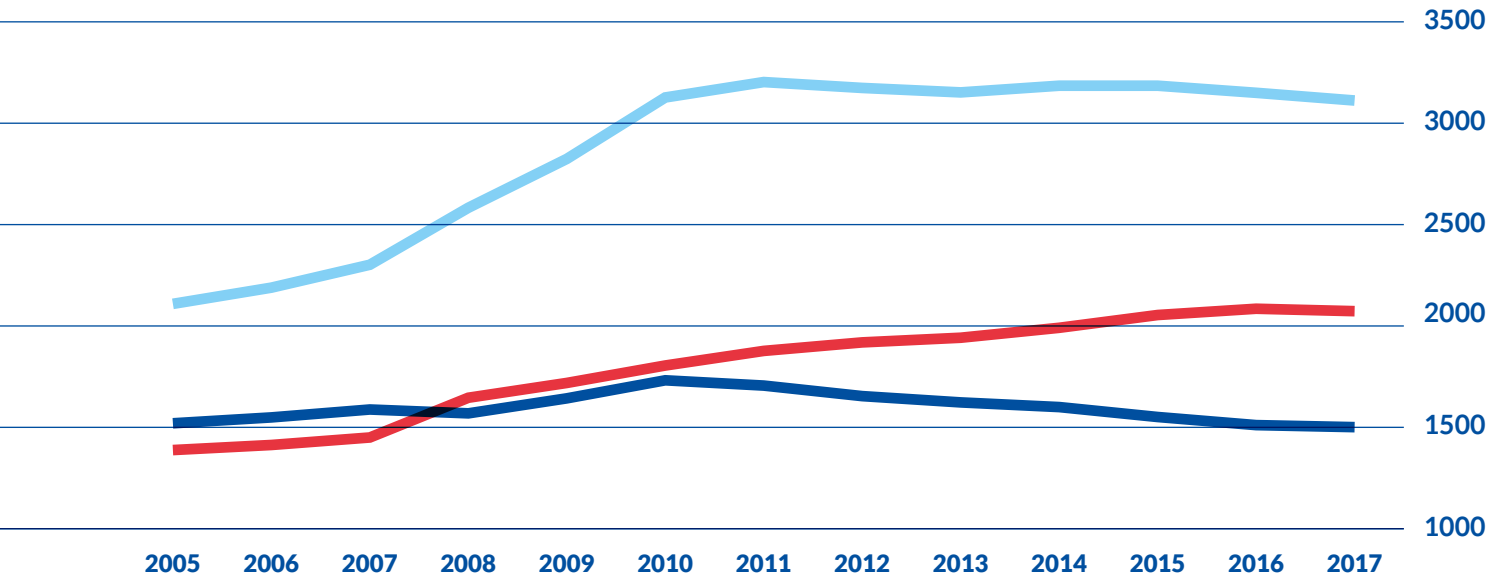
Number of vessels

Average loading capacity (t)

Source: CCNR analysis based on data from national administrations.
Note: For Germany, data indicated for 2017 are from 2016.

In the **dry cargo** segment, the number of vessels decreased further in 2017; but due to a rising newbuilding rate, and larger vessels coming on the market, the total loading capacity did not parallel this decrease. 50% of all dry cargo vessels in the Rhine fleet had a Dutch flag in 2017, 22% a German flag, 15% a French flag, and 13% a Belgian flag. Switzerland's and Luxembourg's shares were below 0.1%.

EVOLUTION OF THE TANKER CARGO FLEET IN RHINE COUNTRIES



Loading capacity (1000 t)

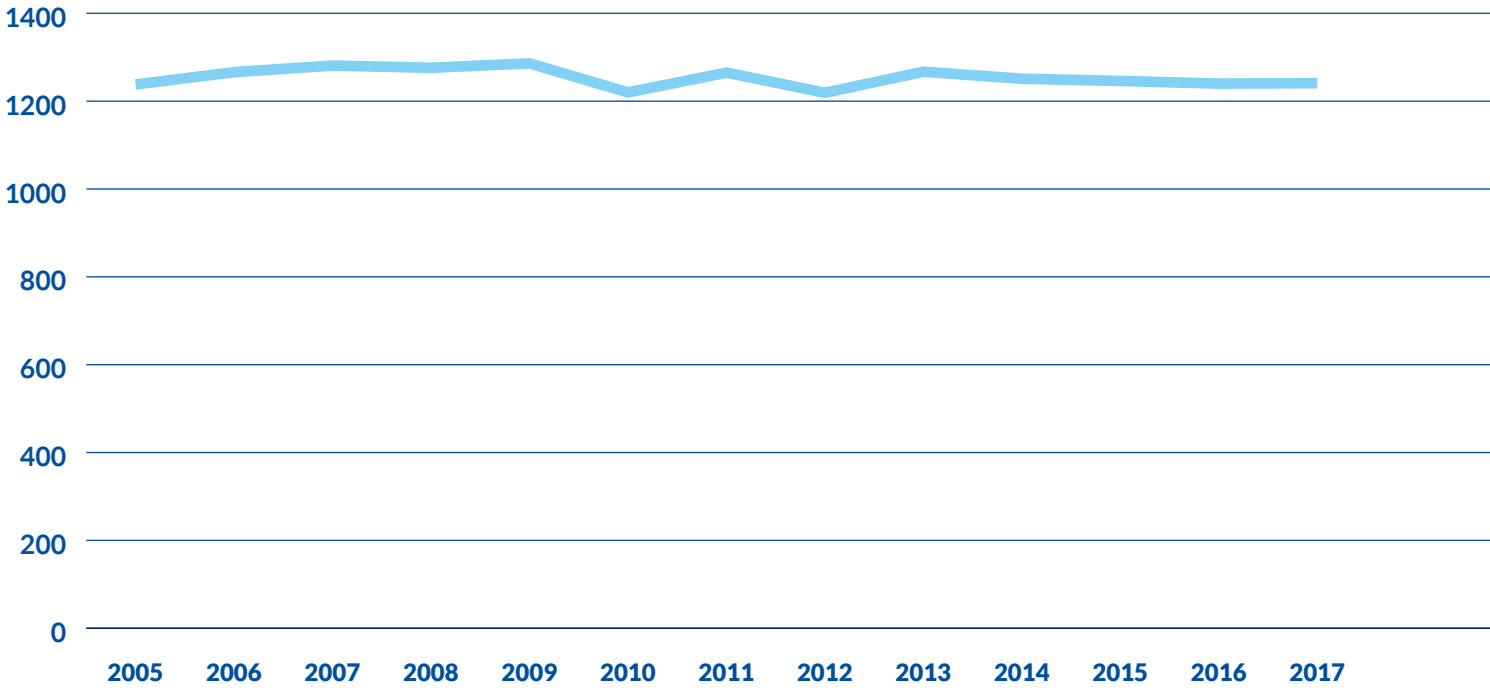
Number of vessels

Average loading capacity (t)

Source: CCNR analysis based on data from national administrations.
Note: For Germany, data indicated for 2017 are from 2016.

In **tanker shipping**, the total number of vessels continued to decrease in 2017, to a value of 1,501 units, but the decrease was quite limited when compared to the previous years. The total loading capacity was more or less stable, keeping a level at around 3.1 million tonnes. The average loading capacity per vessels surpassed the swell of 2,000 tonnes.

EVOLUTION OF THE PUSH & TUG FLEET IN RHINE COUNTRIES (NUMBER OF VESSELS)



Source: National administrations, CCNR analysis. Note: For Germany, data indicated for 2017 are from 2016.

The **push & tug** fleet remained almost stable at a level of slightly more than 1,200 units over a decade, in all Rhine countries except France. At present, the Belgian fleet of push & tug boats follows a decreasing trend, while the fleet in the Netherlands is growing.

DANUBE COUNTRIES

75% of all 3,214 vessels in the Danube fleet are dry cargo vessels. 18% are push or tug boats and 7% are tankers.

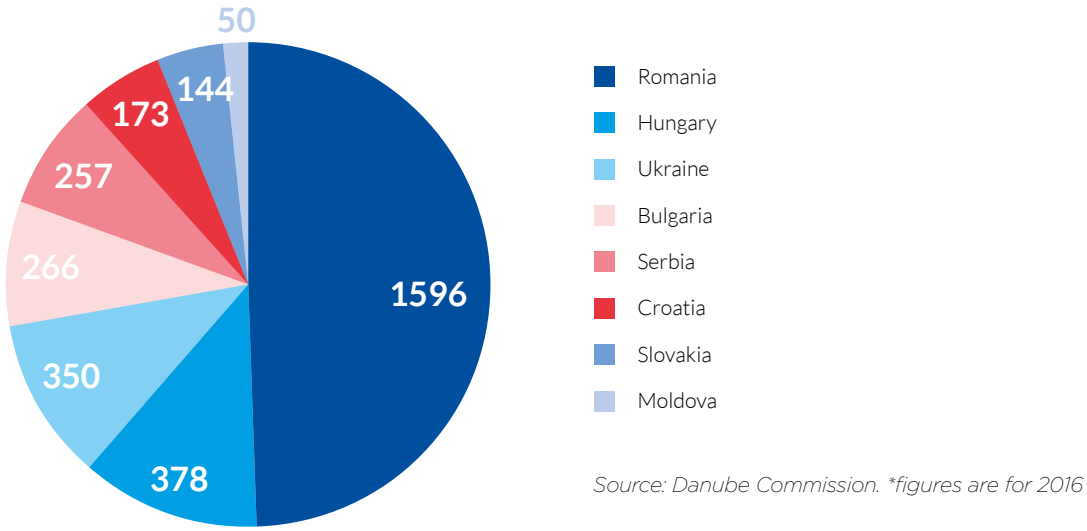
Within the 2,424 dry cargo vessels, 84% are dumb barges (non-self-propelled vessels).

The total loading capacity of the Danube fleet amounts to 3.4 million tonnes, of which 93% is dry cargo tonnage and only 7% liquid cargo tonnage.

Romania has the largest Danube fleet with a 50% share in the number of vessels and a 48% share in the total loading capacity. The Romanian fleet has been increasing for several years, while the fleets of other Danube countries – in particular those from Hungary, Slovakia and Serbia – are shrinking.

STRUCTURE OF THE FLEET IN DANUBE COUNTRIES

(NUMBER OF DRY CARGO, TANKER CARGO AND PUSH & TUG VESSELS) **BY NATIONALITY***

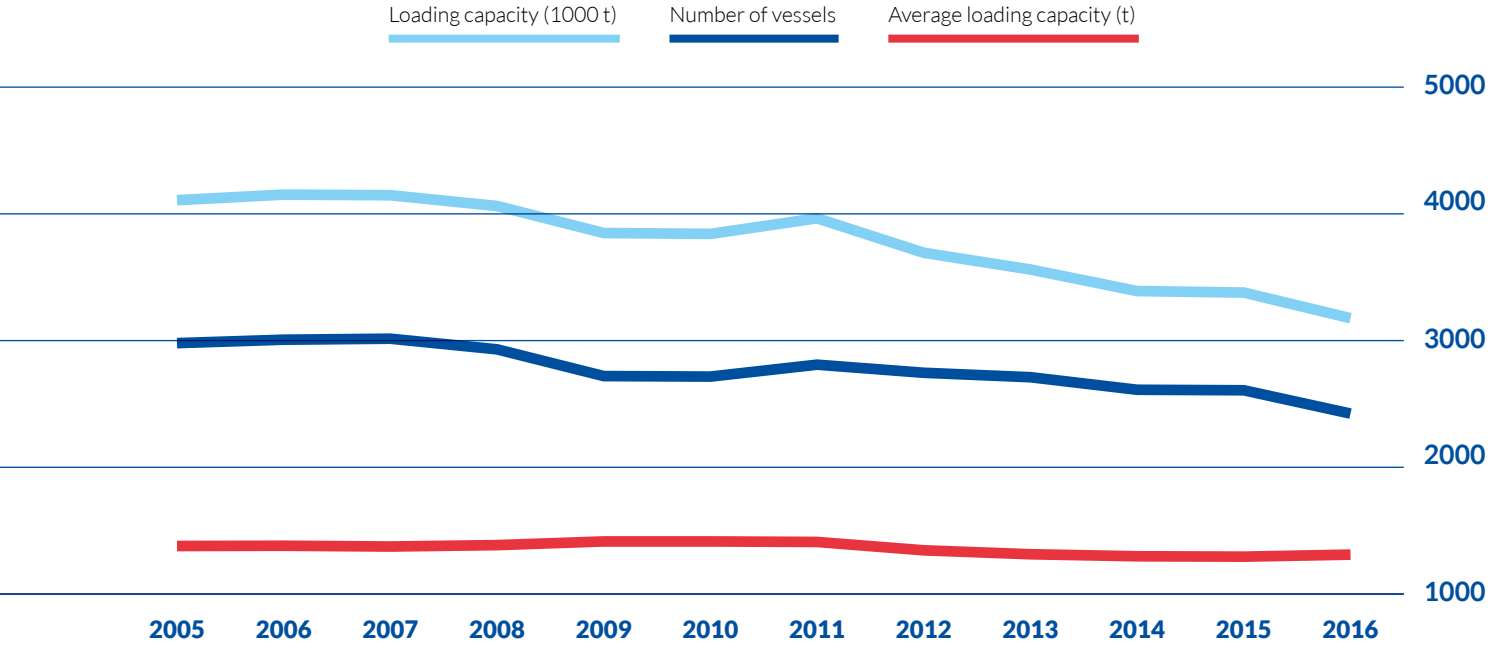


*Source: Danube Commission. *figures are for 2016*

In 2016, Ukrainian vessels had the highest average loading capacity in Danube countries, with an average tonnage of 1,547 tonnes for dry cargo vessels, and 1,667 tonnes for tanker vessels. In the dry cargo segment, Slovakian vessels (1,535 tonnes) and Bulgarian vessels (1,495 tonnes) were ranked 2 and 3 behind the Ukraine. The smallest dry cargo vessels are to be found in Croatia (807 tonnes).

Only 406 out of 2,536 **dry cargo** vessels in Danube countries were self-propelled. The reason for this rather low share has to do with the different types of operation on the Danube. The push boat and tug boat operation with barges – often in the form of convoys involving up to 16 barges being pushed by push boats – is of high importance on the Danube. The share of self-propelled vessels is thus lower than in Rhine countries.

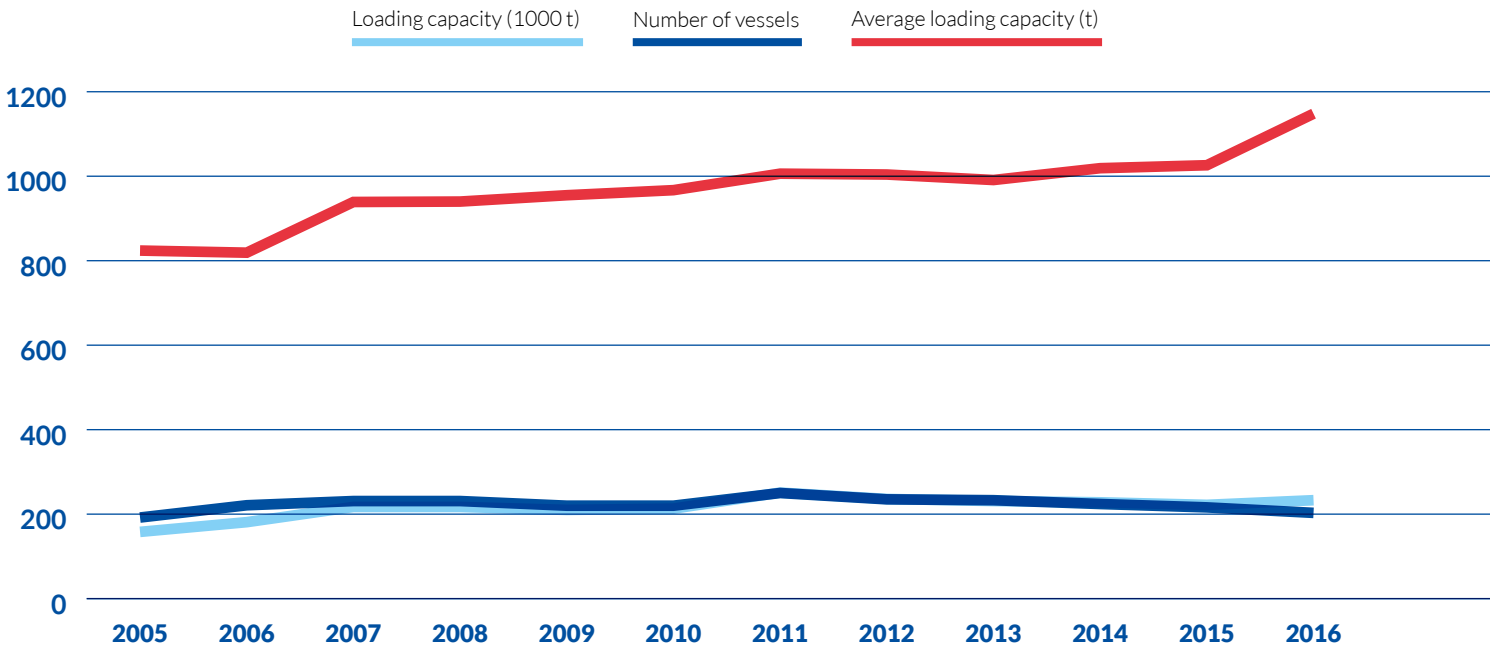
EVOLUTION OF THE DRY CARGO FLEET IN DANUBE COUNTRIES



Source: Danube Commission

The **tanker sector** is dominated by the Romanian fleet which has a share of 46%, followed by Serbia (18%), Croatia (14%) and Bulgaria (9%). With a total of 203 tanker vessels registered in Danube countries, the tanker fleet segment only has a share of 6% of the total Danube fleet.

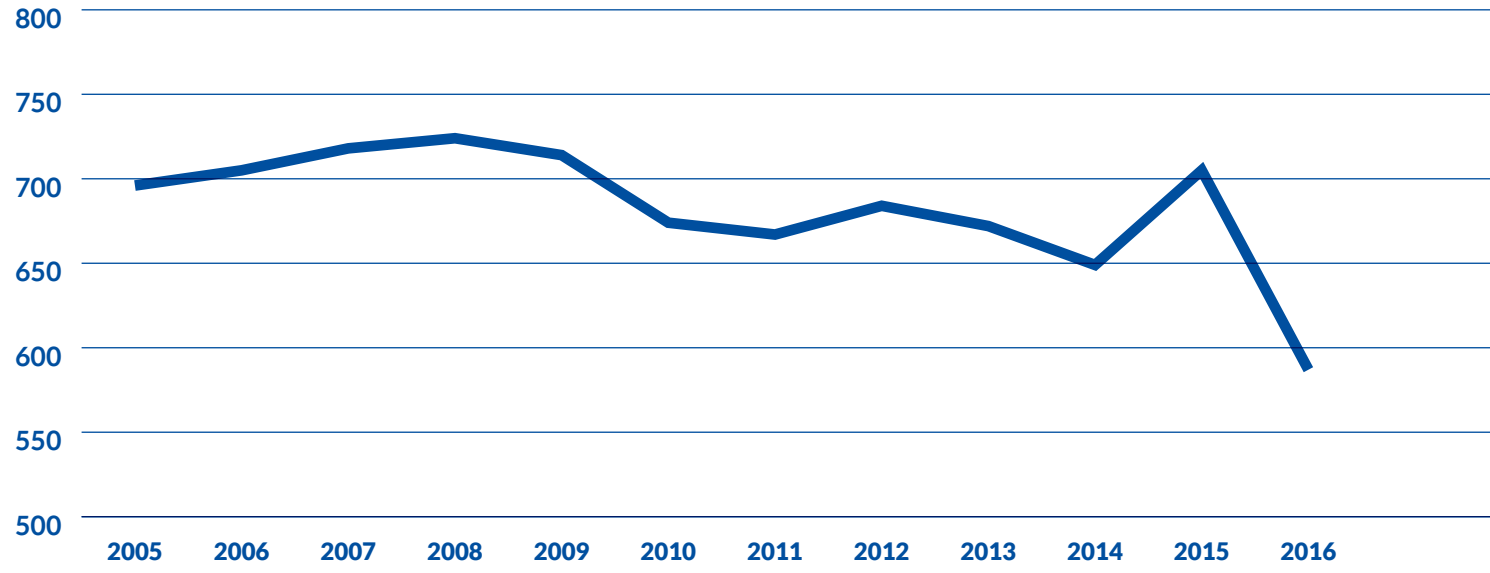
EVOLUTION OF THE TANKER CARGO FLEET IN DANUBE COUNTRIES



Source: Danube Commission

Similarly, the Ukrainian vessels have the highest average loading capacity, with 1,667 tonnes. Romanian tanker vessels are amongst the smallest, with an average of only 925 tonnes.

EVOLUTION OF THE PUSH & TUG FLEET IN DANUBE COUNTRIES (NUMBER OF VESSELS)



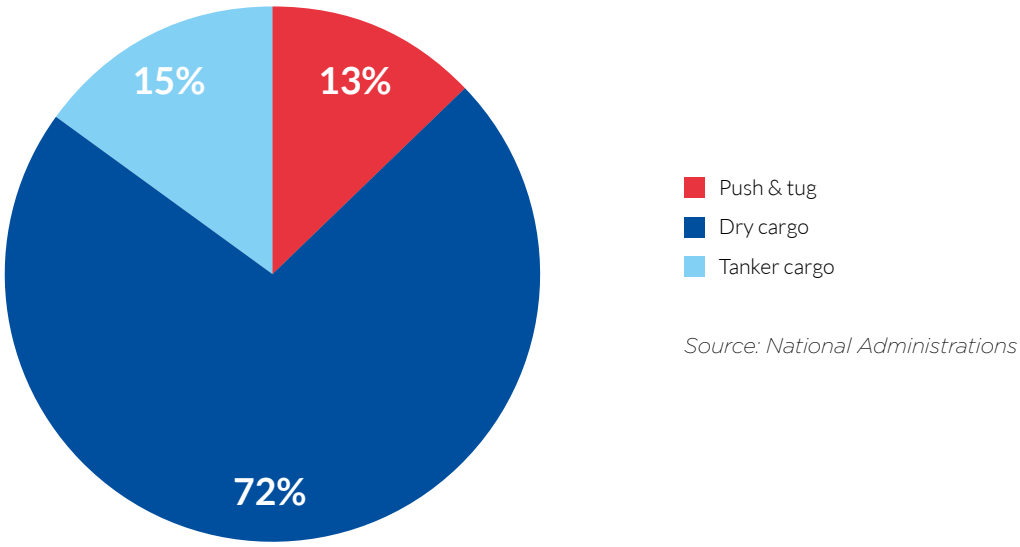
Source: Danube Commission

The number of **push & tug vessels** slightly decreased from 2010 onwards, mainly due to the reduction of the Ukrainian (-25%) and Hungarian (-27%) fleets. From 2015 to 2016, the strong decrease was due to a reduction of Serbian push and tug boats. The Romanian fleet, having been reduced until 2014, has grown very strongly during 2015 and 2016. Romania is in fact the only country where the number of push & tug boats has increased since 2005. In all other countries, there were negative trends.

Comparison between Rhine and Danube structure of the fleet (2016/2017)

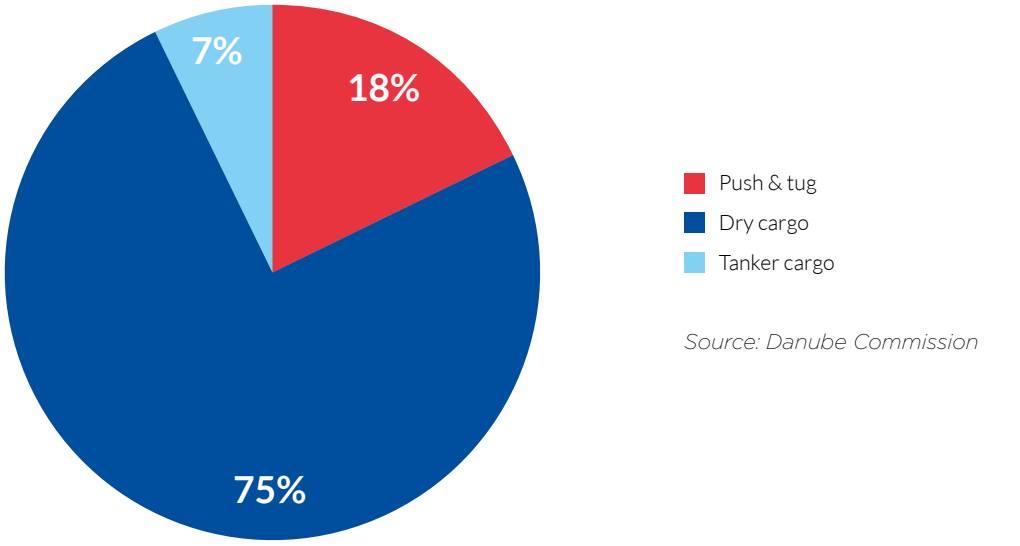
The structure of the fleet in Rhine and Danube countries is similar - most of the vessels transport dry cargo bulk. In 2016/2017, a total of about 7,100 and 2,400 dry cargo vessels operated in the Rhine and Danube countries respectively. In tanker shipping, the structure differs slightly. As the sector has more activity in the Rhine region, more vessels operate in this area (15%). About 1,500 tanker vessels were active on the Rhine as compared to 203 vessels operating in the Danube area. The push & tug fleet represents a higher percentage than tanker vessels in the Danube fleet structure, showing that the operational mode of convoy traffic is quite important on the Danube.

RHINE STRUCTURE OF THE FLEET



Source: National Administrations

DANUBE STRUCTURE OF THE FLEET



Source: Danube Commission

NEW VESSEL CONSTRUCTION

In 2017, the dry cargo tonnage added to the market was about

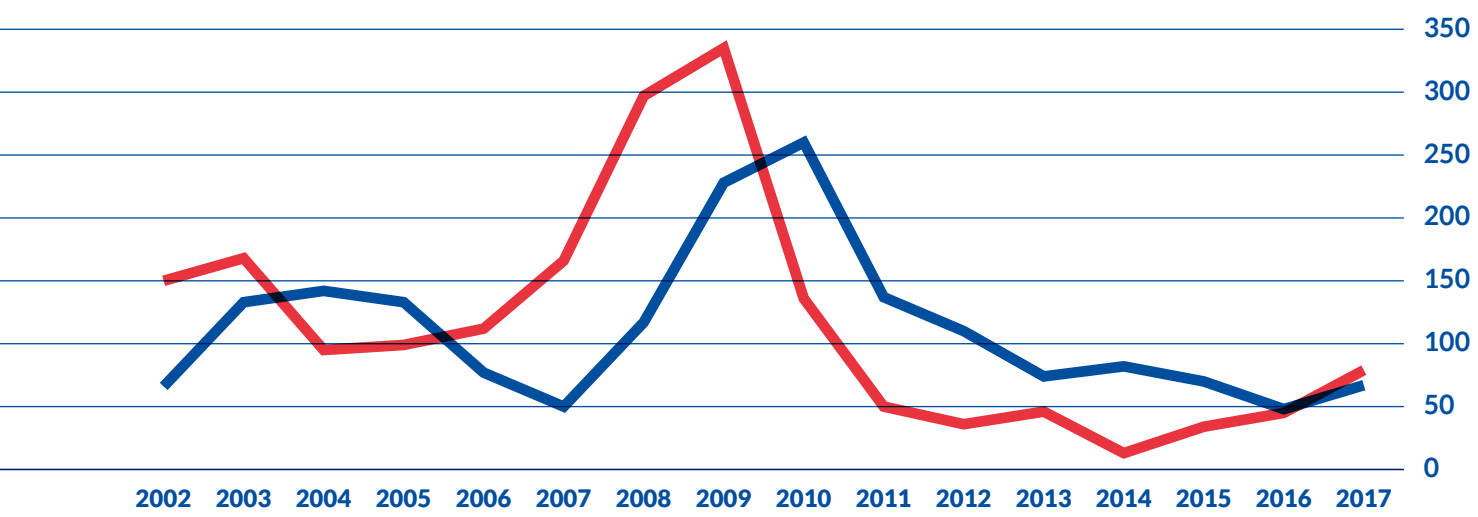
75%

higher than in 2016

In 2017, the newbuilding rate in western Europe picked up significantly compared to the years before. This was the case for the dry cargo vessels as well as for the tanker vessels. 28 new dry cargo vessels with a total capacity of about 80,000 tonnes meant an increase of 75% (both in numbers and in capacity) compared to the previous year. The newbuilding rate in the dry cargo segment is pursuing its recovery, after its low point in 2014.

The tanker cargo segment also increased its newbuilding rate in 2017. There were 27 new vessels, with a total capacity of 67,000 tonnes. The increase by 35% in numbers and by 40% in tonnage was less strong than in the dry cargo segment. This is explained by the fact that the tanker segment had already invested heavily in new capacities in the previous years, due to the conversion from single hull to double hull ships.

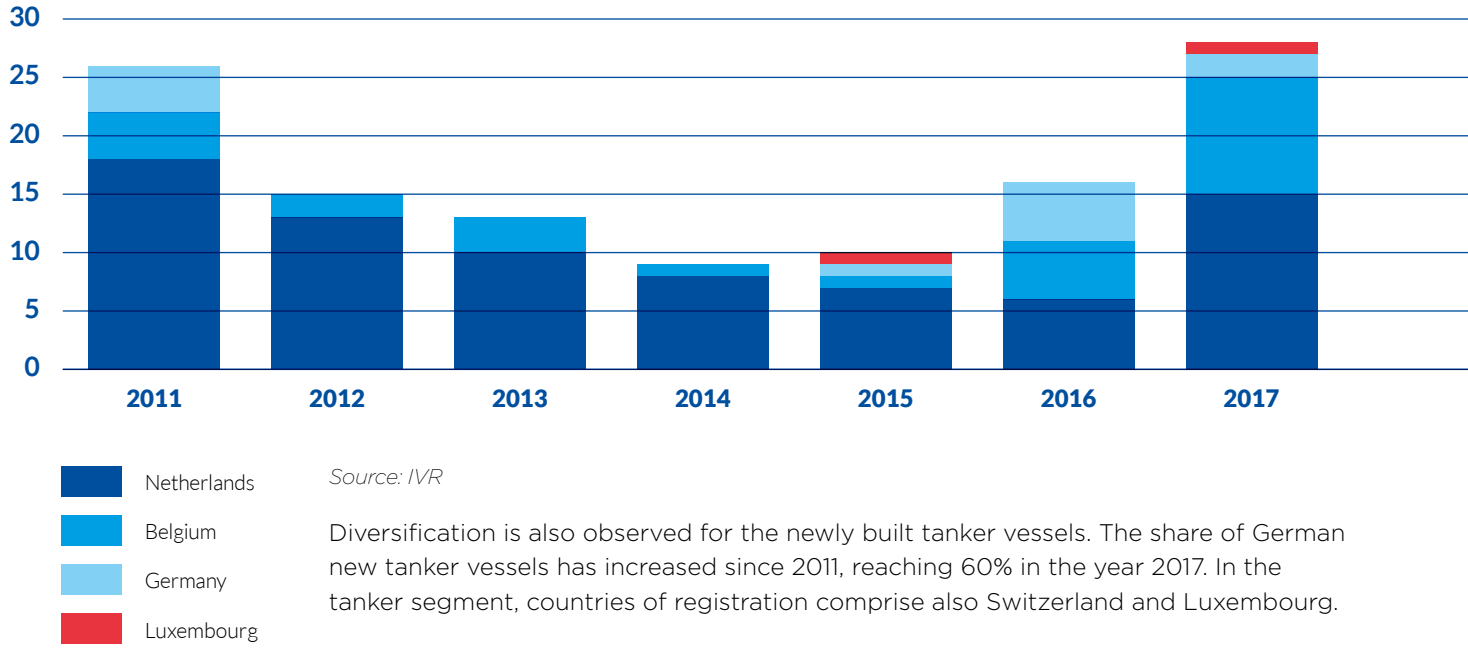
NEW CAPACITY COMING ON THE MARKET IN DRY AND TANKER CARGO SECTORS
(TONNAGE 1000 T)



Source: IVR

In 2016 and 2017 there was more diversification within the countries of registration of new vessels. For example, in 2017, 13 out of 28 new dry cargo vessels - therefore about one half of all new vessels in that year - were registered in Belgium, Germany and Luxembourg. The remaining 15 vessels were registered in the Netherlands. But in the years 2012-2015, and especially in 2014 when newbuilding rates reached their low points, almost all new vessels came from one country only, the Netherlands.

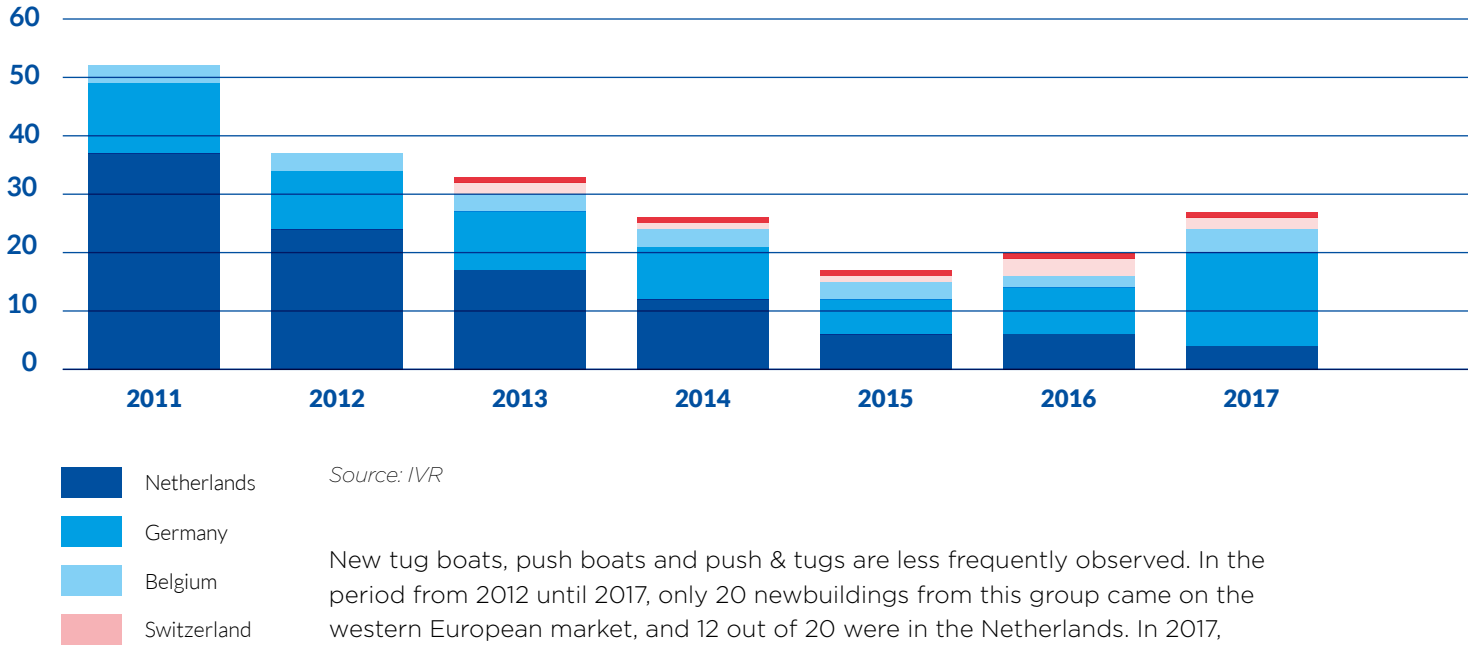
NEW DRY CARGO VESSELS COMING ON THE MARKET PER COUNTRY OF REGISTRATION
(NUMBERS, 2011-2017)



Source: IVR

Diversification is also observed for the newly built tanker vessels. The share of German new tanker vessels has increased since 2011, reaching 60% in the year 2017. In the tanker segment, countries of registration comprise also Switzerland and Luxembourg.

NEW TANKER VESSELS COMING ON THE MARKET PER COUNTRY OF REGISTRATION
(NUMBERS, 2011-2017)

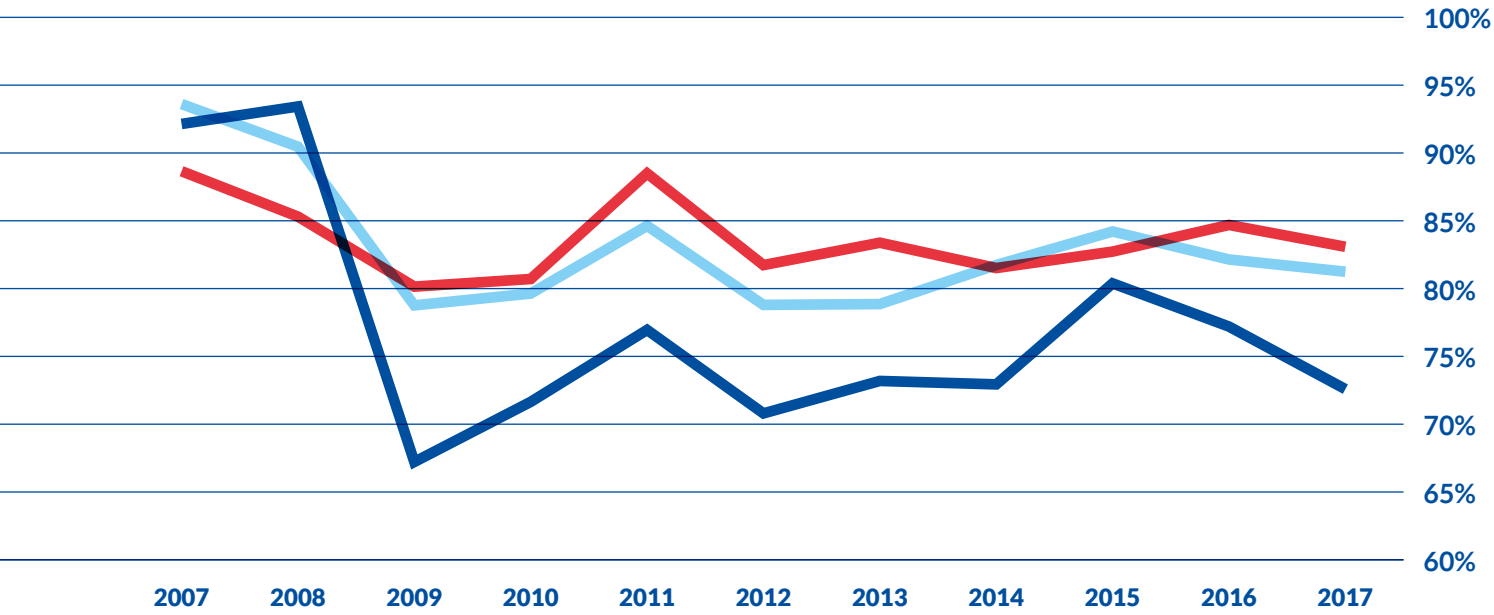


Source: IVR

New tug boats, push boats and push & tugs are less frequently observed. In the period from 2012 until 2017, only 20 newbuildings from this group came on the western European market, and 12 out of 20 were in the Netherlands. In 2017, there were four newbuildings, two in Germany, one in the Netherlands and one in Luxembourg.

CAPACITY MONITORING

CAPACITY UTILISATION RATES IN DRY CARGO SHIPPING (%)



Source: Panteia and CCNR

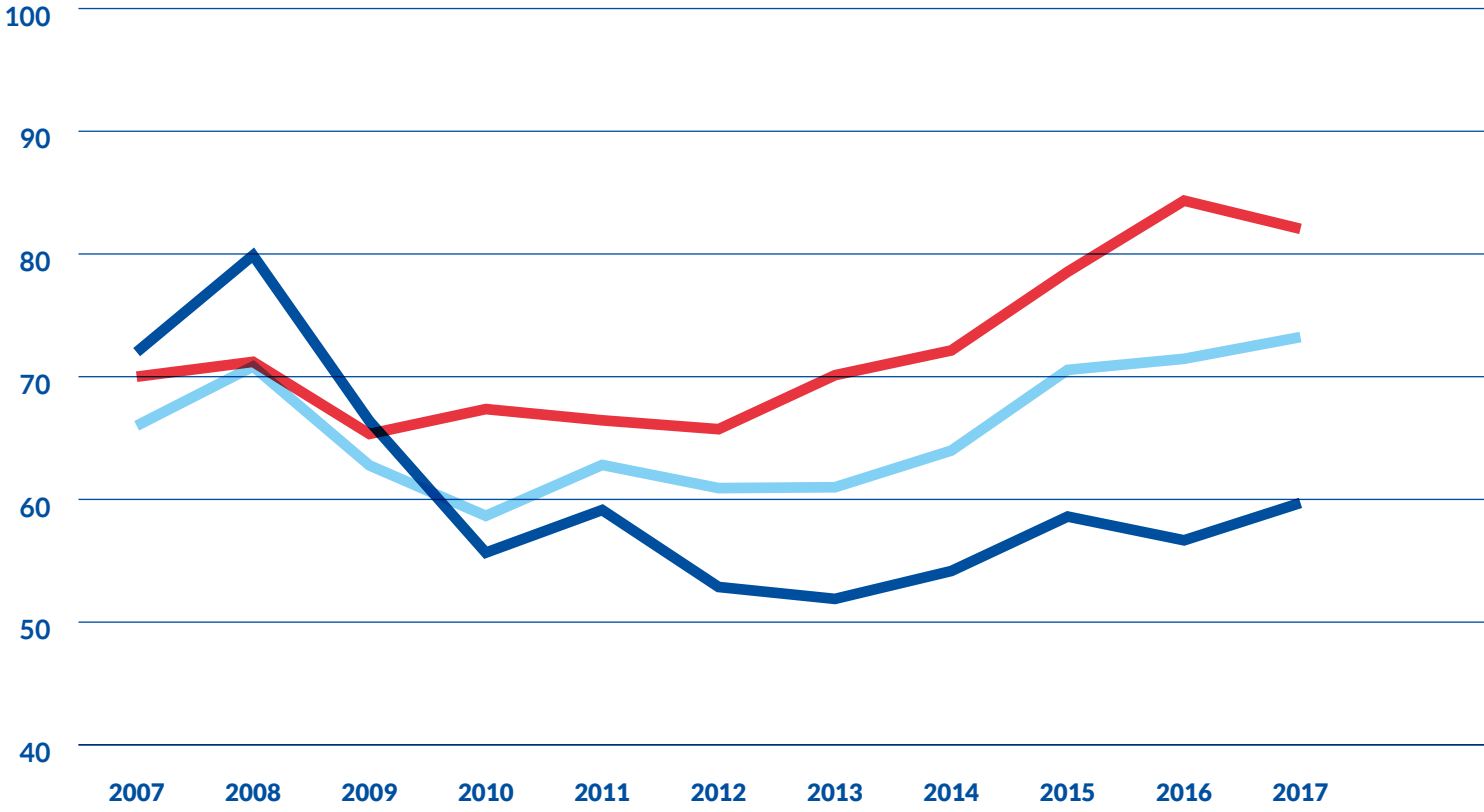
In 2017, the average utilisation rate of the dry cargo fleet dropped compared to 2016. In the corresponding graph, the evolution of the demand/supply ratio in inland navigation is plotted for the different cargo segments. It can be noted that vessels over 2,000 tonnes contributed to the decline.

The major reasons for this decline are negative growth rates for specific cargo segments which are of great importance for these vessel categories (coal and ore, due to the closure of coal plants) but on the other hand, better water conditions as compared to 2016.

In 2016 low water levels were prominent from October to December, whereas in 2017 there were only low water levels in January. Capacity utilisation remained high for the vessel categories with up to 1,000 tonnes of loading capacity, and for the vessel category from 1,000 to 2,000 tonnes, despite the higher water levels.

Although the dry cargo fleet shows a structural recovery from the crisis, fleet utilisation rates still did not reach the values of 2007 and 2008. This is mainly due to a large increase in the fleet capacity. These developments still show indications of overcapacity in the dry cargo fleet. However, it should be noted that overcapacity only exists for the category of largest vessels.

CAPACITY UTILISATION RATES IN DRY CARGO SHIPPING (%)



Source: Panteia and CCNR

In 2017 the average utilisation rate of the liquid cargo fleet rose by 3% to 64%. The major reason for this increase is the decommissioning of single hull tankers and the increase in transport performance (more hinterland forwarding and less inter-port traffic).

Due to the obligation for transporting almost all kinds of liquid commodities in double hull vessels from 2019 onwards, nearly all single-hull tankers have recently been discarded. Low water levels in the past years delayed the decommissioning of these tankers. Last year, this mainly affected the tankers larger than 2,000 tonnes.


7502

06

URBAN LOGISTICS, A NEW GROWTH OPPORTUNITY FOR INLAND WATERWAY TRANSPORT

- **Most large European cities are confronted with important challenges with regards to urban logistics: increasing cargo flows, road congestion, air pollution, and demographic density.**
- **In this specific context, inland waterway transport can provide solutions to these challenges by absorbing the segment of urban logistics.**
- **The case of Paris, with the integration of inland shipping into logistical chains for large construction projects, shows that urban logistics represent a market segment with high potential.**

HISTORICAL BACKGROUND

Inland waterways played a prominent role in the industrialisation of major European cities as they originally represented the main corridors for freight transport. The "Canal Mania" period in the late 18th century in Britain, characterised by intense canal building to transport high volumes of coal to cities and factories, reflects the importance of inland waterways during the industrial era. On the European continent, industrialisation occurred later - in the 19th century - but is also characterised by a strong link between IWT development and economic expansion of cities. The use of the Rhine as the main transport axis has significantly contributed to the industrialisation of cities such as Strasbourg or Mannheim.[6] In the late 19th and the early 20th centuries, inland waterways and ports became centres of industrial activity in many European cities.

Moreover, the use of inland waterways as main transport corridors during this period had a significant impact on the geographic distribution of big cities. Cities crossed by waterways could benefit from this resource to encourage industrialisation and urbanisation so that even today, the geographic location of major European metropolitan areas is linked to their closeness to inland waterways.

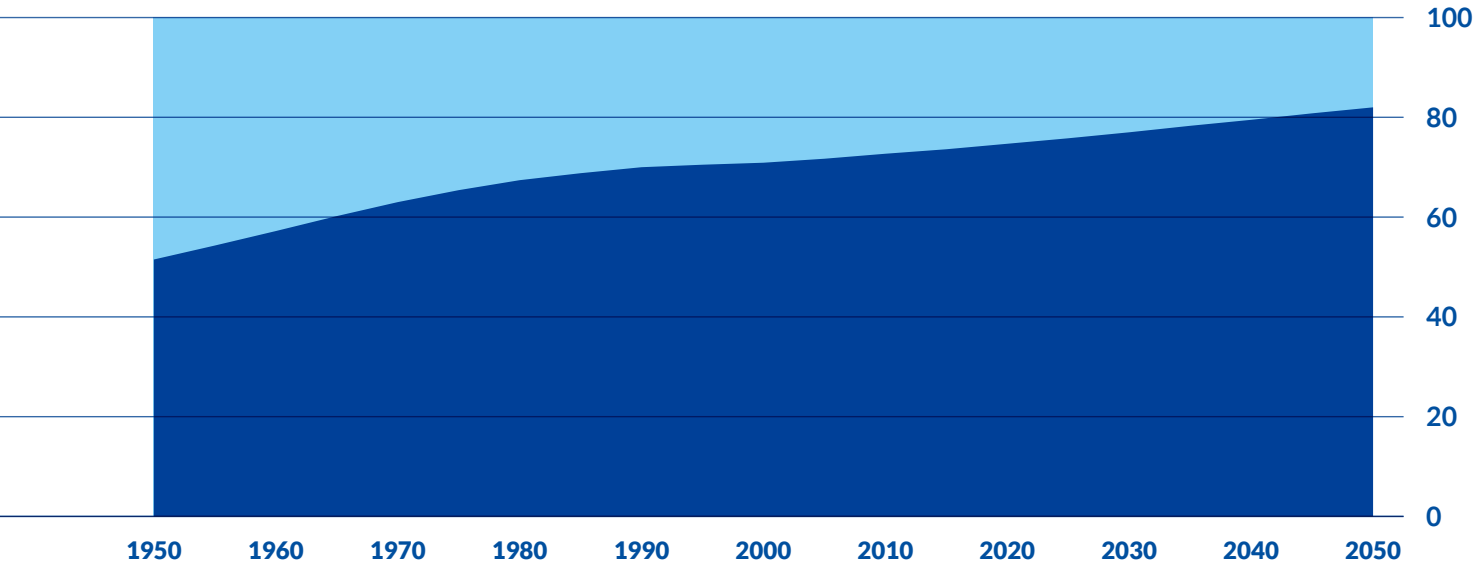
Nevertheless, the competitive pressure due to the increase in railways in the 18th century has led to the progressive shift of freight transport from rivers to rail. Progressively, rivers, canals and port spaces in urban areas were considered more for their symbolical capital and used for urban development projects than for the productive and logistic potential they represent for city centres.

[6] *Source: Kriedel, N. (2015)*

TODAY'S ENVIRONMENTAL AND URBAN CHALLENGES

Nowadays, large agglomerations are facing important challenges at the demographic, economic and environmental levels. Most European countries are characterised by a long-run process of urbanisation which increases demographic pressure in urban areas. In 2017, people living in cities represented 74% of the total population in Europe, and in 2050, urban population could reach 82% of the total population. This phenomenon is even more important in western European countries such as France, Belgium and the Netherlands.

SHARE OF URBAN AND RURAL POPULATIONS IN EUROPE BETWEEN 1950 AND 2030
(% OF TOTAL POPULATION)

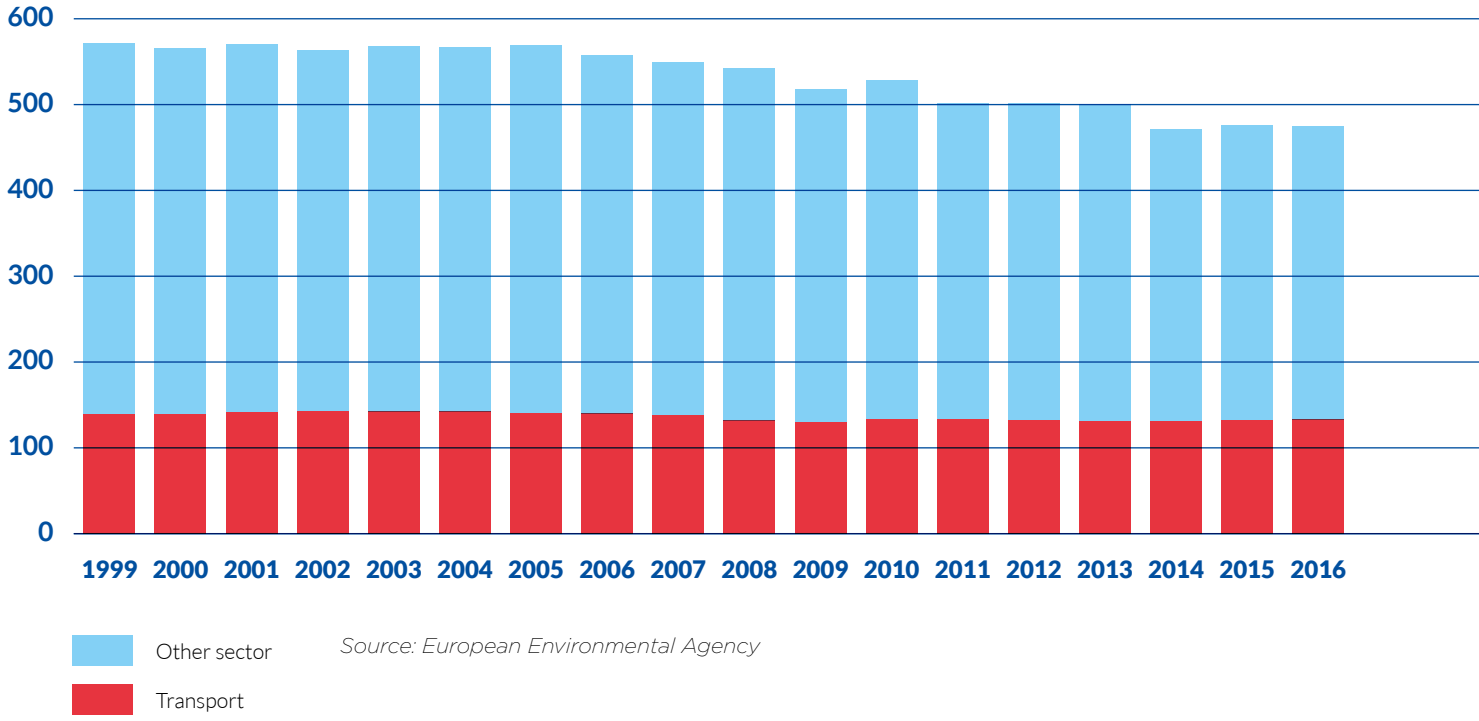


Source: World urbanisation prospects – United Nations, Department of Economic and Social Affairs, Population Division (2014)

The densification of urban areas has generated an important increase and concentration of transport flows in large cities. Road transport is by far the dominant mode of transport and represents 76% of total freight transport in the European Union, compared with 18% for rail transport and 6% for IWT. Consequently, roads are characterised by a high degree of saturation and metropolitan areas are confronted with important road congestion. This generates negative externalities such as air pollution, increasing noise in city centres and accidents.

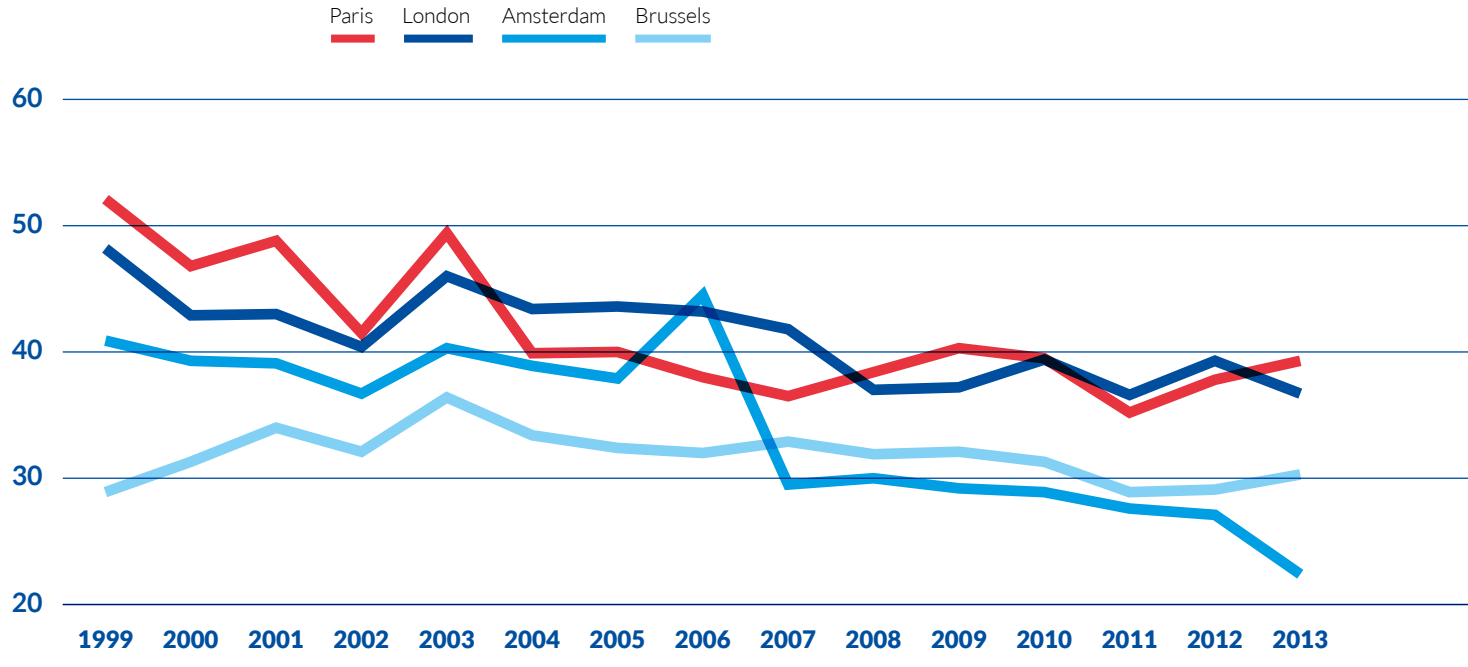
The transport sector is one of the most polluting sectors. In France, although greenhouse gas emissions decreased by approximately 100 million tonnes of CO_2 equivalent between 1999 and 2015, the share of transport in pollutant emissions has risen from 24% to 28% over the same period.

STRUCTURE OF GREENHOUSE GAS EMISSIONS IN FRANCE
(MILLION TONNES OF CO_2 EQUIVALENT)



Source: European Environmental Agency

AVERAGE CONCENTRATION OF NITROGEN DIOXIDE IN SELECTED EUROPEAN CITIES BETWEEN 1999 AND 2013 (µG/M³)



Source: Eurostat [urb_cenv]

Even though in recent years air quality has been improving in European agglomerations such as Paris, London, Brussels and Amsterdam, the impact of road transport in terms of air pollution is still significant. However, energy transition is occurring in most European countries and important initiatives are being taken to mitigate climate change, namely in the sector of transport, both at the national and European levels.

In this context of green reindustrialisation, inland waterway transport can be regarded as an opportunity to restructure logistic chains to reduce environmental impact of freight transport in dense urban areas. The example of Paris shows that apart from environmental concerns, a change of the modal split in favour of IWT would constitute an important economic potential for urban logistics.

ADVANTAGES OF IWT IN URBAN AREAS: EXPERTS' POINT OF VIEW

Inland waterway transport generates positive externalities which can foster the modal shift towards inland waterways in urban agglomerations. Indeed, inland shipping offers significant potential for the development of urban logistics both from economic and environmental aspects.

- First, the development of inland waterway transport in dense urban areas would have a positive impact on urban mobility. Contrary to road freight, inland waterway transport is an unsaturated mode of transport. It allows access to the centre of many large agglomerations without congestion issues. Besides, the ongoing process of road closures in large cities such as Paris so as to decrease pollution and noise can be regarded as an opportunity for a modal shift towards IWT.

- Secondly, IWT is a sustainable mode of transport, mainly for its ability to massify transport flows. The development of IWT may increase social welfare in urban areas as it is environmentally friendly, produces no noise pollution and generates fewer accidents than road transport. Road congestion and the resulting additional time of transport are important factors of air pollution and greenhouse gas emissions in city centres. The modal shift towards IWT would alleviate the negative externalities produced by road freight. In addition, the industrial sector and public authorities, by incorporating IWT into urban logistic chains, could benefit from IWT as an eco-friendly mode of transport to strengthen their image.

- Moreover, IWT is a cost-effective mode of transport. It offers a high degree of competitiveness compared to road transport and allows the transport of very high volume over long distance and at low cost.

"The transport cost per day is identical for a 25-tonne truck or for a vessel with a capacity of 300 tonnes"

P. Maugé, SCAT fluvial

Besides, in many large agglomerations, the development of port infrastructures requires few investments since ports and docks already exist and are operational.

- One important advantage of IWT for urban logistics is its reliability compared to road transport. Contrary to road transport, which is characterised by recurrent delays on pick-up and delivery schedules due to congestion, unsaturated inland waterways make it possible to deliver on time.

"Transport time is today the largest cost item for goods delivery"

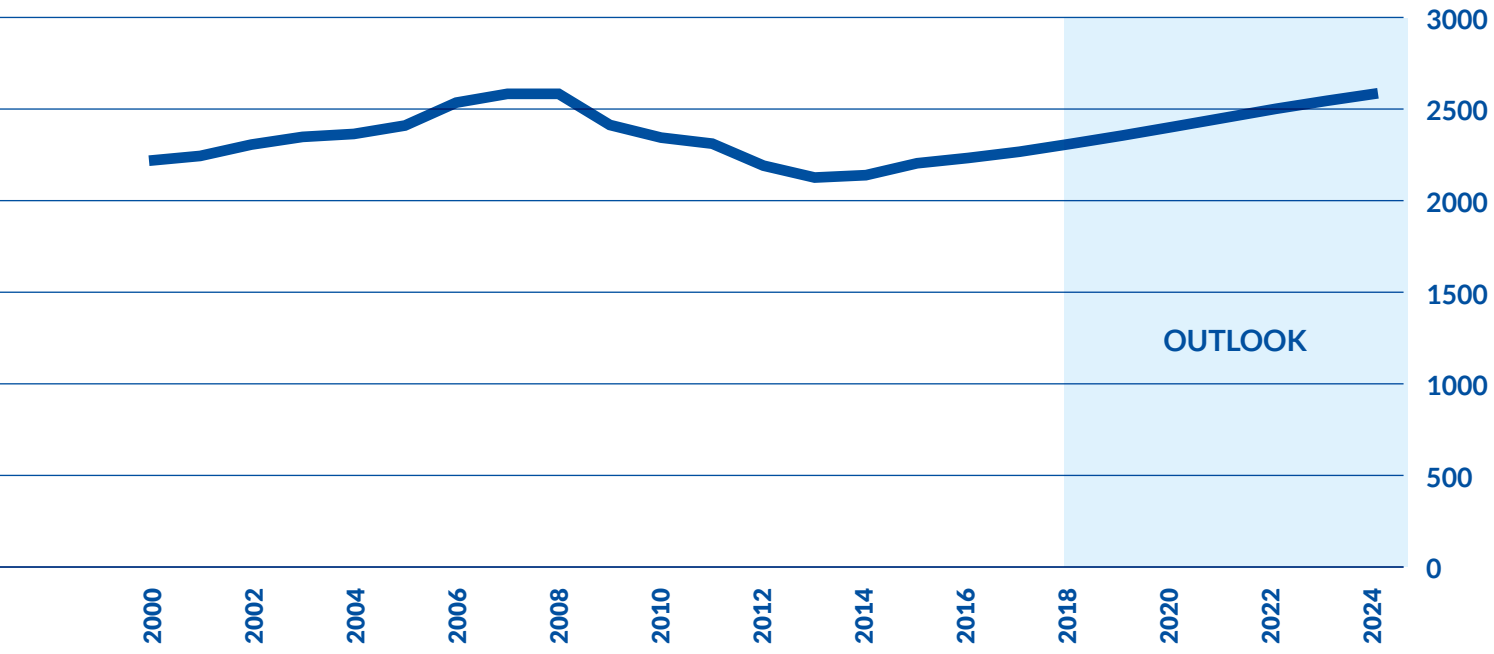
M. Bazenet, Cluster logistique urbaine IDF

- The final aspect that shows the ability of IWT to be integrated into urban logistics is the innovative potential of the sector. In recent years, innovative projects - namely in Paris - have been implemented to adapt inland waterway transport to the different requirements of goods delivery in dense urban areas. For instance, on-board conveyer means have been developed to deliver goods to any dock in the city.

THE SECTORS OF URBAN LOGISTICS
WITH HIGH POTENTIAL FOR IWT

- **Building materials segment:** The construction industry is a traditional IWT-related segment. The expected growth of this sector over the next few years due to the increase of housing building should have a positive impact on the IWT of building materials. Urban logistics could benefit from this trend as construction projects are mostly located in large cities. Also, IWT is particularly profitable for the transport of building materials to city centres with high volume being transported at lower cost.

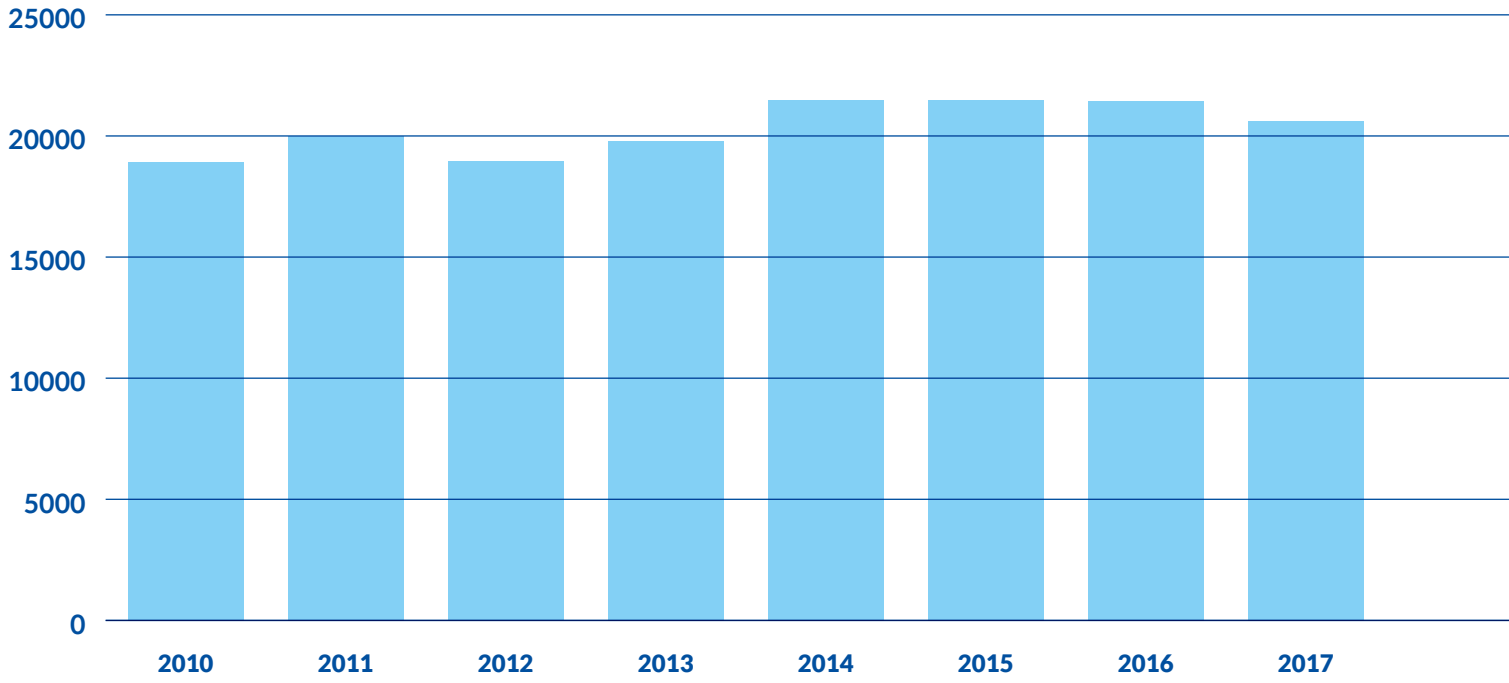
EU GROSS OUTPUT OF THE CONSTRUCTION INDUSTRY
(EU GROSS OUTPUT IN BILLION REAL US$ - 2010 US$)



Source: Oxford Economics, CCNR analysis

- **Transport of renewable waste:** Since 1999, the port of Lille is engaged in waste transport by inland waterways. Household waste and renewable waste are transported in containers between a waste-to-energy processing plant located in the north of the city and an organic recovery centre in the south of the city.

VOLUME OF WASTE HANDLED IN THE PORT OF LILLE (IN TEU)



Source: Oxford Economics, CCNR analysis

Waste transport by inland waterway in Lille represents nearly 12,000 trucks avoided per year on one of the most saturated roads of the city, and a reduction of 1,500 tonnes of CO_2 emissions.

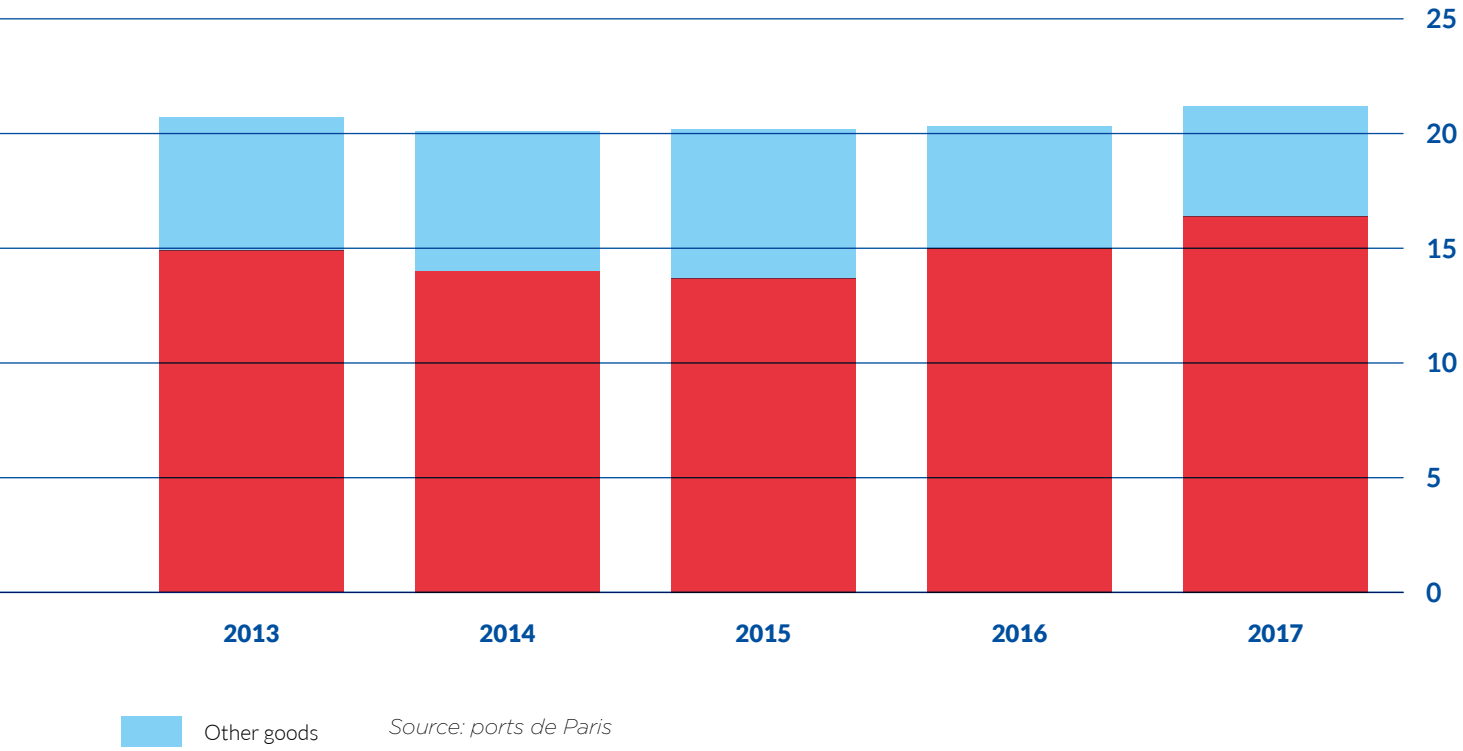
- **Shops and supermarkets delivery/ Express parcel delivery:** At first, IWT may not be adapted to this segment of urban logistics which is characterised by short distances of transport, low volumes of cargo and customised goods. Nevertheless, some experiments (e.g. Distri-Seine project in Paris) have shown that, with the gathering together of different types of cargo on a same vessel, IWT could be an effective mode of transport for these sectors.

IMPLEMENTING INLAND WATERWAY TRANSPORT

IN URBAN LOGISTICS: THE CASE OF PARIS

The port of Paris is the largest inland port in France in terms of traffic volume and the second largest inland port in Europe after Duisburg. In 2017, the port registered a total inland waterway transport of 21 million tonnes – an increase of 4% compared to 2016.

TOTAL INLAND WATERWAY TRAFFIC AND BUILDING MATERIALS TRAFFIC IN THE PORT OF PARIS (IN MIO T)



Source: ports de Paris

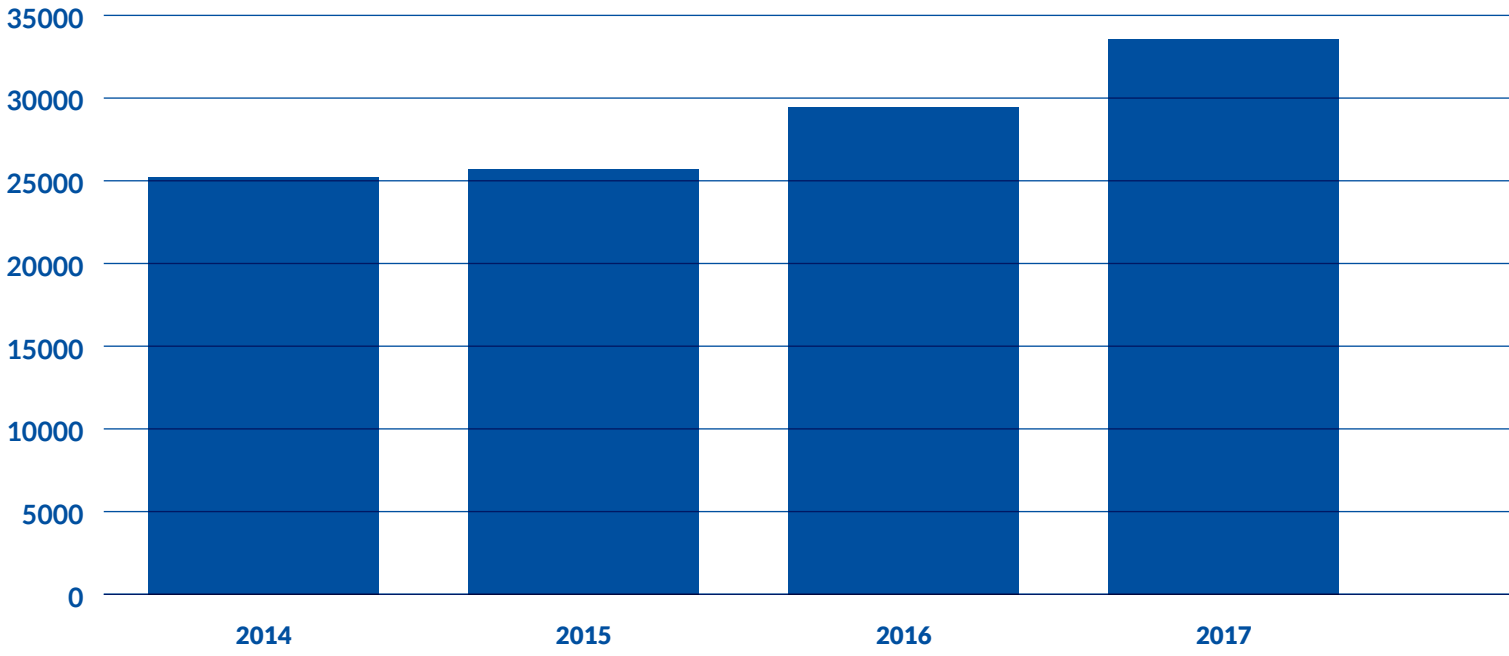
Note: Since data for 2014 is lacking, the traffic of building materials for this year has been estimated by linear interpolation.

The expansion of inland waterway traffic in the ports of Paris is largely driven by the segment of building materials whose volume of transport increased by nearly 20% between 2015 and 2017. Additionally, the traffic of building materials represents 78% of the total traffic in the ports of Paris, which makes it a growth driver for IWT in this river basin.

The evolution of building materials traffic follows the same trend as the gross output of the construction industry in Europe (see the graph above). This means that, as for the gross output of the construction sector, inland waterway transport of building materials is assumed to increase in the next few years.

The expected growth of this segment of transport in the Seine basin may be explained by the involvement of the ports of Paris in the urban construction project of the Grand Paris Express. This project, which includes the construction of new metro lines, promotes the use of the Seine and the Oise to evacuate waste materials. The partnership between the ports of Paris and Grand Paris Express aims at evacuating around 30 million tonnes of waste materials on inland waterways over the next 15 years.

CONTAINER TRAFFIC BETWEEN THE PORT OF BONNEUIL-SUR-MARNE AND THE PORT OF PARIS LA BOURDONNAIS (IN TEU)



Source: VNF (bassin de la Seine)

A second segment which is expected to play an important role in the development of urban logistics is container traffic. Many experiments of urban logistics are conducted on the rivers Seine and Oise in Paris. The most famous example is the experiment conducted by the supermarket chain Franprix since 2012. Container traffic between the ports of Bonneuil-sur-Marne and Paris la Bourdonnais for the delivery to 300 supermarkets has been growing since 2014 to reach 34,000 TEU in 2017. The supermarket chain has successfully integrated IWT into its logistic chains by adapting progressively the multimodal organisation to make it profitable.

Many other experiments of urban logistics are conducted in Paris. Among them, a company for express parcel delivery has experimented with the multimodal delivery using self-propelled barges and bicycles. The innovative aspect of this project is that, to compensate for the loss of time related to IWT, the company used the barges as warehouses. More precisely, the employees benefited from the travel time on inland waterways to sort the goods and prepare the parcels for the final delivery.

Urban logistics in Paris are expected to grow over the next year with the dynamic activity of the construction industry and the opening of a new container line between the port of Le Havre and the inland port of Bonneuil-sur-Marne that should promote urban logistics.

More generally, national container transport in Europe is expected to grow significantly over the next few years. As seen in chapter 2 (part 5) on inland navigation container transport, national container traffic – which includes urban logistics – is growing at a higher speed than international container traffic. The strong expansion of national transport of containers is a positive sign for urban logistics.

"Good flows in Paris can be multiplied by 4 without adapting existing infrastructures or building new ones"

M. Bazenet, Cluster logistique urbaine IDF

THE FACTORS OF A SUSTAINABLE INTEGRATION OF IWT INTO URBAN LOGISTIC CHAINS: EXPERTS' POINT OF VIEW

- The question of multimodality is crucial when it comes to urban logistics. Indeed, IWT provides consistent economic and logistic solutions only in specific areas and cannot be considered as an exclusive mode of transport in large cities. Logistical matters such as pre-and post-carriage, last kilometre and urban network development should be thought of in terms of complementarity of IWT and road transport.
- Besides, the improvement of IWT's profitability is a key condition for its incorporation into logistical chains. The development of a business model that focuses on the pooling of goods, the decrease of bulk breaking and which considers the specificities of IWT is necessary for inland shipping to be profitable in the context of urban logistics.
- Public support is an essential tool to foster and facilitate inland shipping in dense urban areas. Public policies should be well-targeted and promote projects and experiments that aim at developing urban inland waterway transport. Besides, success stories of urban logistics should be highlighted to incentivise economic actors to integrate IWT into their logistic chain.

"Public actors should be 'facilitators' since implementing waterway logistics requires specific skills and the removal of some regulatory, administrative and technical constraints"

D. Baudry, Cerema

- In many large agglomerations, docks and port areas are increasingly coveted by the housing sector or even for leisure activities. Therefore, a positive image of IWT should be promoted to ensure acceptance among urban populations and an efficient articulation of the different uses of inland waterways within the city must be made.

07

RIVER CRUISES

- **With 346 active cruise vessels, Europe has the largest river cruise fleet in the world, compared to other continents.**
- **Despite the lower newbuilding rates, the expansion of the fleet also continued in 2017, with 17 new vessels coming on the market.**
- **The traffic figures of cruise vessels on the Rhine were 20% higher in 2017 than the previous year. Despite this notable increase, the Rhine remains in 2nd position behind the Danube, as far as the number of cruise vessels transiting the locks is concerned.**

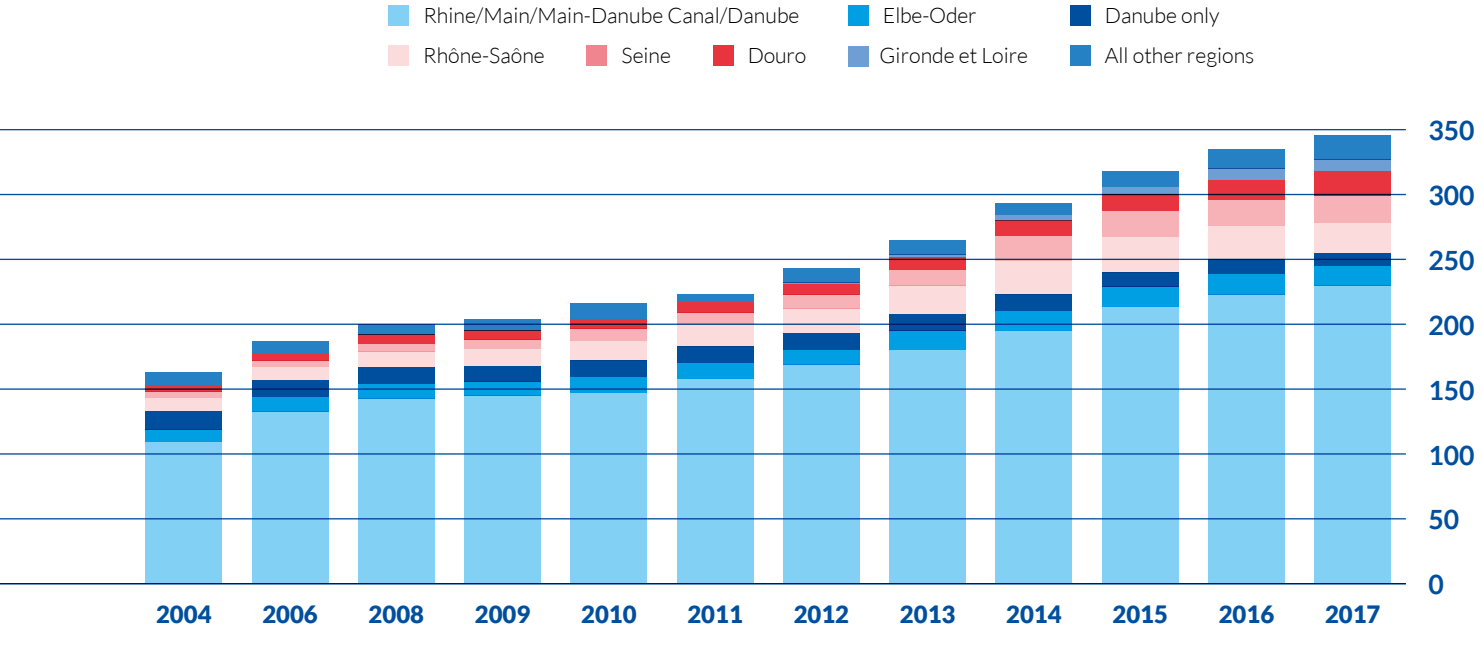
FLEET FOR RIVER CRUISES

Before the Main-Danube-Canal was built in 1992, the EU had two main distinct river basins which were not connected to each other, the Rhine basin and the Danube basin. With the completion of the Main-Danube Canal, these basins became interconnected. Already at the beginning of the 20th century, the Elbe and the Oder were connected to the Rhine by the construction of a large canal network (in particular the Mittelland Canal) in northern Germany.

In the 2017 season, the river cruise fleet in Europe[7] comprised 346 active vessels with 50,616 beds. The number of active cruise vessels more than doubled between 2004 and 2017. In 2017, 17 vessels were introduced to the market with 2,558 beds. This newbuilding volume represented 5% of the existing fleet. As seven ships were removed from the fleet in 2017, the net increase in 2017 was 11 vessels with approximately 1,770 beds, representing 3.6% of the existing fleet.

17 new cruise vessels with 2,558 beds were introduced to the European market in 2017

NUMBER OF RIVER CRUISE VESSELS IN EUROPE BY REGION OF OPERATION (2004 – 2017)



Source: Hader, A. (2017), The River Cruise Fleet

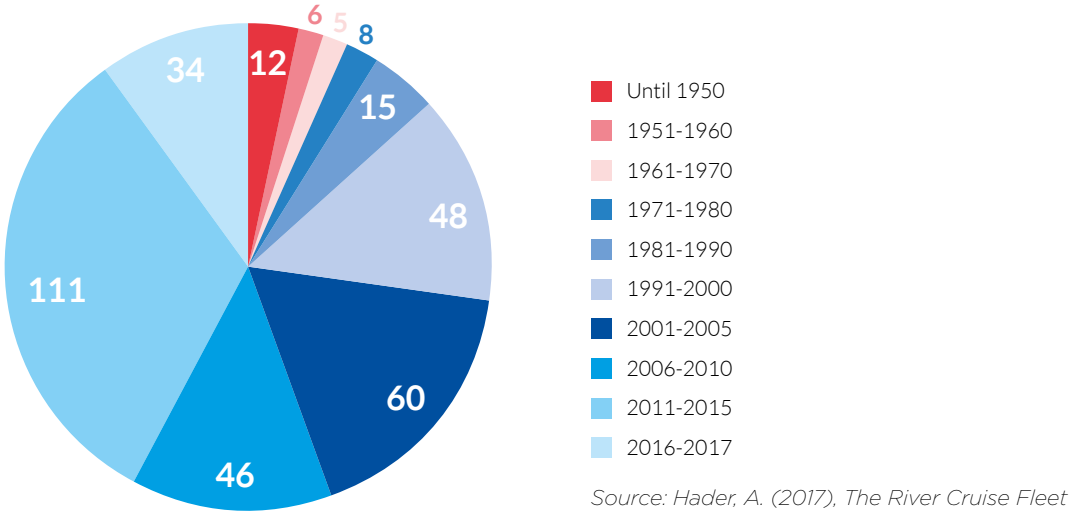
[7] *The European river cruise fleet, as it is defined in this report, comprises the fleet in the EU and in Switzerland.*

On the Elbe and the Loire, a leading European company in river cruising operates three new vessels with paddle-wheel propulsion. They are very well adapted to shallow waters, a phenomenon that sometimes occurs on these two rivers.

In 2017, 153 of 346 cruise vessels were registered in Switzerland. The Swiss river cruise fleet doubled within a decade. Another 62 cruise vessels were registered in Germany, where some of the most important tour operators are based.[8]

The age structure of the European fleet shows that 42% of all vessels were built after 2010. Only 13% were built before 1990. The oldest vessel has been in service for more than 100 years on the Göta Canal in Sweden.

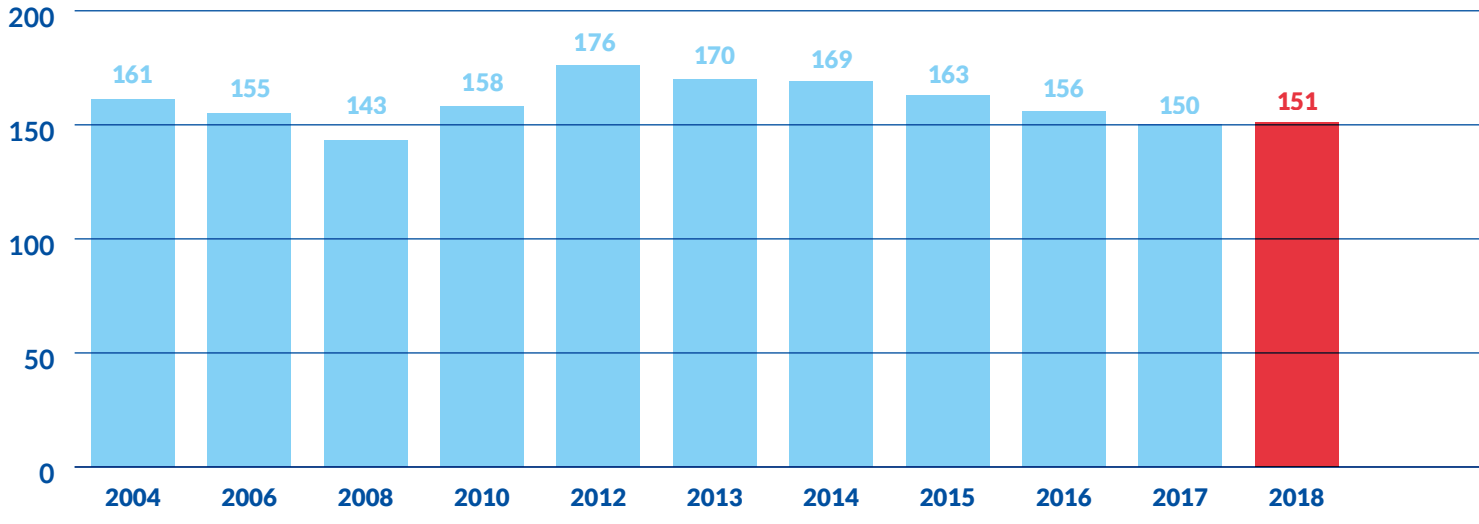
NUMBER OF RIVER CRUISE VESSELS IN THE EU BY YEAR OF CONSTRUCTION



Source: Hader, A. (2017), The River Cruise Fleet

The average number of beds in new cruise vessels has been decreasing slightly since 2012. However, based on order books, the expected average number is 151 beds for the newbuildings in 2018, which is almost equivalent to the 2017 figure.

AVERAGE NUMBER OF BEDS IN NEW RIVER CRUISE VESSELS IN EUROPE BY YEAR OF CONSTRUCTION *



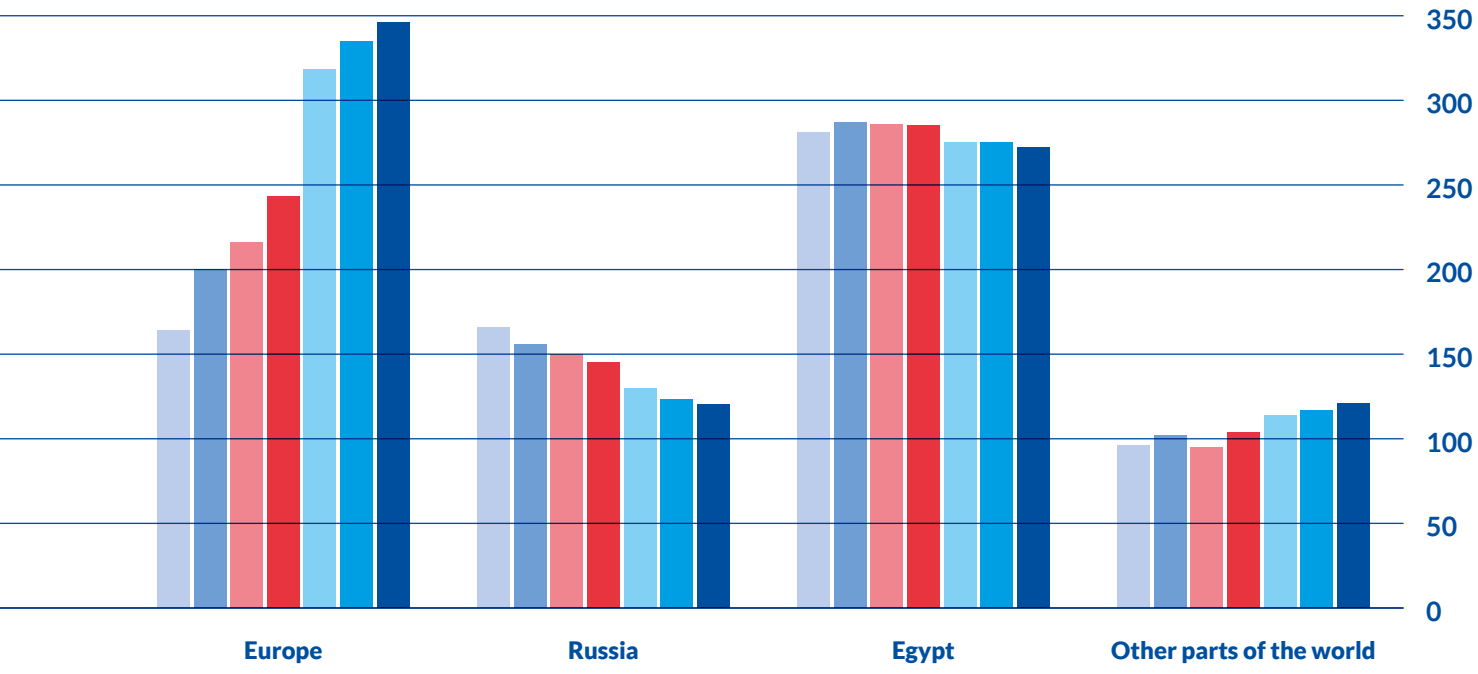
*Source: Hader, A. (2017), The River Cruise Fleet. * figure for 2018: forecast*

[8] *Sources: Swiss Rhine ports and German Inland Vessel Register*

In terms of greening measures, it should be mentioned that for passenger vessels, the share of vessels that were equipped with at least one greening measure was 54% in 2014, 57% in 2015 and 61% in 2016, and the upwards trend continues in 2017. The intensity of the intention to make the fleet more ecologically friendly thus increased constantly between 2014 and 2017. It can be added that the greening rate was generally higher in passenger shipping than in goods transport.[9]

The figure below shows the evolution of active cruise vessels worldwide. It is well recognised that **Europe has the largest cruise fleet today.**

DISTRIBUTION OF RIVER CRUISE VESSELS PER REGION WORLDWIDE
(NUMBER OF VESSELS)



Source: Hader, A. (2017), The River Cruise Fleet

Due to the absence of newbuildings, the Russian fleet is dwindling and the EU fleet already overtook the Russian fleet in 2005.

The Nile fleet is still large, but the number of tourists going to Egypt, following a peak in 2011, has been decreasing significantly since the revolution in 2011. This loss could not be compensated with the "home cruising" sector, as most Egyptians do not have the financial means to enjoy a cruise in their own country. Due to the drop in tourist numbers, some Nile vessels were put on hold and are currently not active.

A closer look at other parts of the world, and particularly rivers in Asia and the Americas, shows that the US fleet is gaining in importance (the Columbia and Mississippi rivers), but also in China a growing fleet can be observed (the Yangtze river) and in Southeast Asia (the Mekong river) the fleet is constantly growing.

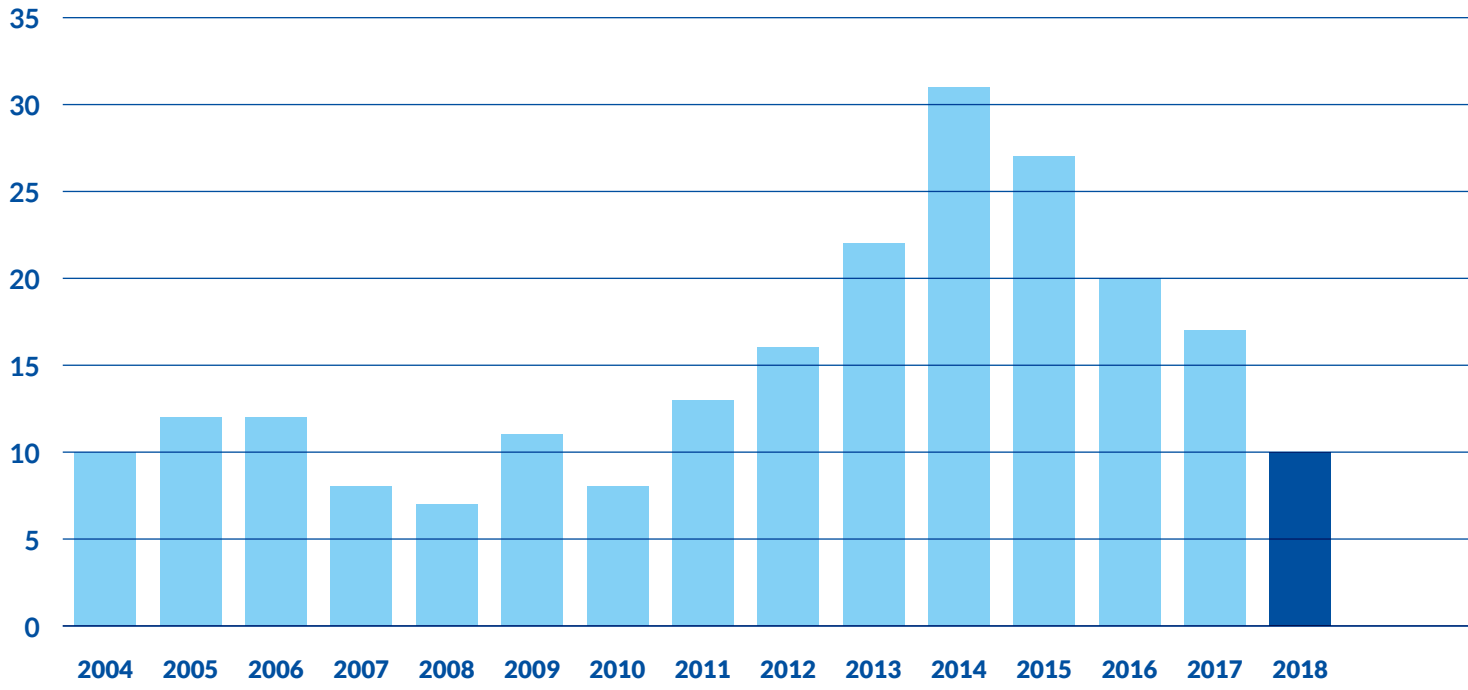
[9] *See Market Report 2014-2017 (NAIADES II Progress report) - Main features and trends of the European Inland Waterways Transport sector, CCNR*

The river cruise fleet in Europe grew by 182 vessels from 2004 to 2017 – an increase of

111%

In the years following 2014, the newbuilding activity in the European market slowed down. The driving force for the newbuilding rate is the demand for newly built cruise vessels from the overseas source markets (US-Americans, Canadians, Australians). Because of the terroristic attacks in recent years in Europe, the demand from these overseas tourists has weakened and resulted in a decline of newbuilding rates. However, after the decreasing newbuilding activity in recent years, predictions do not confirm a further decline for 2019.

NEW RIVER CRUISE VESSELS FOR THE EUROPEAN MARKET 2004-2018 *

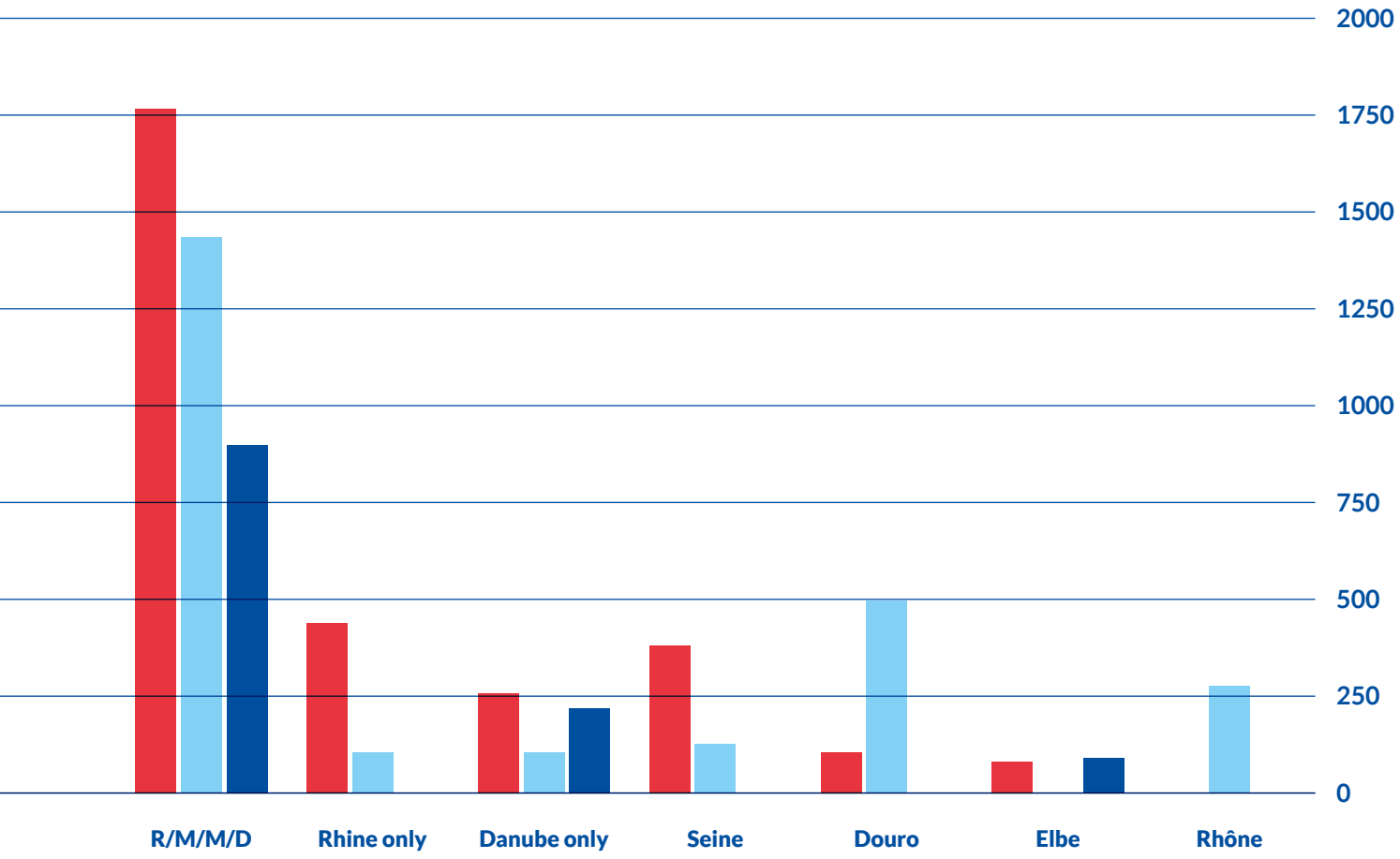


*Source: Hader, A. (2017), The River Cruise Fleet. * 2018: forecast based on order books*

The year 2017 was characterised by a stronger regional diversification: seven out of 17 new vessels (35% of the new bed capacity) were deployed on relatively "newcomer rivers" (Seine, Rhône, Douro).

NEW CRUISE CAPACITIES IN 2016, 2017 AND 2018 PER REGION OF OPERATION

(NUMBER OF BEDS) *



Source: Hader, A. (2017), The River Cruise Fleet

**R/M/M/D = Rhine/Main/Main-Danube Canal/Danube. Figures for 2018: forecast.*

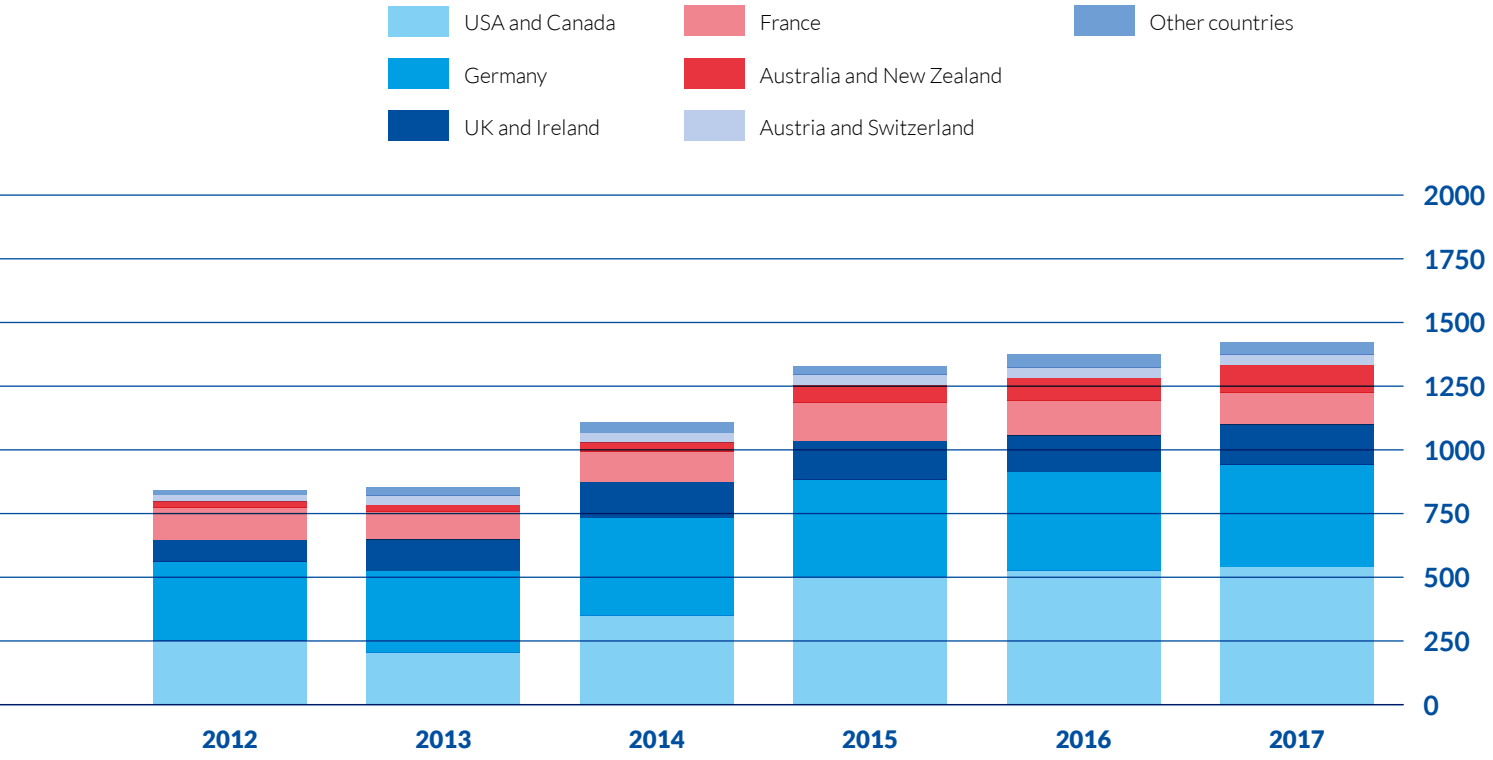
Concerning the construction plans of new vessels, there are projects to again launch some very large vessels in the coming years. Today, most of the vessels with a 110 m or 135 m length have a beam (width) of 11.4 / 11.45 m. This is the maximum width allowed to pass through locks which are 12.0 m, wide.

Locks in the Danube, the Upper Rhine and some Dutch canals are much larger with a 24 m, width. Therefore taking into account this size, only very few cruise vessels use the full opportunities offered by the locks in these regions.

The largest river cruise vessel ever built for Europe, the AMAMAGNA (for 194 passengers) is currently under construction. Its hull is being built in Serbia, and due to its large size, it is being transported on the seaway from Serbia via the mouth of the Danube to the Netherlands, where the finishing works are being carried out. It will then be transported back to the mouth of the Danube via seaways. The vessel will come onto the market in 2019.

DEMAND FOR RIVER CRUISES

NUMBER OF PASSENGERS ON EUROPEAN CRUISE VESSELS BY NATIONALITY (IN 1000)



Source: IG River Cruise / German Travel Association (DRV) / SeaConsult

Of the 1.4 million passengers who took a river cruise trip in Europe in 2017, which is 3% more than in 2016 (1.36 million), 38% of them were US-Americans or Canadians. In 2016, their growth rate had been 5%, but in the years 2014 and 2015, much higher growth rates were observed. The slowdown of demand in 2016 and 2017 could be explained by the terrorist attacks that took place in 2015 in Europe. This had an impact on travel behaviour of US-American tourists, to the detriment of the European cruise sector.

In 2017, German tourists were ranked second, and their number also increased by 3%. The British and Irish source markets were again the third largest category of passengers. Compared to the previous year, their stake even increased by 10%. The number of passengers showing the strongest relative growth, however, are Australians and New Zealanders. Their stake increased by 22% in 2017, after an almost equally strong increase (23%) in the previous year.

Australians and New Zealanders are the source market with the strongest percentage growth in the European river cruise market:

+23%

in 2017 and

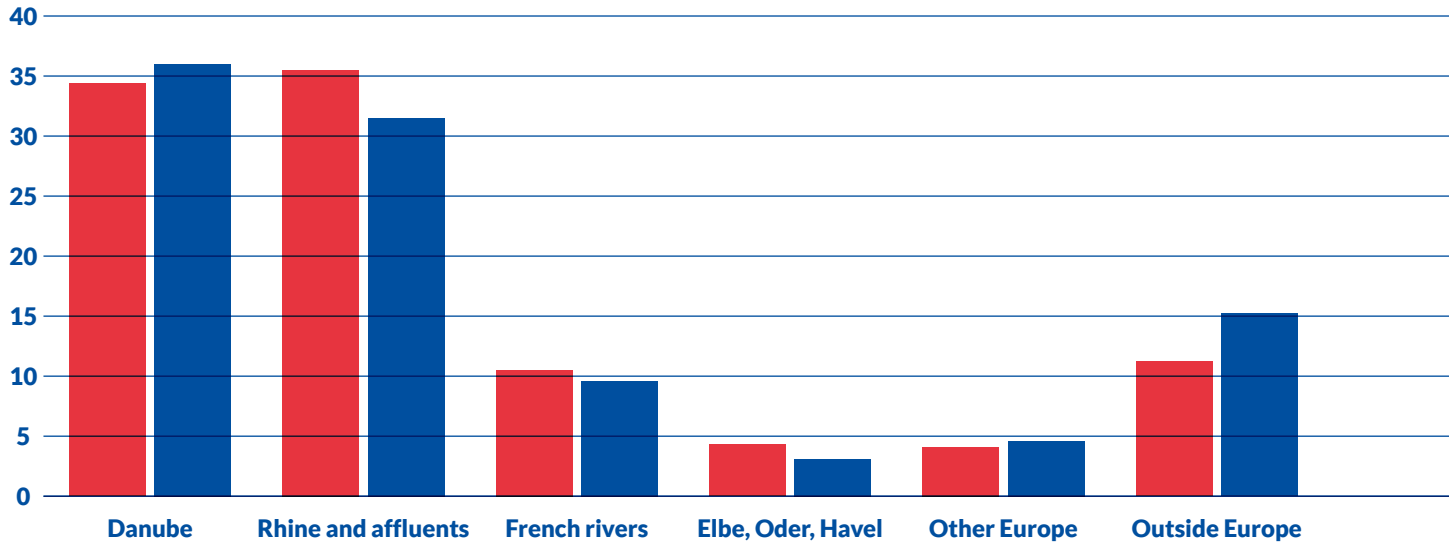
+22%

in 2016

Already now, operators report growing numbers of Chinese tourists, and expect their share to grow to an important level in the future.

For the German tourists, the Danube, with a share of 36%, was the preferred river in 2017. It has thus overtaken the Rhine, which had a share of 31.5% in 2017, showing a decrease from a former 35.5% in 2016.

DISTRIBUTION OF GERMAN RIVER CRUISE PASSENGERS PER TRAVEL DESTINATION (%)



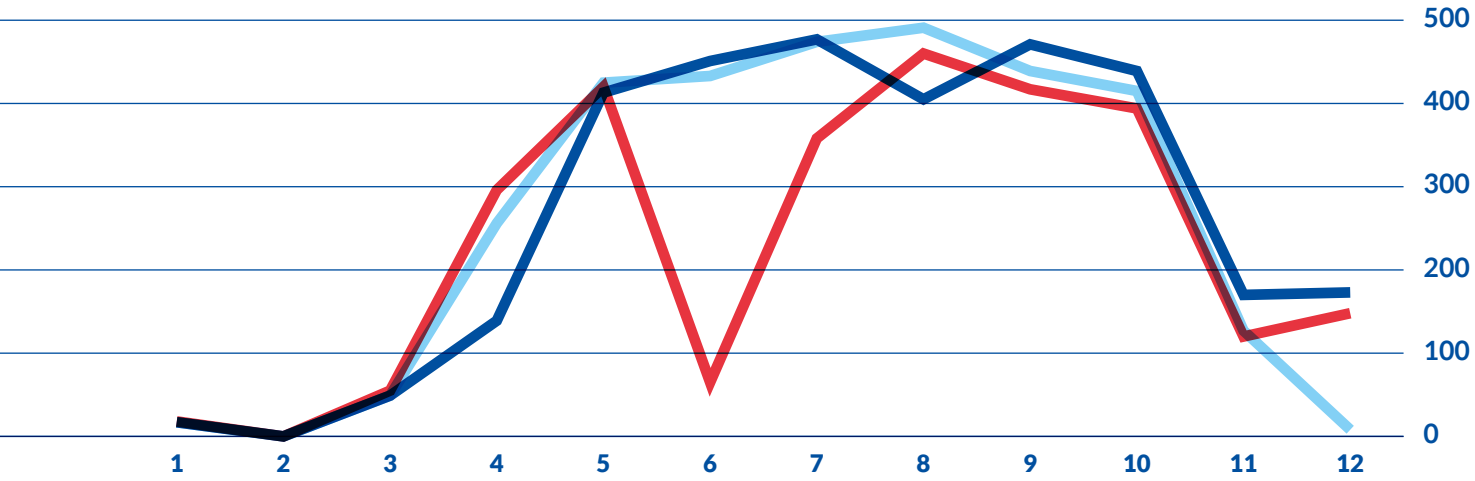
Source: IG River Cruise / German Travel Association (DRV) / SeaConsult

Overall, it can be observed that river cruises are still characterised to be most attractive for age groups > 55. Among the German tourists, 25.6% of passengers were in the 56-65 age group in 2017, and 59.3% were older than 65. Hence, only 15.1% of the passengers were in age classes < 55.

The overall evolution of demand thus depends on important source markets with a significant demographic potential in the age groups that show the strongest preference for river cruises. Demand evolution is of course also dependent on the overall political situation in Europe, and major events such as terrorist attacks can put a strain on the demand development.

Furthermore, environmental conditions also play a role. It is both the low water and high water situation that creates difficulties for cruise traffic. In 2013, for example, a flood occurred on the Danube, which had a strong impact on the river cruise traffic, as can be seen in the figure below which shows the number of vessel transits per month through the lock of Jochenstein at the German-Austrian border near Passau. The flood's impact in June 2013 is clearly visible.

CRUISE SHIP TRANSITS ON THE DANUBE (GERMAN-AUSTRIAN BORDER NEAR PASSAU) PER MONTH *

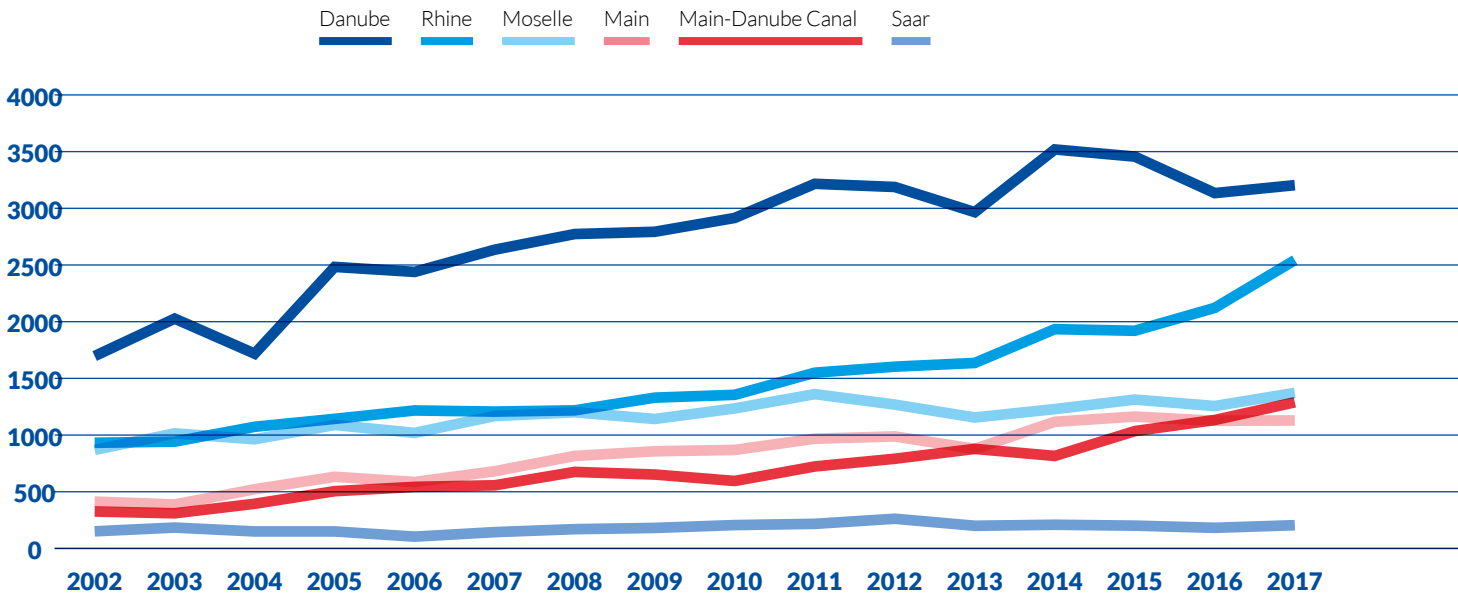


*Source: German Waterway and Shipping Administration. * lock of Jochenstein*

The number of cruise vessels that transited through the German-Austrian border point near Passau amounted to 3,204 in 2017, compared to 3,134 in 2016 (+2.2%). Out of this number, approximately half of the vessel transits are downstream transits while the other half are upstream. Most river cruises are in fact round trips, for example travelling from Passau to Budapest and back within 7-8 days, or from Passau to the Danube Delta and back to Passau within 14-16 days. Among German tourists, this length of cruise was the preferred segment in 2017, with a share of 61% of all cruises. Cruises of a 8-12 day duration represented 13.6%. Even longer trips of 13-15 days, had a 8.3% share of. Short cruises (up to 4 days) represented 16.3%.

The following figure shows the evolution of ships transiting locks on the Danube, Rhine and its affluents. The Danube takes the lead, but suffered during the low water and ice conditions in 2015 and 2016. The average rate of increase on the Rhine was 8% per year during the period 2011-2016; before 2011, the average annual rate was lower, at around 5%. The period 2011-2016 corresponds to the time when the boom from US-American tourists started and developed. In 2017, traffic on the Rhine had a strong increase of 20% compared to 2016. This rate of growth is above the average rate of growth between 2011 and 2016.

YEARLY NUMBER OF CRUISE SHIP TRANSITS ON EUROPEAN RIVERS



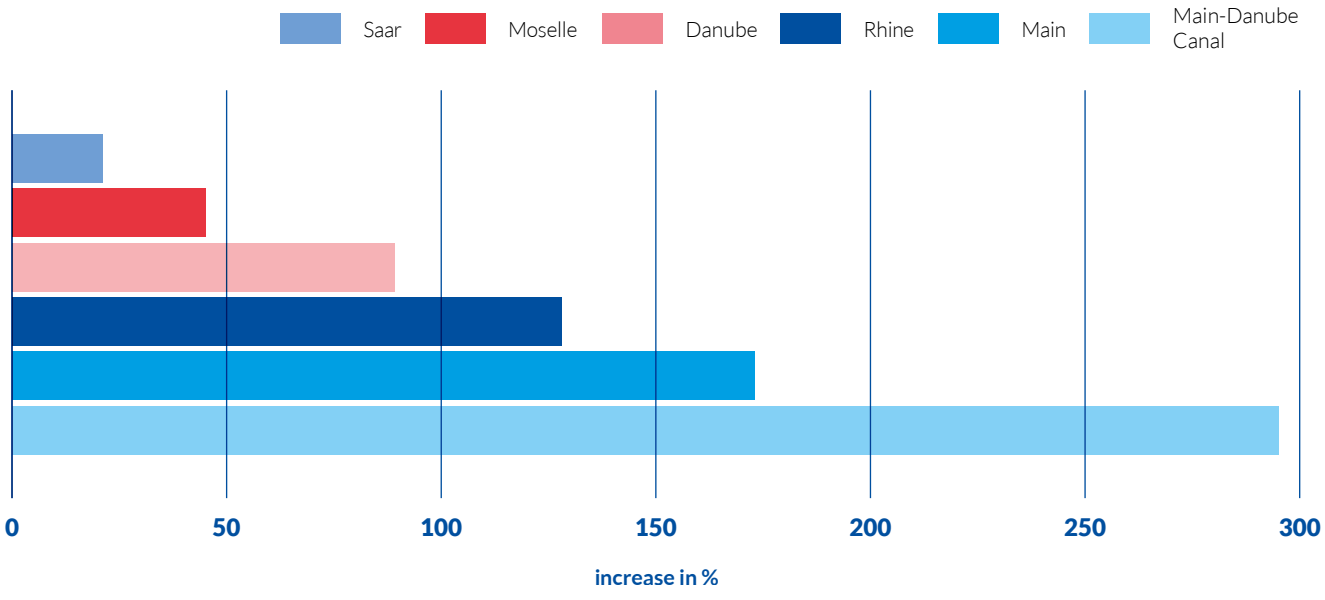
Source: German Waterway and Shipping Administration

**sum of upstream and downstream traffic of cabin vessels at the following locks: Jochenstein (Danube), Iffezheim (Rhine), Koblenz (Moselle), Kelheim (Main-Danube Canal), Kostheim (Main), Kanzem (Saar).*

Between 2002 and 2017 river cruise traffic on the Danube increased by **89%**, by **128%** on the Rhine, and by **295%** on the Main-Danube Canal.

As can be seen in the following figure, river cruise traffic on the Main-Danube Canal has nearly tripled since 2002, while Danube traffic nearly doubled and Rhine traffic more than doubled between 2002 and 2017.

PERCENTAGE INCREASE OF RIVER CRUISE TRAFFIC BETWEEN 2002 AND 2017 ON EUROPEAN RIVERS (%)



Source: CCNR based on German Waterway and Shipping Administration

08

ACCIDENTS

- **The number of accidents on inland waterways has decreased considerably over the past 20 years. In particular, the number of collisions between ships follows a clear downward trend, which can be explained by the introduction of electronic devices and equipment.**
- **Accident rates vary from one river to another. The Rhine, for example, has a far lower accident rate than the Danube.**
- **Collisions with infrastructures and bridges remain a type of accident that still shows relatively high numbers.**

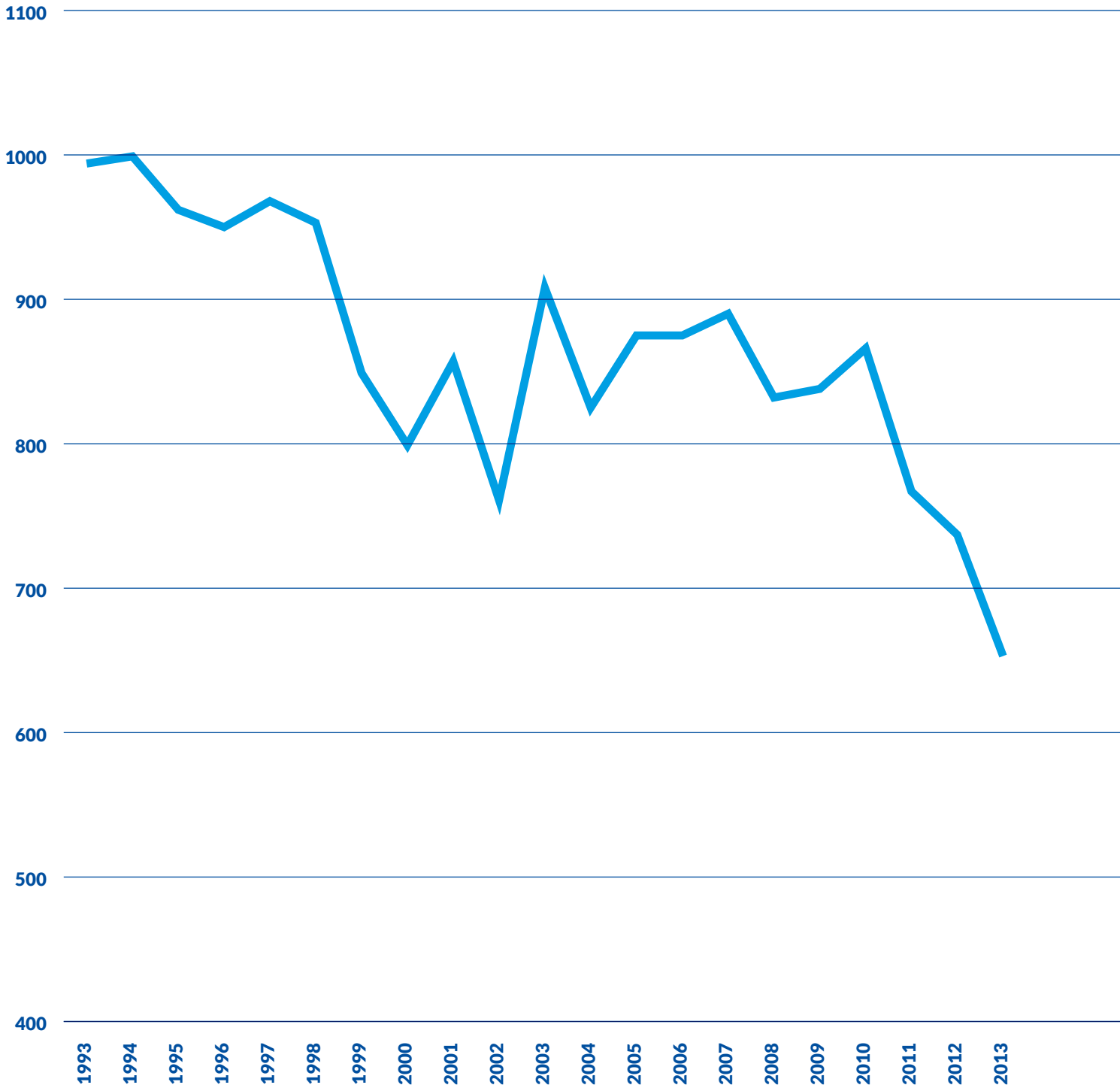
OVERVIEW AND OVERALL EVOLUTION OF ACCIDENTS

Statistics on accidents in inland shipping are currently very scarce. Eurostat collects accident statistics on a voluntary basis by national statistical offices. Not many countries in the EU deliver accident data and there is no clear evidence on a common methodology among the countries. In addition, the current Eurostat data collection does not provide information about the type or the causes of the accidents. Nevertheless, over the last two years, preparative studies are being carried out in order to set up such a system within the EU. A Eurostat working group, comprised of Eurostat experts, the national statistical offices, the CCNR, other European river commissions and DG MOVE, has been working on establishing a set of definitions, categories and types of accidents. From 2019 onwards, Eurostat will carry out pilot studies in the EU member countries to test if the elaborated definitions and categories can be put into practice.

In Germany, a collection and very detailed analysis of statistics on accidents was carried out by the German Waterway and Shipping Administration and the Ministry of Transport, but this collection of data ended in 2013. Currently, preparations are in place to set up a new system, based on the older one, but with more categories, and in a regionally more harmonised way. This new system is being prepared within the HAVARIS project. Statistical data from this project, for the period after 2013, are currently only available for three German waterways: the Main, Main-Danube-Canal and Danube. Data for other rivers and canals will follow.

Concerning the total number of accidents, it is interesting to look at the data provided by the “old” system up until 2013.

EVOLUTION OF THE NUMBER OF ACCIDENTS ON GERMAN INLAND WATERWAYS
(1993-2013)



Source: German Ministry of Transport

The figure reveals that, within a time span of 20 years, there was a decrease in the number of accidents, from around 1,000 cases in 1993 down to 650 in 2013.

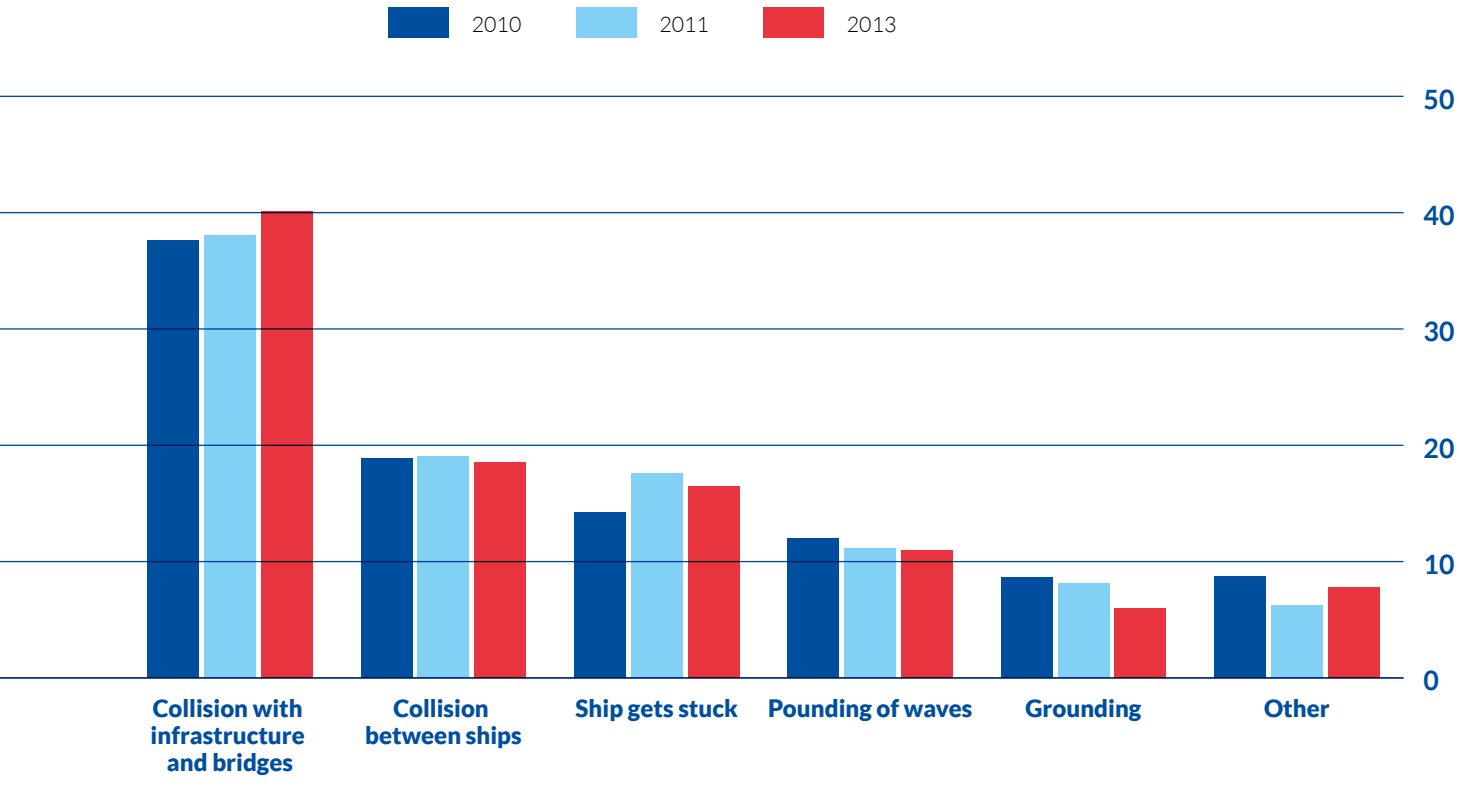
TYPES OF ACCIDENTS

Within the previous system (accident statistics until 2013), the following categories for accidents were identified:

- Grounding
- Ship gets stuck
- Collision between ships
- Collision with infrastructure and bridges
- Pounding of waves
- Other accidents

For the years 2010, 2011, 2013 (the latest years for which all inland waterways in Germany are currently covered), the most frequent type of accident was the collision with infrastructure and bridges. This type accounted for 38-40% of all accidents in these three years. The second most frequent type of accident was the collision between ships (18-19%).

ACCIDENTS ON GERMAN INLAND WATERWAYS BY TYPE (SHARE IN %)



Source: German Ministry of Transport

For the years 2012 and 2013, additional information is available regarding the number of people injured and the number of casualties. In 2012, there were 29 injured persons and 2 fatal casualties. For 2013, the respective figures are 19 injured persons and 2 fatal casualties.

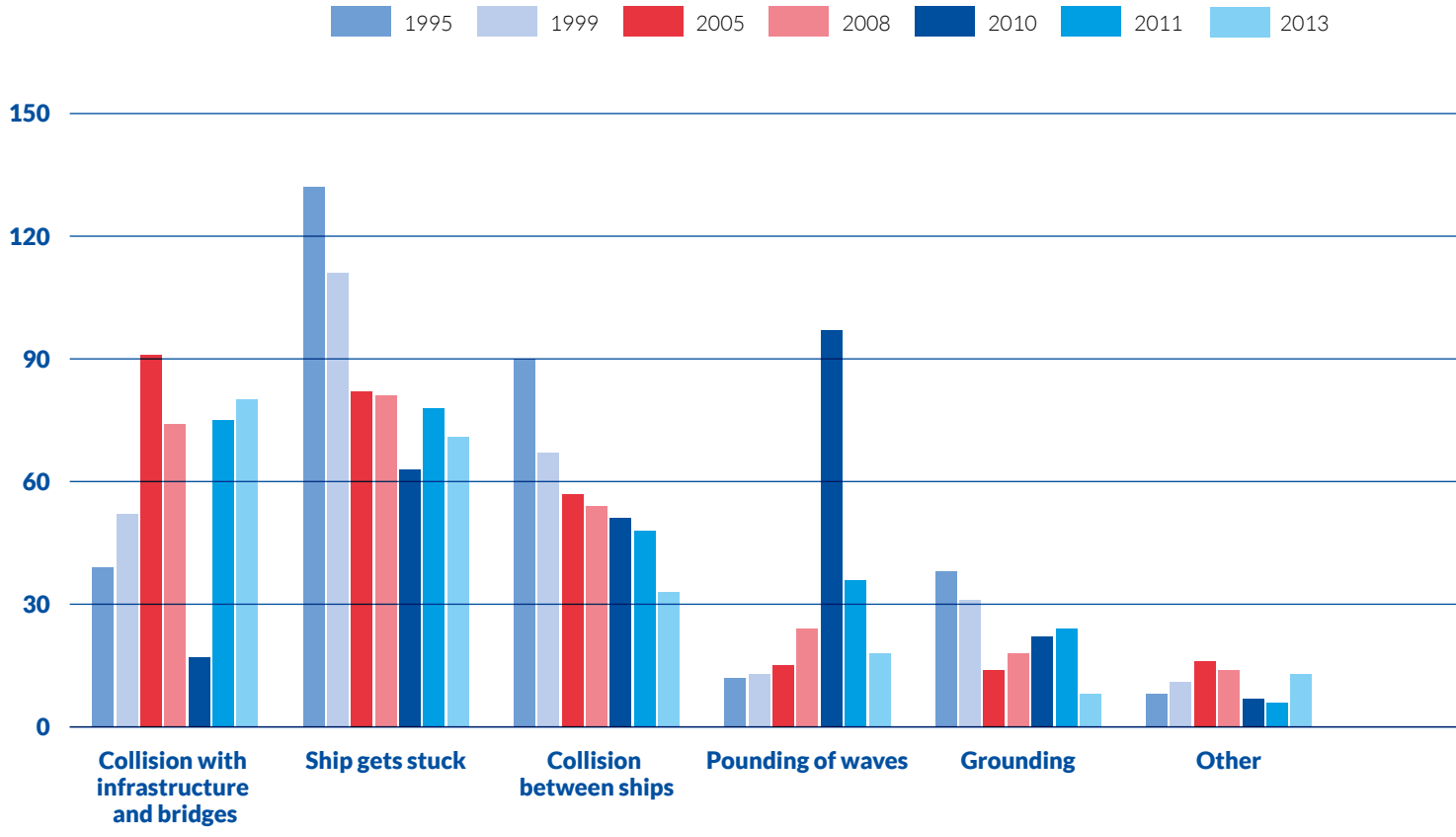
It also must be said that a significant amount of all accidents are in fact accidents of small pleasure boats (not cruise vessels or day trip vessels). In 2013, 82 of all 653 accidents were accidents of pleasure boats. In 2012, this figure was 89 out of 737 accidents.

In order to analyse the evolution of the number of accidents by types of accidents over a longer time period, the Rhine is compared with the Danube.

The reason for choosing the Rhine is obvious, as it is the river with the highest transport activity of all German rivers. Even without its tributaries, it accounts for around 70% of the total transport performance of IWT on German inland waterways. In the years 2010, 2011 and 2013, the Rhine's share of all accidents on all German waterways was 33%, 35% and 34% respectively.

These figures indicate that the accident rate on the Rhine is relatively low, compared to its transport activity. It seems reasonable to attribute this to the high level of quality of its navigational infrastructure. It should also be kept in mind that among the German waterways, there are many smaller ones, on which the quality of navigational infrastructure is certainly not as good as on the Rhine.

EVOLUTION OF THE NUMBER OF ACCIDENTS ON THE RHINE BY TYPE OF ACCIDENT



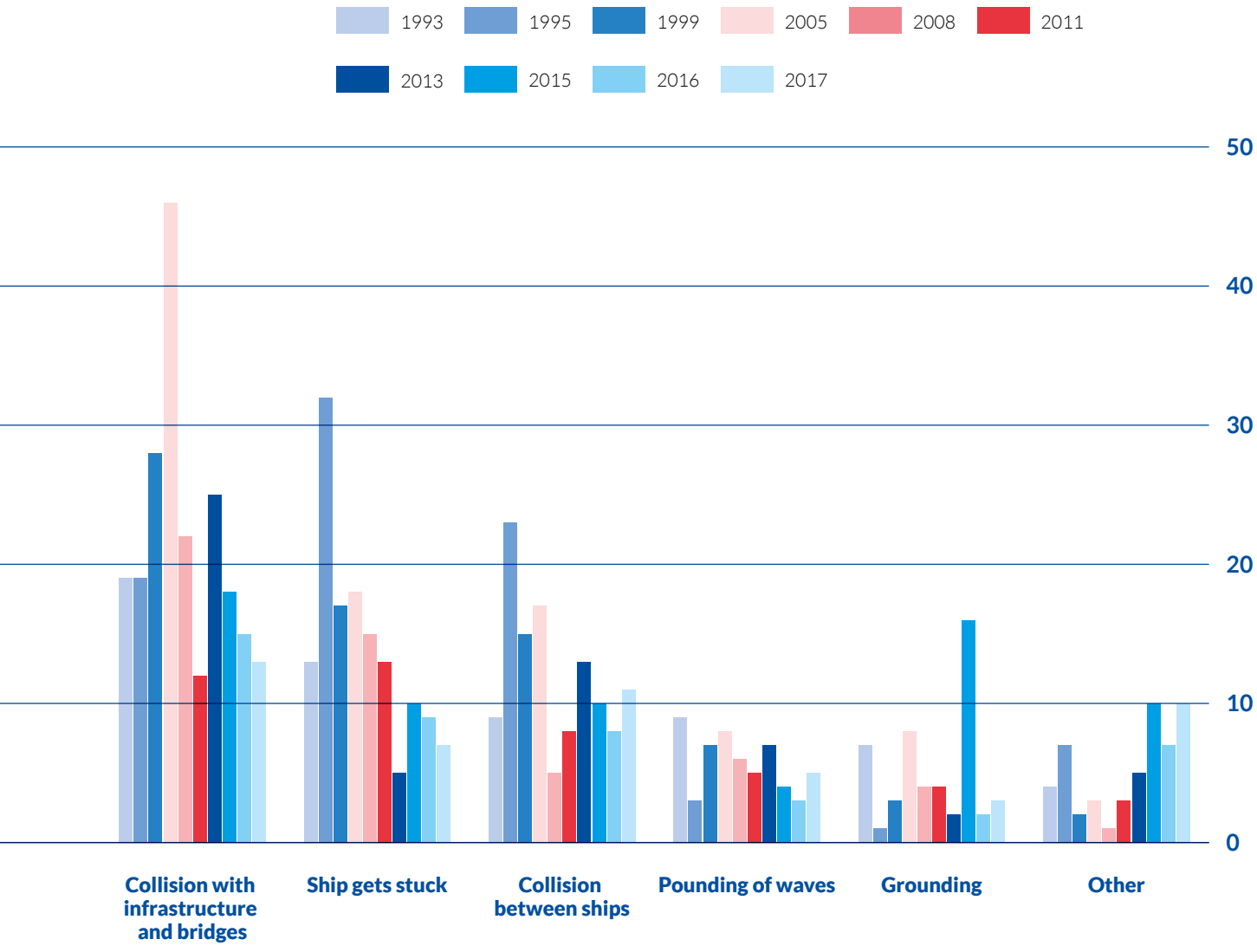
Source: German Ministry of Transport

For the Rhine, the share of cases “ship gets stuck” was 32% in 2013, compared to 16.5% on all German inland waterways. The share of cases “collision between ships” was 15% in 2013, compared to 18.5% over the whole network. The collision with infrastructure and bridges represented 36% on the Rhine, and 40.1% in the whole network.

Overall it is observed that the number of collisions of ships on the Rhine reduced in number between 1993 and 2013. This can be explained by the introduction of electronic systems, which reduce the probability of this type of accident. Also, the category “ship gets stuck” shows far fewer cases in 2013 than 20 years previously. However, the collision with infrastructure and bridges does not show a reduction but an increase.

The share of the German part of the Danube in total transport performance on German waterways is 1.4%. The share of accidents on the Danube in all accidents on the German network was 6.9% in 2013. The Danube’s accident rate is therefore relatively high.

EVOLUTION OF THE NUMBER OF ACCIDENTS ON THE GERMAN DANUBE BY TYPE OF ACCIDENT



Source: German Ministry of Transport and German Waterway and Shipping Administration (data for 2015, 2016, 2017)

For the German Danube, the accidents of the type “ship gets stuck” decreased strongly in numbers up until 2017. In that year, its share in all Danube accidents was 14%.

Also the number of collisions between vessels shows a falling trend. Nevertheless, it still represented 22% of all Danube accidents in 2017. This share is above the national average observed for the year 2013.

The collision with infrastructure and bridges represented 44% on the Danube in 2013, but it decreased constantly to reach 27% in 2017. The absolute number rose until 2005 but fell afterwards.

Overall it is observed that both on the Rhine and on the (German part of the) Danube, the more dangerous types of accidents, such as collisions between ships, showed a decreasing trend between 1993 and 2013 (for the Rhine) and between 1993 and 2017 (for the Danube). Both the installation and introduction of further electronic devices are expected to reduce the number of such accidents further in the future.

Also, the type of accident “ship gets stuck” has strongly reduced on the Rhine and Danube. However, the collision with infrastructure and bridges does not show a clear reduction.

09

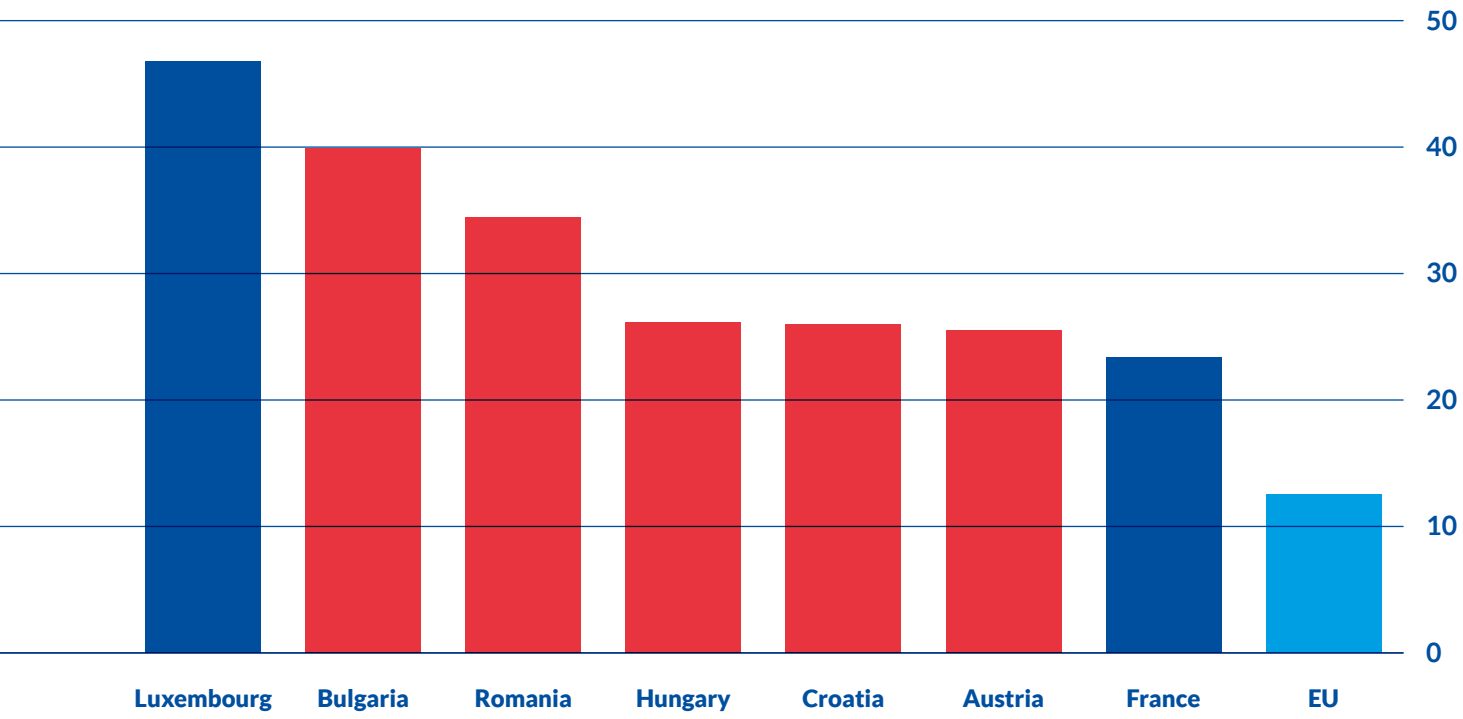
OUTLOOK

- The transportation demand for agricultural products is strongly correlated with harvest results in both the Rhine and Danube regions.
- The poor harvest results in the Rhine region in 2016 directly impacted Rhine traffic in 2016 and 2017. There was a decrease of 14% in this segment between 2016 and 2017.
- The forecast for the transport of grain in 2018 points to an increase, in the wake of a recovery of grain harvests in 2017 and 2018.
- Biomass is a market segment with a high potential in the long term, and biomass commodities are statistically part of the foodstuffs segment.

TRANSPORT
OF AGRICULTURAL PRODUCTS

Agricultural products are an important segment in inland waterway transport. It is especially important for the Danube countries, where their share in total transport performance reaches 40% in Bulgaria, 34% in Romania and 26% in Hungary. But in some parts of Western Europe, it also has a high share in total transport performance, i.e. 23% in France and 47% in Luxembourg.

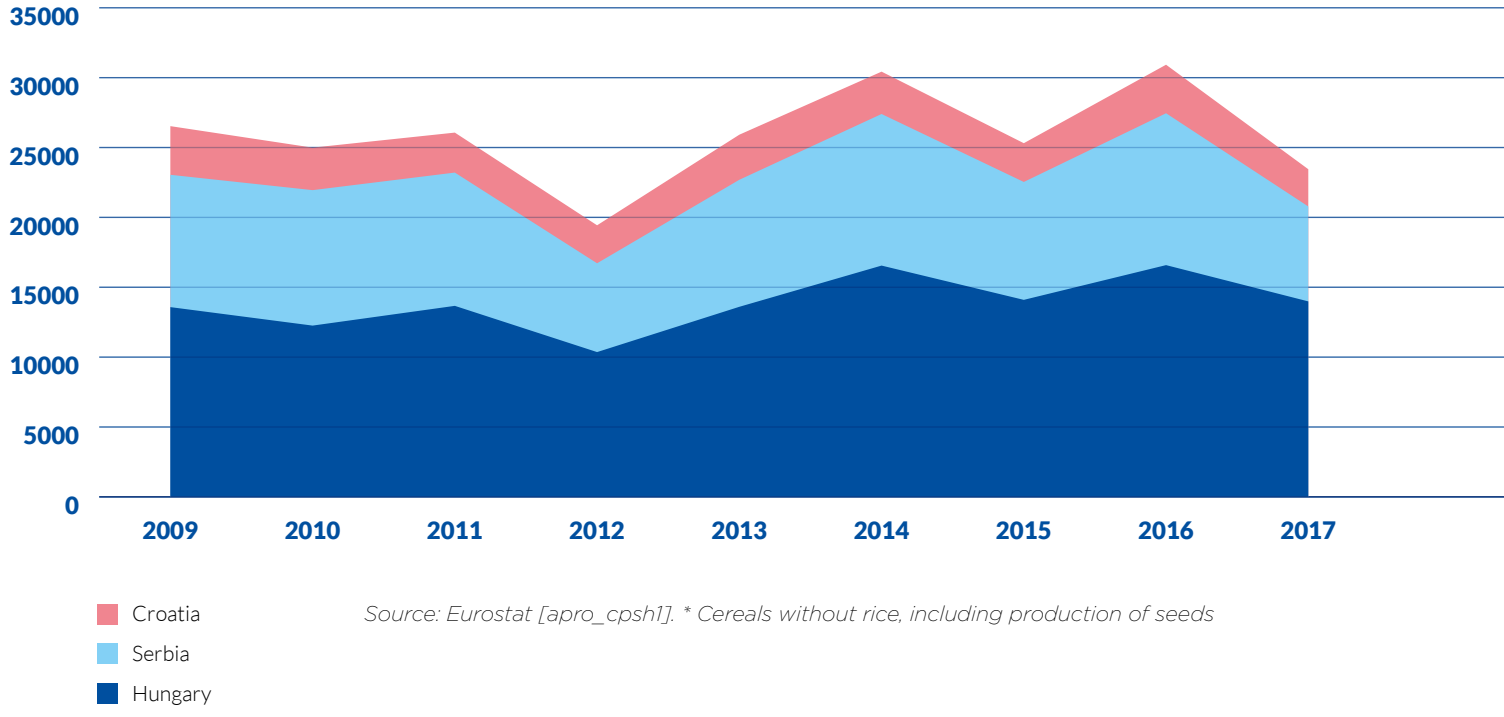
COUNTRIES IN THE EU WITH THE HIGHEST SHARE OF AGRICULTURAL PRODUCTS IN TOTAL INLAND WATERWAY TRANSPORT PERFORMANCE
(SHARE OF AGRICULTURAL PRODUCTS IN %)*



*Source: Eurostat [iww_go_atygo] * dark blue = Rhine countries, red = Danube countries*

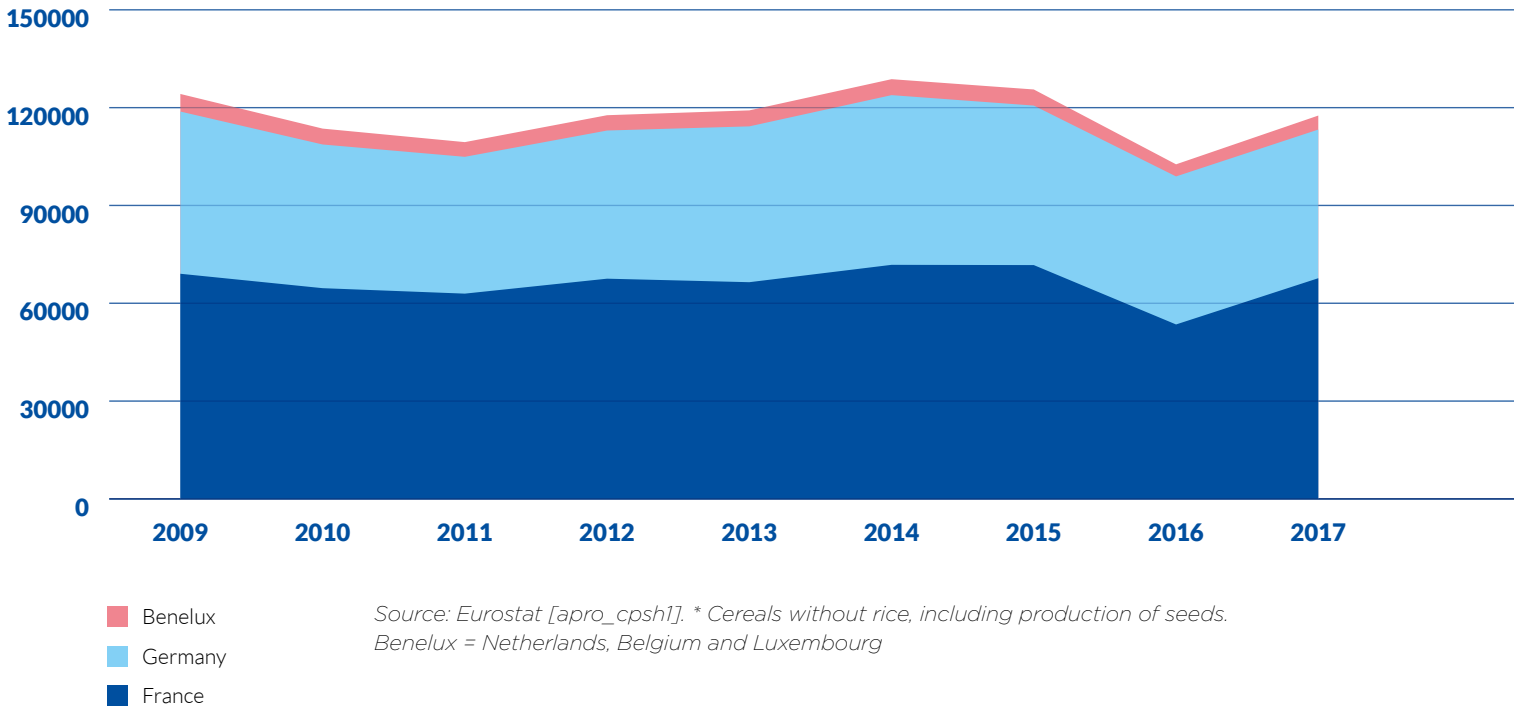
Bad harvest results, which occurred in western Europe in 2016, or in the Danube region in 2017, can have a strong impact on the overall transport evolution in these countries. In the Danube region, this segment is very important for middle Danube countries (Hungary, Croatia, Serbia), where large parts of the IWW transport demand is focused on agricultural products, foodstuffs and food products. The decline in harvest results in the Danube countries in 2017, and in Rhine countries in 2016, as mentioned in chapter 2, is seen in the following figures.

GRAIN HARVEST VOLUMES IN MIDDLE DANUBE COUNTRIES (1000 TONNES)*



*Source: Eurostat [apro_cpsh1]. * Cereals without rice, including production of seeds*

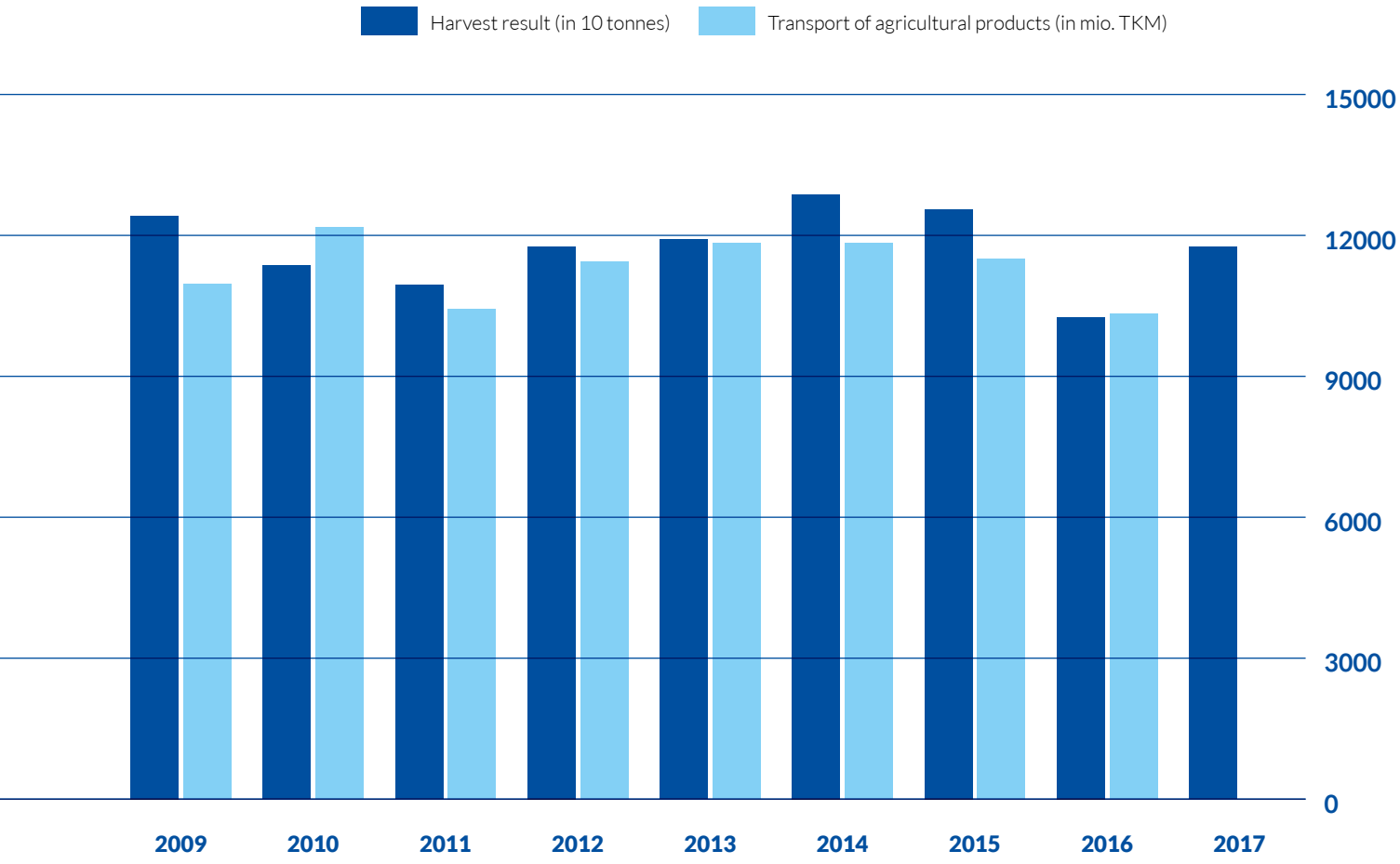
GRAIN HARVEST VOLUMES IN RHINE COUNTRIES (1000 TONNES)*



*Source: Eurostat [apro_cpsh1]. * Cereals without rice, including production of seeds.*
Benelux = Netherlands, Belgium and Luxembourg

The relationship between harvest results and the transport of harvest products on inland waterways is revealed when looking at the total grain harvest volumes in Rhine countries (Belgium, France, Germany, Luxembourg, the Netherlands) compared to the transport performance of agricultural products on inland waterways in these countries (see figure).

GRAIN HARVEST OF RHINE COUNTRIES* AND IWW TRANSPORT PERFORMANCE FOR AGRICULTURAL PRODUCTS



*Source: Eurostat [apro_cpsh1], [iww_go_atygo] * Belgium, France, Germany, Luxembourg, Netherlands*

With the exception of the year 2010, an increase or a decrease in the harvest volumes was followed by an increase or decrease of transport demand for agricultural products. The year 2016 was a time when harvest results decreased strongly in France and Germany, leading to a strong fall in transport activity in 2016 and in 2017.

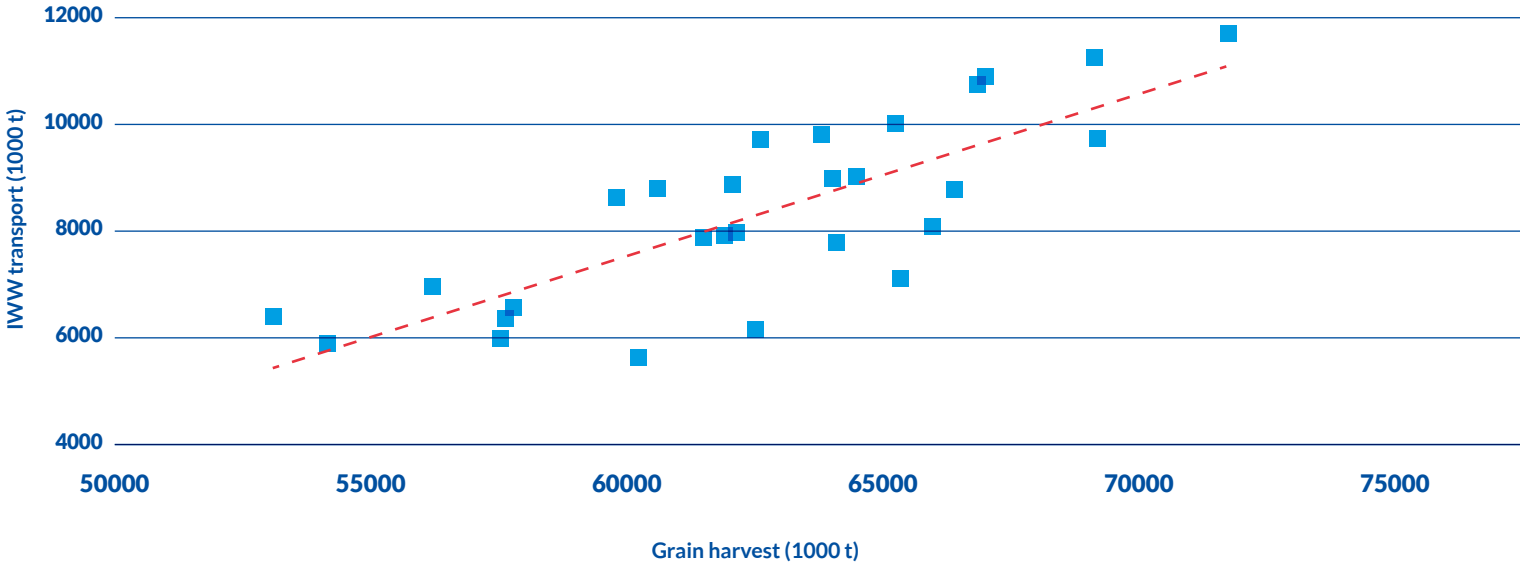
To assess the correlation, the arithmetic averages of harvest results (h) of two consecutive years [1/2 × (ht-1 + ht)] were used as an indicator which was compared with the transport demand in year t.

The reasoning behind this is the following: if a bad harvest occurs, as it did in 2016, this has an influence not only on the transport of grain in that same year, but also in the following year. Grain is harvested in summer, so until a new harvest comes on the market, the result of the previous year still influences the amount of grain transport.[10]

Taking into consideration France, which is the western European country with the highest harvest volumes, and collecting data back until the year 1990, the following long-term correlation is observed:[11]

[10] Indeed, the correlation between the harvest results of year t and transport demand in year t is much weaker than the correlation between the average harvest results of years (t-1) and t with the transport in year t.
[11] Each point in the figure corresponds to a combination of grain harvest volumes and transports of grain in France for a particular year.

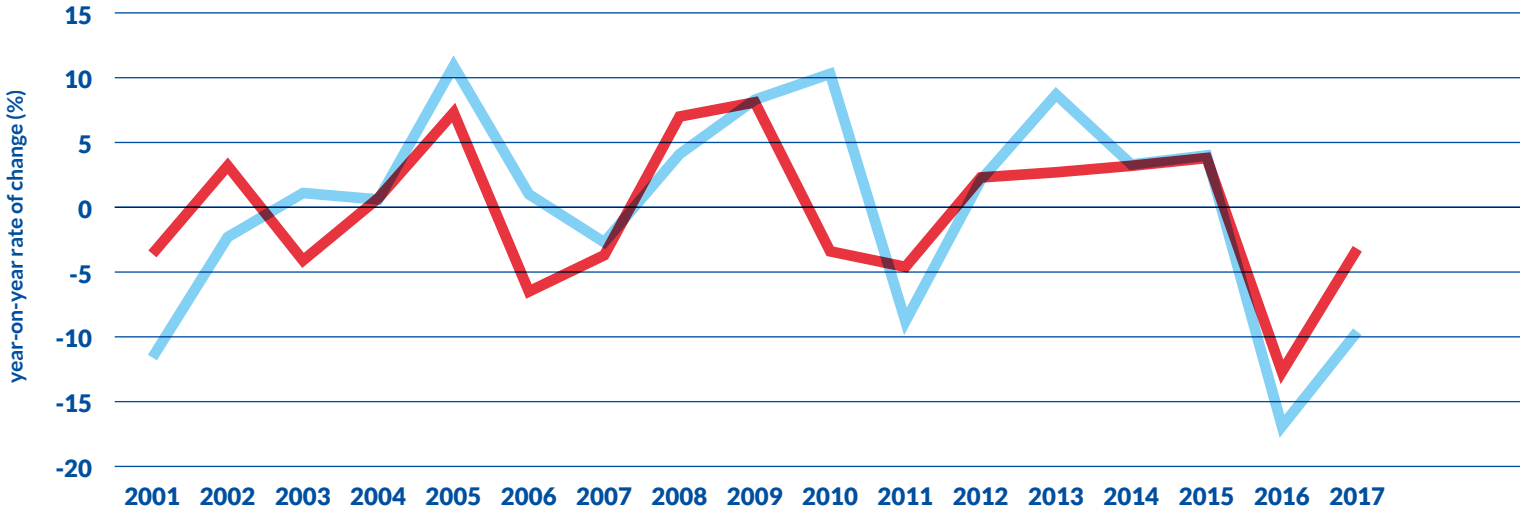
GRAIN HARVEST IN FRANCE AND TRANSPORT OF AGRICULTURAL PRODUCTS IN FRANCE
(1990-2017, IN 1000 T)



Source: Eurostat [apro_cpsh1], Voies Navigables de France, CCNR analysis

The annual rate of change of grain harvests in France is now compared with the rate of change of agricultural transport in France. The result is seen in the following figure.

GRAIN HARVEST IN FRANCE AND IWW TRANSPORT OF AGRICULTURAL PRODUCTS IN FRANCE (2001-2017, IN %)

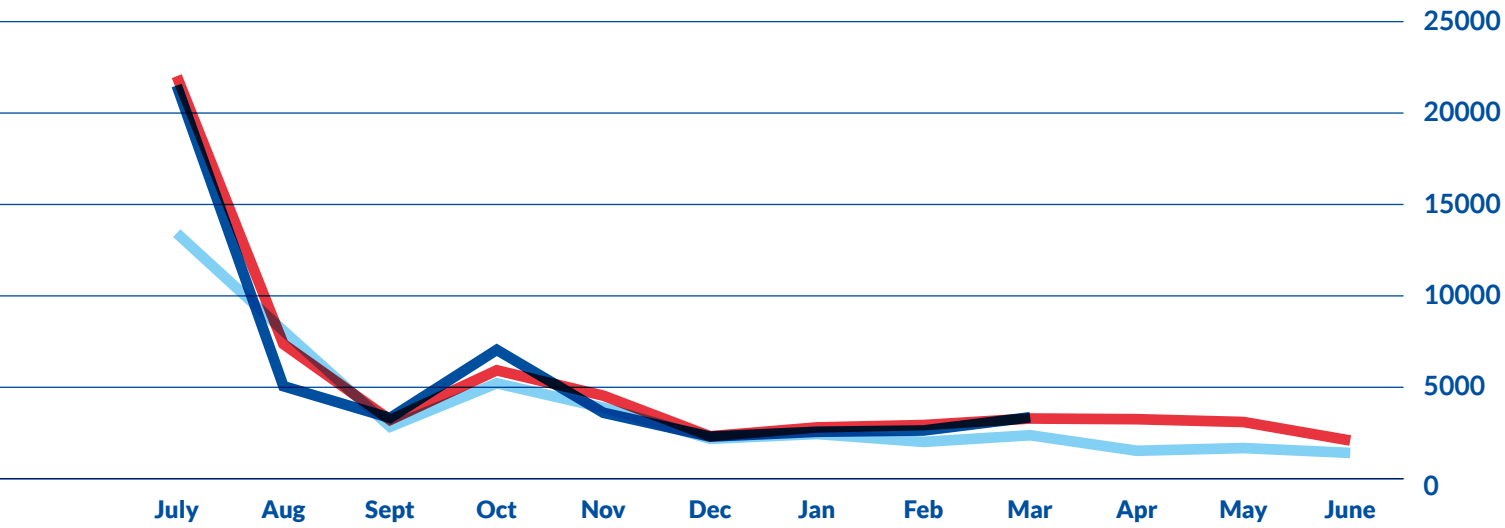


*Source: Eurostat [apro_cpsh1], [iww_go_atygo] * Belgium, France, Germany, Luxembourg, Netherlands*

There is a cyclical structure in the harvest results in France. Peaks occurred in the years 2005, 2009 and 2015, and dips in the years 2006, 2011 and 2016. Meteorological or agro-scientific evidence could explain this structure.

The French Ministry of Agriculture, in particular its department for statistics and market observation, AGRESTE, publishes a bulletin each month, in which monthly values for the actual and previous harvest seasons are presented with a time lag of two months.

MONTHLY GRAIN HARVEST IN FRANCE PER HARVEST SEASON (IN 1000 TONNES)

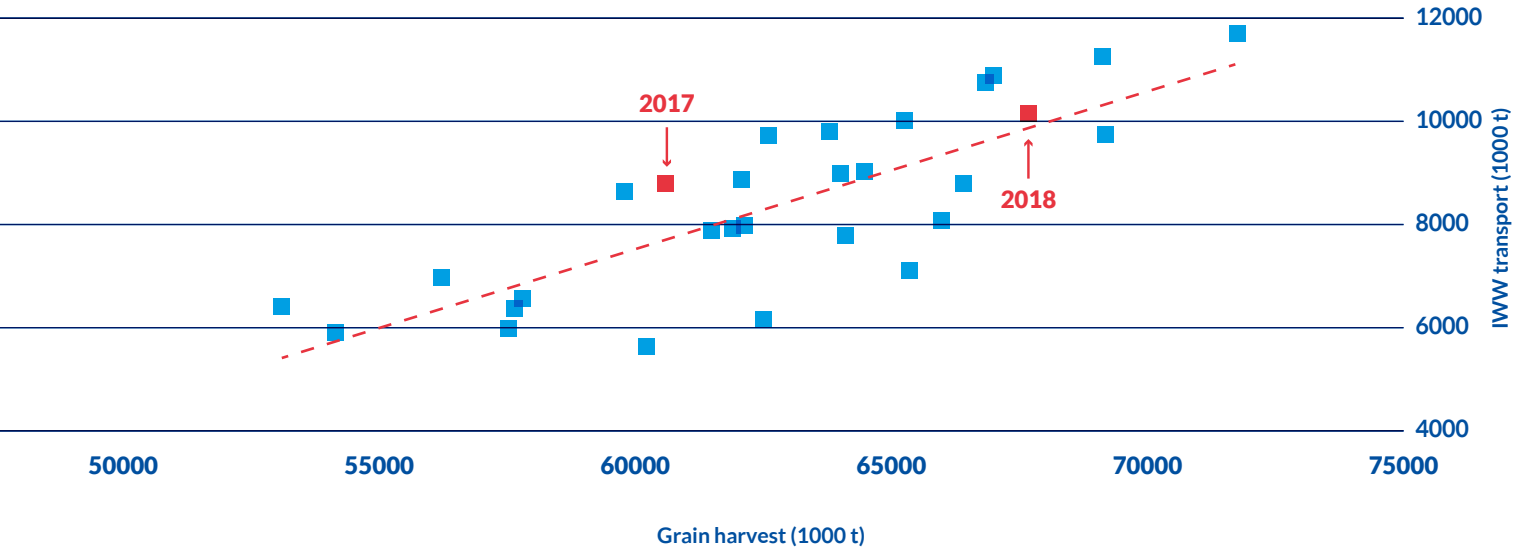


2015-2016
2016-2017
2017-2018

Source: Ministère de l'agriculture et de l'alimentation / Bulletin mensuel « Grandes Cultures »

These data show the bad harvest results in July 2016, which were the main cause of a decrease in grain harvests in the season 2016/2017. The harvest results in the season 2017/2018 are very close to the results of the season 2015/2016.

GRAIN HARVEST IN FRANCE, TRANSPORT OF AGRICULTURAL PRODUCTS (1990-2017) **AND FORECAST FOR 2018**



Source: CCNR analysis based on Eurostat [apro_cpsh1], Voies Navigables de France

Taking into account the harvest forecast and the relationship between harvest and transport volumes, the transport of agricultural products is expected to reach around 10.1 million tonnes in France in 2018. Compared to 2017, this would mean an increase of 15%. Compared to the results in the time period 1990-2017, it would also be a result at the upper end of the spectrum.

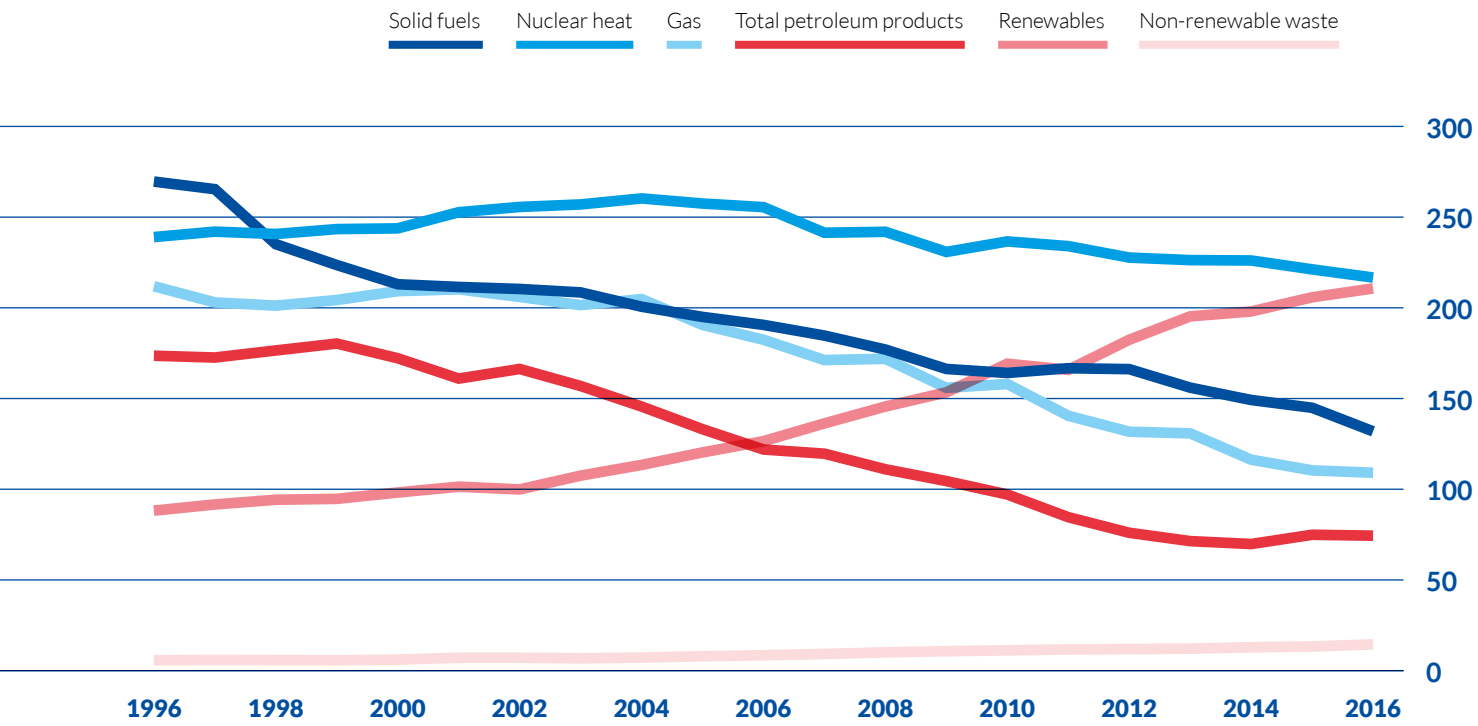
BIOMASS AS A GROWTH OPPORTUNITY
FOR INLAND WATERWAY TRANSPORT

Structural shift of energy sector and IWT-related segments

Over the past two decades (1996-2016), the trend in primary energy production in Europe is negative for fossil fuels and nuclear energy. The sectors where this evolution is the most striking are petroleum products with a 57% decrease and fossil fuels whose production fell by 51%. However, renewable energy production is characterised by a tremendous growth of 139% over the same period.

This structural evolution is partly due to the energy transition initiated in Europe but also to a progressive shift of energy public policies towards renewable energies. This is at the expense of industries which have so far been considered as pillar sectors for inland waterway transport, especially in the Rhine area, and coal and mineral oil products.

PRIMARY ENERGY PRODUCTION IN THE EU (MTOE)



Source: Eurostat [nrg_100a] CCNR analysis

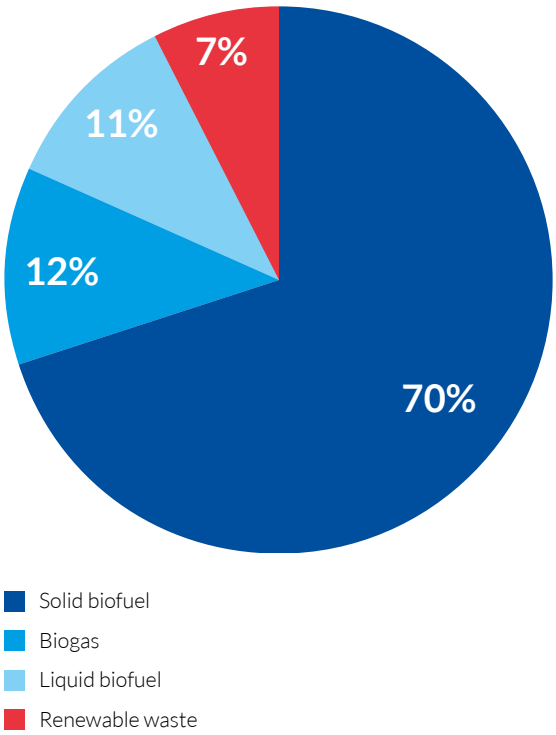
Apart from the construction sector which is assumed to expand its activity in Europe over the next few years, most of the traditional IWT-related sectors have limited outlooks in terms of growth. Coal consumption is expected to decrease with the progressive phasing-out of coal fired power plants and the strong commitment of policy makers for the greening of the energy sector. The demand for oil has been decreasing over the last ten years and is expected to stagnate whereas gas consumption and metals production should slightly increase.

However, agricultural products show an upward trend for the years ahead promoted by the rising importance of biomass in the European market of energy resources. The restructuring process that is occurring in the agricultural sector around the growth of biomass demand provides important opportunities for IWT.

BIOMASS: DEFINITION AND KEY FIGURES

- The biomass is one type of renewable energy source and represents all the organic matters that can become sources of energy. It can be exploited either directly via wood combustion or indirectly after a methanation process (biogas) or a chemical transformation (biofuel).
- Three forms of biomass can thus be distinguished: solid biofuel, liquid biofuel and biogas. Solid biofuels derive from wood and wood products such as wood pellets. Electricity and heat are produced by a combustion process that releases chemical energy from wood. As for liquid biofuels, they are mainly used in the transport sector. First generation liquid biofuels are generated from agro-food products such as soybeans, rapeseed and sugarcane. They include biodiesel (produced from plant oil) and bioethanol (produced from sugar and starch). Second generation biofuels are derived from non-food plant matters such as agricultural waste.
- Given geographic and climate aspects, and the fact that European countries are for the most part urbanised countries, other sources of renewable energy such as hydro, solar and wind have limited outlooks of development. On the other hand, biomass is characterised by a high degree of stability and predictability, and hence appears as a great potential for the sector of renewable energy in Europe.
- With 65% of the demand for total renewables in 2016, biomass is by far the most important source of renewable energy in Europe.
- Since 1990, inland consumption of biomass in the EU has been multiplied by 3.

DISTRIBUTION OF BIOMASS INLAND CONSUMPTION IN 2016 (EU-28)



Source: Eurostat [nrg_100a] CCNR analysis

With the saturation of its traditional sectors, inland shipping should look for new market segments to be potentially absorbed. The extensive analysis of three inland ports – Straubing (Germany), Mannheim (Germany) and Liège (Belgium) - that are involved to a different degree in the biomass and bioenergy sectors, suggests that the biomass segment may have a significant role in the upcoming development of inland ports and the IWT sector in general.

PORT OF STRAUBING-SAND (GERMANY)

Inland waterway traffic in 2017: **800,000 tonnes;** share of biomass within total goods traffic: **85%**

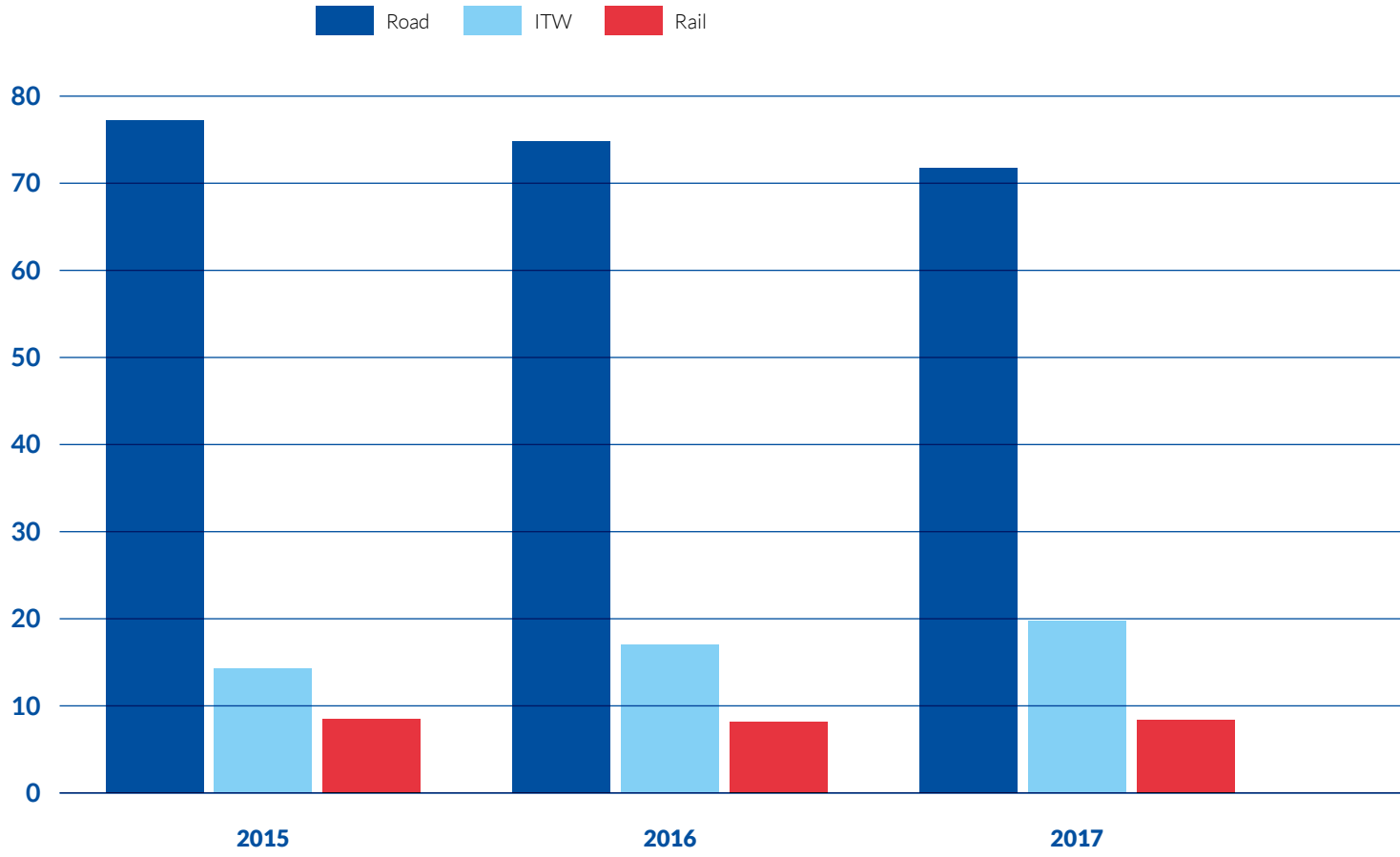
The port of Straubing is a Danube inland port located in the lower Bavaria region in southern Germany. Lying in a fertile area where agriculture, forests and wood are abundant, the port specialises in agricultural products. More precisely, biomass and the exploitation of its energy potential, represent the core activity of the port. With the support of local and regional authorities, the port aims to develop a cluster of green chemistry and biotechnologies which combines innovative bioenergy production and the inland waterway transport sector.

Road transport is still the dominant mode of transport in the port of Straubing, but a progressive shift from road to inland waterway transport is taking place with increasing imports of biomass from the Danube countries (Hungary, Austria) and the ambition of the port authority to promote alternative modes of transport.

The majority of the biomass transhipped in the port of Straubing encompasses soy and rapeseed, much of which is used by a food-processing company to produce liquid biofuel (rapeseed oil). A by-product of this transformation is shredded rapeseed used in the foodstuff sector in the Netherlands and Belgium. As for rapeseed oil, it is transported to Austria and Mainz by rail where it is transformed into biodiesel in bio-refineries.

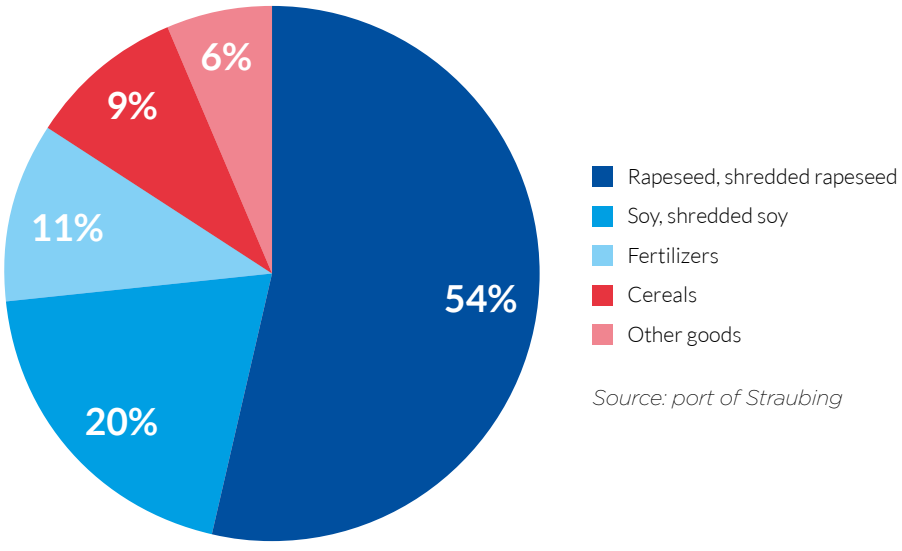
The use of inland waterways for the transport of biomass and biomass products offers several advantages. From a logistical point of view, very high volumes of biomass are transported since biofuel production requires the transport of large quantities of raw materials. Besides, the biomass transported to Straubing is mostly non-perishable, which means that it can be stored for several days. Inland shipping, for which travel times are longer than for rail and road transport, is thus particularly adapted when it comes to biomass transport. From the port's perspective, IWT of biomass provides a significant added value since its activities aim at promoting the sector of renewables and, to a large extent, sustainable development.

MODAL SPLIT IN THE PORT OF STRAUBING (2015-2017, IN %)



Source: port of Straubing

STRUCTURE OF WATERSIDE GOODS TRAFFICS IN THE PORT OF STRAUBING (2017)



Source: port of Straubing

PORT OF MANNHEIM (GERMANY)

2017 total waterway traffic: **9.6 Mio t**; biomass traffic: **1.5 Mio t**

The activities of the port of Mannheim are closely linked to the bioenergy industry. The biomass –mostly rapeseed - is transported via inland waterways and road to the port of Mannheim. It comes from the Benelux area (Rotterdam), from north-eastern France (Metz, Ottmarsheim, Alsace) and from agricultural regions of Germany via the Neckar and the Main.

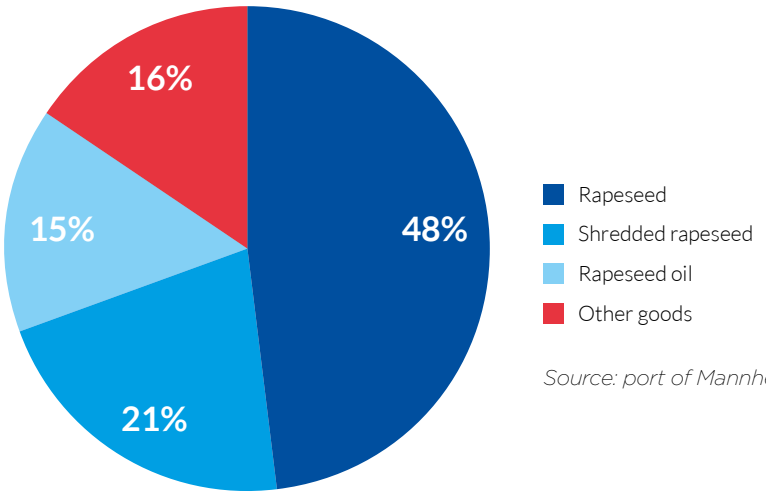
The volume of biomass and biodiesel transported to the port of Mannheim has been relatively stable since 2015. Rapeseed is the main input for bioenergy production and thus represents the largest volume with approximately 750,000 tonnes transported per year. The traffic of shredded rapeseed, which is a by-product of rapeseed oil production, reached around 350,000 tonnes in 2017.

The oil mill (Ölmühle Bunge) receives the rapeseed, stores it, and produces rapeseed oil and shredded rapeseed, a by-product used in the foodstuff segment. Most of the rapeseed oil is transported to the port's company, Mannheim Bio Fuel GmbH, to manufacture biodiesel. The nominal capacity of the production site of Mannheim is 120,000 tonnes of biofuel per year.

From the point of view of the companies specialising in biomass in the area of Mannheim, inland waterways offer important opportunities in terms of transport logistics. Indeed, inland shipping provides an ecological, competitive and reliable way to transport very high volumes of biomass. Using IWW for trade in biomass and biofuel is particularly beneficial since they provide a direct link to the Amsterdam-Rotterdam-Antwerp set of maritime ports which forms a key component of the European oil supply chain.

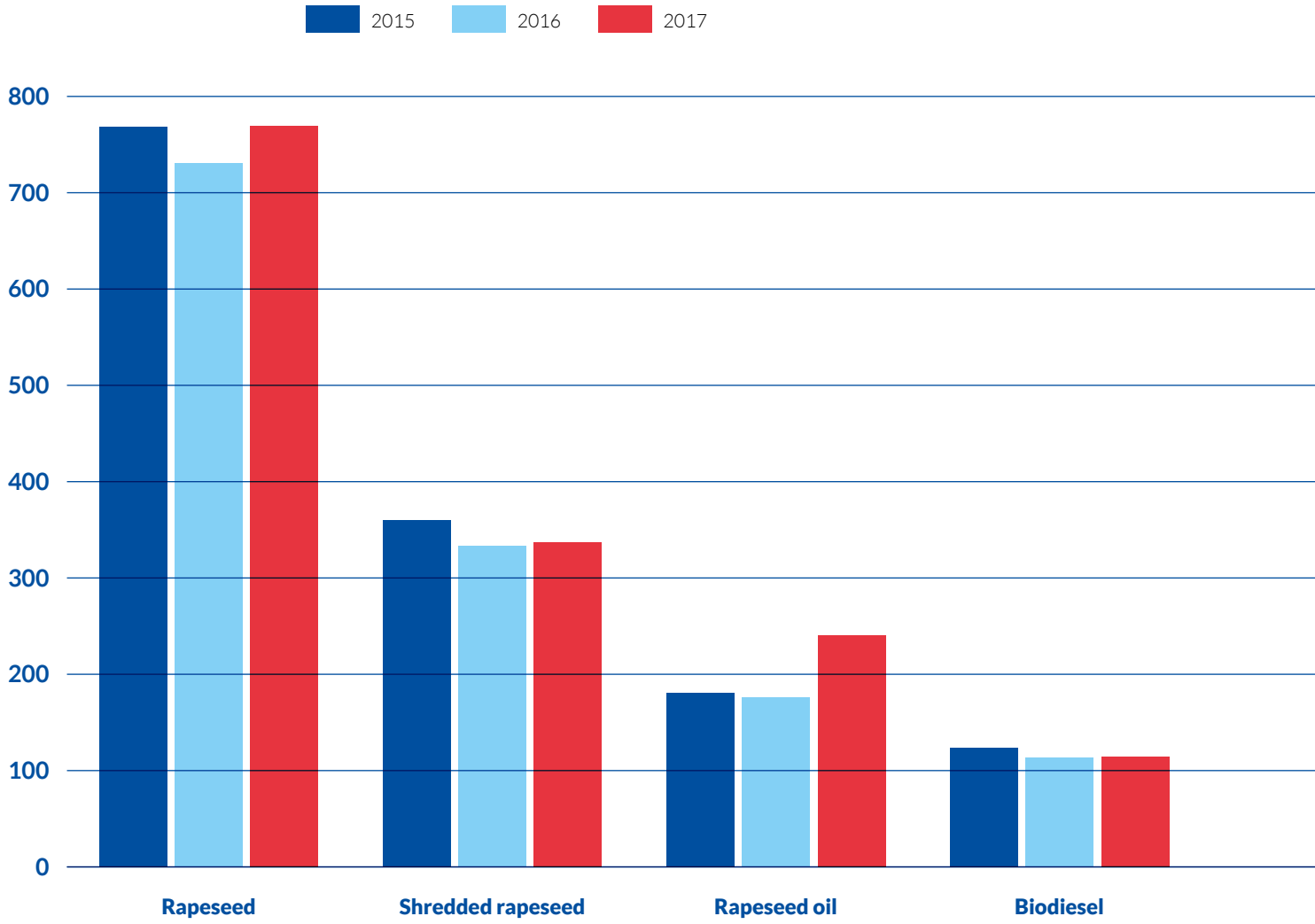
As far as the port of Mannheim is concerned, the growth of the biomass segment is an opportunity to build up its image on the promotion of inland shipping as a sustainable mode of transport consistent with environmental matters and energy transition.

STRUCTURE OF FOODSTUFFS AND ANIMAL FODDER SEGMENT IN THE PORT OF MANNHEIM (2017)



Source: port of Mannheim

EVOLUTION OF VOLUME OF BIOMASS TRAFFIC IN THE PORT OF MANNHEIM
(IN THOUSAND TONNES)



Source: port of Mannheim

PORT OF LIÈGE (BELGIUM)

Total waterway traffic (2017): **16 Mio. tonnes;**
increase of wood products traffic since 2005: **+330%**

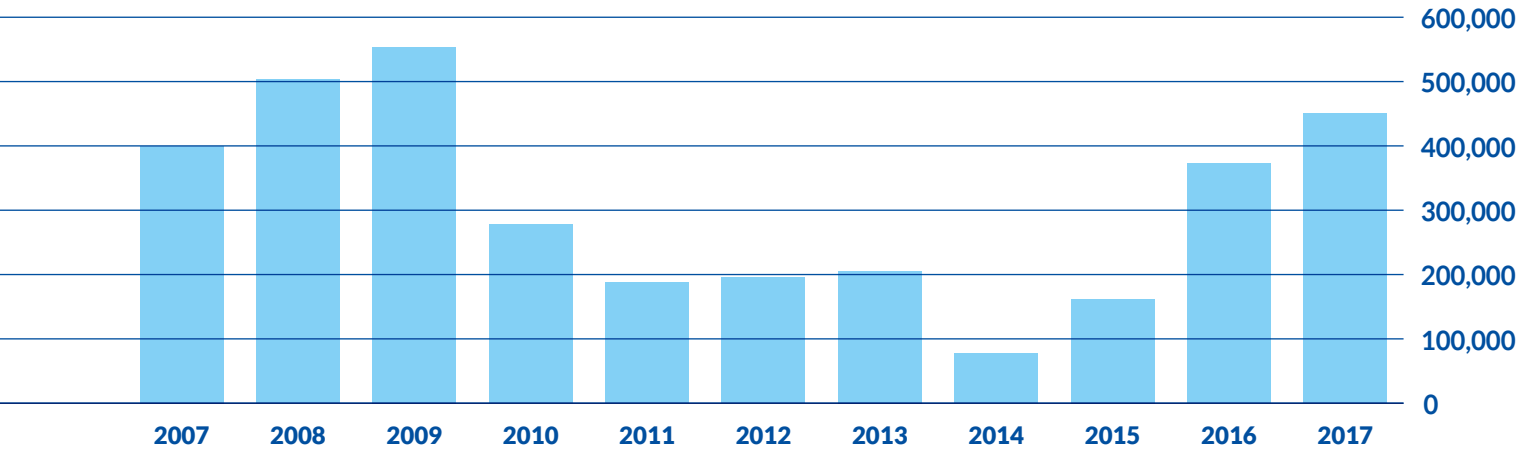
As the largest inland port in Belgium and third largest European inland port, the port of Liège is located at the heart of Rhine-Scheldt-Maas river basin, the densest river basin in the world. In 2012, the difficult economic setting and the steel industry crisis significantly affected freight traffic in the port of Liège whose activity until then strongly relied on iron ores and coal segments of transport.

Nevertheless, since 2014, the port has managed to recover its pre-crisis traffic volumes by investing in new infrastructures (multimodal logistic platform Liège Trilogiport) and by restructuring its activity around expanding segments of IWT which are container and biomass transport.

In 2005, the Awirs coal-fired power plant that lies on the left bank of the Maas river was fully reconverted to a biomass plant. This is a first worldwide project and is, in line with the commitment of Belgium under the 2020 climate and energy package of the European Commission, to increase the share of renewables in the total energy consumption to 13%.

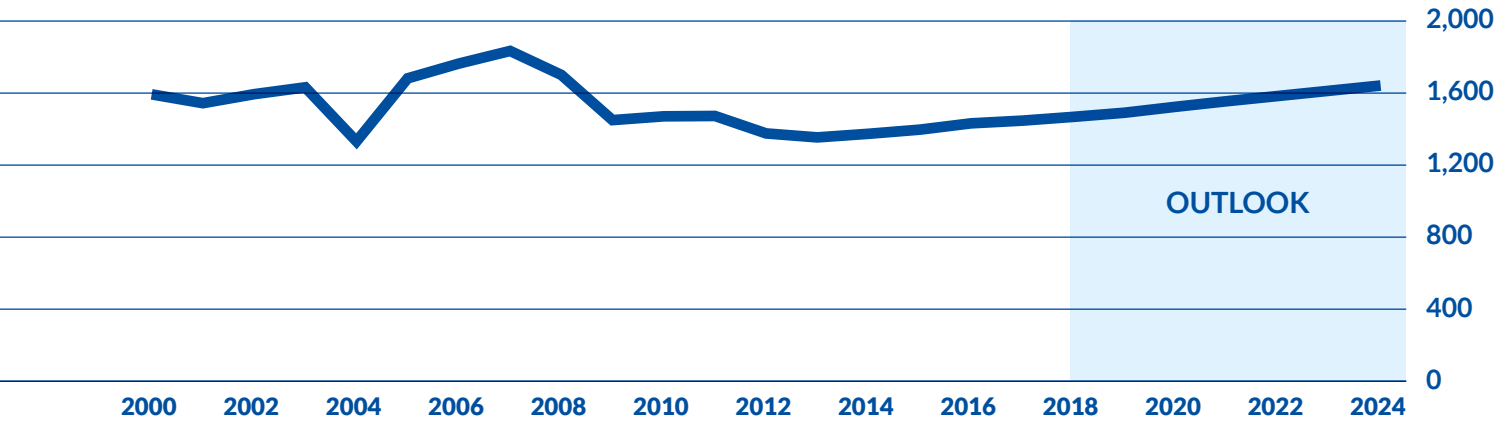
In order to produce electric power, the biomass plant uses wood pellets as fuel source and these are produced mainly in Belgium, France and Germany. Around 1,200 tonnes of wood pellets are transported to the power station by ship on the Maas or by road.

TRAFFIC OF WOOD PRODUCTS IN THE PORT OF LIÈGE



Source: port of Liège

EU GROSS OUTPUT OF WOOD AND WOOD PRODUCTS
(EU GROSS OUTPUT IN BILLION REAL US$ - 2010 US$)



Source: Oxford Economics, CCNR analysis

The conversion of the power plant into a biomass plant opened up a new segment of transport in the port of Liège. In 2007, wood pellets delivery by inland waterways reached 400,000 tonnes and increased over two years. From 2010 to 2014, inland traffic of wood products in the port of Liège substantially declined. This drop was due to the weak activity of the biomass power station which suffered from a poor profitability in the early stages of its operations. Indeed, the operational costs of the plant were too high, with the increase of wood pellet prices, while the price of electricity was considered too low.

Nevertheless, wood products traffic in the port of Liège has been growing since 2015 due to public support and the change of legislation concerning green certificates granted to the biomass plant. In addition, the wood industry activity in Europe is expected to grow over the next few years. The wood product traffic in Liège follows the same trend as wood production in the EU, and this expected growth is a positive sign for the inland traffic of wood and wood products in the port of Liège.

The case of the port of Liège reveals that although the biomass market can be genuinely beneficial for the activity of the port in terms of market opportunities, it is still an emerging segment characterised by a vulnerable growth. The market of wood and wood products is cyclical and very volatile. Besides, inland shipping of wood products in Liège strongly depends on the activity of the biomass plant which is itself largely supported by public authorities.

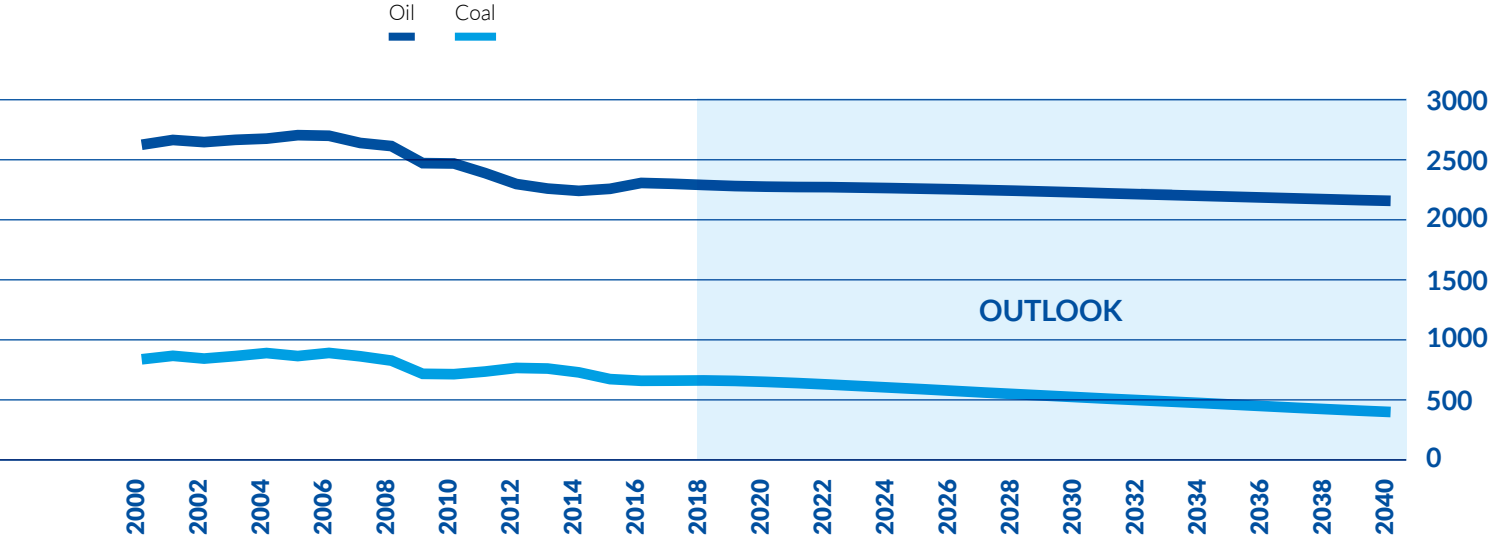
Conclusion

The study of the two German ports and the Belgian inland port reveals two important aspects of the integration of the biomass segment into the IWT market. On the one hand, the biomass sector's characteristics - proximity with the agricultural industry, high volumes required for biofuel production, large growth potential, political commitment to renewables show positive signs for inland shipping.

On the other hand, the three case studies show that in most cases, biomass-related companies are located near the port or have even been developed at the port's initiative. This suggests that inland ports are not only logistic platforms for IWT, but also effective processing and production sites for the bioenergy sector and to a greater extent for industrial sectors with high innovative potential. Thus, inland ports as industrial actors could also benefit from the absorption of the biomass segment by IWT to become economic clusters with a European reach.

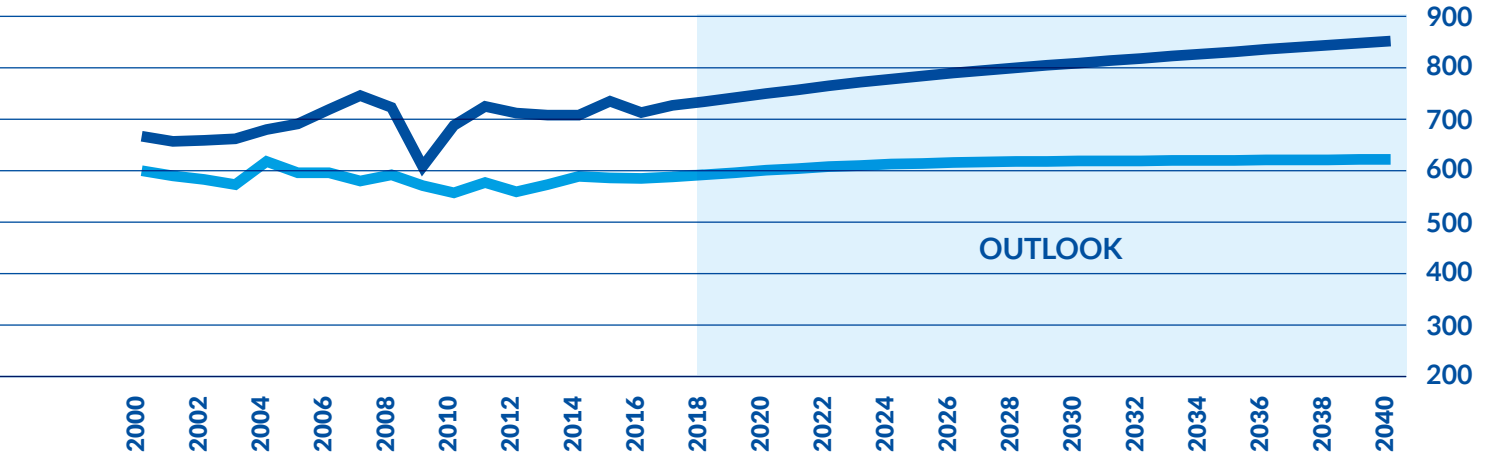
LONG-TERM TRENDS FOR IWT MARKETS

DOMESTIC DEMAND FOR OIL AND COAL IN THE EUROPEAN UNION *



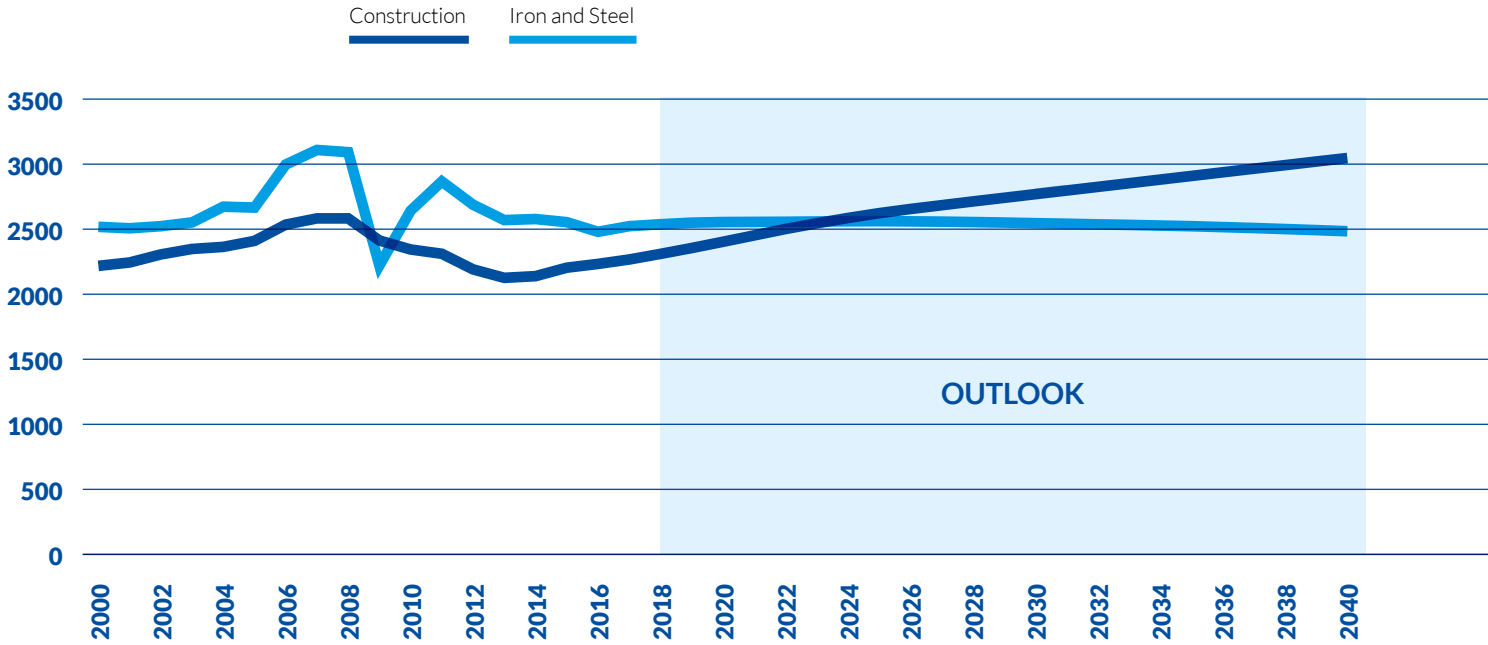
*Source: Oxford Economics. * in mtoen (1000 tonnes)*

GROSS REAL OUTPUT OF CHEMICALS AND AGRICULTURAL PRODUCTS IN THE EUROPEAN UNION *



*Source: Oxford Economics. * in billion US-$, 2010 prices*

GROSS REAL OUTPUT OF IRON AND STEEL AND IN THE CONSTRUCTION SECTOR IN THE EUROPEAN UNION *



*Source: Oxford Economics. * in billion US-$, 2010 prices*

Oil and coal demand in the European Union is expected to decrease in the long term, due to decarbonisation in the energy sector, saving measures in energy demand, and in particular the shift from oil and coal to renewables. These downward orientated trends will obviously affect transport demand for coal and mineral oil products.

Limited growth is foreseen for the output of agricultural products. Iron and steel production is expected to stagnate in Europe in the long term, although the development is more positive in certain countries (e.g. Germany).

The construction activity and the chemical production are part of the main growing segments for inland waterway transport. Other growing segments are new markets such as the biomass segment, the urban waterway and container transport.

GLOSSARY

ARA: Amsterdam – Rotterdam – Antwerp

bn: Billion

EU: European Union

Europe: European inland navigation in this report includes two countries that do not belong to the European Union – Switzerland and Serbia

Freight rate: Price at which a cargo is delivered from one point to another

GDP: Gross Domestic Product

IWT: Inland Waterways Transport

IWW: Inland Waterways

Loading degree: Percentage of maximum vessel loading

Mio: Million

MTOE: Million Tonnes of Oil Equivalent

NOx: Collective term for nitrogen oxides

OECD: Organisation for Economic Co-operation and Development

PM: Particular Matter Emissions arising due to combustion or wear and tear

Q1: First Quarter

Rhine countries: Belgium, France, Germany, Luxemburg, Netherlands, Switzerland

RWI/ISL Container Throughput Index: Index of worldwide container throughput in ports

Tank-to-wheel emissions: Emissions arising from fuel combustion during vehicle use

TEU: Twenty-foot Equivalent Unit (unit for container volume)

TKM: Tonne-Kilometer (unit for transport performance which represents volume of goods transported multiplied by transport distance)

Traditional Rhine: Rhine from Basel to the border between the Netherlands and Germany

Turnover: Sales volume net of sales taxes

Waterside goods traffic: Loading or unloading activity in ports, which includes inland vessels

Well-to-tank emissions: Emissions arising during extraction, transport and refinery of fuels or during electric power generation and transmission

Well-to-wheel emissions: The sum of well-to-tank and tank-to wheel emissions

NATIONAL STATISTICS OFFICES

Sources	Original Name	English Name	Country
BFS	Bundesamt für Statistik	Federal Statistical Office	Switzerland
CBS	Centraal Bureau voor de Statistiek	Central Statistical Office	Netherlands
Destatis	Statistisches Bundesamt	Federal Statistical Office of Germany	Germany
HSCO	Központi Statisztikai Hivatal	Hungarian Central Statistical Office	Hungary
INS	Institutul National de Statistică	Romanian Statistical Office	Romania
STAT	Statistik Austria	Statistics Austria	Austria
	Републички завод за статистику Србије	Statistical Office of the Republic of Serbia	Serbia

PORTS

Original Name	English Name	Country
Haven Antwerpen	Port of Antwerp	Belgium
Port de Bruxelles	Port of Brussels	Belgium
Port of Constanța	Port of Constanța	Romania
Duisport	Duisport	Germany
Hafen Hamburg	Port of Hamburg	Germany
Port autonome de Liège	Port of Liège	Belgium
Port de Lille	Port of Lille	France
Port de Lyon	Port of Lyon	France
Hafen Mannheim	Port of Mannheim	Germany
Ports de Moselle	Ports of Moselle	France
Port de Mulhouse-Rhin	Port of Mulhouse	France
Port autonome de Namur	Port of Namur	Belgium
Ports de Paris	Ports of Paris	France
RheinCargo	RheinCargo	Germany
Haven Rotterdam	Port of Rotterdam	Netherlands
Schweizerische Rheinhäfen	Port of Switzerland	Switzerland
Port de Strasbourg	Port of Strasbourg	France
Hafen Straubing	Port of Straubing	Germany

BOOKS, JOURNAL ARTICLES & STUDIES

Source	Original Name	English Name	Country
Hader 2017	Hader, A. (2017), The River Cruise Fleet Handbook 2017/2018	Hader, A. (2017), The River Cruise Fleet Handbook 2017/2018	Germany
IG River Cruise / German Travel Association (DRV)	Der Fluss-Kreuzfahrtmarkt 2017	The River Cruise Market 2017	Europe / Germany
Kriedel 2015	Kriedel, N. « La navigation fluviale sur le Rhin au XIXe siècle – avec un regard sur le trafic rhénan actuel et son influence sur la métropolisation rhénane », Revue d'Allemagne et des pays de langue allemande, 2015	Kriedel, N. « The navigation of the Rhine in the 19th century – with a view on contemporary Rhine navigation and its influence on the urbanization process in the Rhine area », Revue d'Allemagne et des pays de langue allemande, 2015	Europe

INTERVIEWS OF EXPERTS

Surname, first name	Organization	Function	Country
Baudry, Didier	Cerema	Director of studies for inland waterway transport and intermodality	France
Bazenet, Marc	Cluster Logistique Urbaine IDF	President	France
Beyer, Antoine	University of Cergy-Pontoise	Professor specialized in transport geography	France
Boonen, Johan	Watertruck+	Project manager	Europe
Joormann, Bas	Lloyd's Register Marine & Offshore	Inland Waterway Product Manager	Netherlands
Lantz, Johan	Avatar Logistics (shipping company)	CEO	Sweden
Löffert, Andreas	Port of Straubing-Sand	Director	Germany
Maugé, Philippe	SCAT (shipping company)	Director	France
Von Castell, Melanie	Port of Mannheim	Department manager	Germany

OTHER SOURCES

Original Name	English Name	Country
Association des ports intérieurs français (AFPI)	Association of French inland ports	France
Bundesanstalt für Gewässerkunde (BfG)	German Federal Institute of Hydrology	Germany
Bundesministerium für Verkehr und digitale Infrastruktur	Federal Ministry of Transport and Digital	Germany
Centraal Bureau voor de Rijn- en Binnenvaart	Central Bureau for Inland Barging	Netherlands
CCNR / DG MOVE (2017), Market Report 2014-2017 (NAIADES II Progress report) - Main features and trends of the European Inland Waterways Transport sector	CCNR / DG MOVE (2017), Market Report 2014-2017 (NAIADES II Progress report) - Main features and trends of the European Inland Waterways Transport sector	EU
Deutscher ReiseVerband	German Travel Association	Germany
Donaukommission	Danube Commission	Europe
Enregistrement et Domaines	National vessel register	Luxembourg
European Commission	European Commission	EU
European Environmental Agency	European Environmental Agency	EU
EUROSTAT	EUROSTAT	EU
IG River Cruise	IG River Cruise	Europe
Institut pour le transport par batellerie (ITB)	Institute for transport by skippers	Belgium
IVR	IVR	Europe
OCDE	OECD	World
Oxford Economics	Oxford Economics	World
Panteia	Panteia	Netherlands
PJK International	PJK International	Netherlands
SeaConsult	SeaConsult	Germany
Statistisches Amt für Hamburg und Schleswig-Holstein	Statistical Office of Hamburg and Schleswig-Holstein	Germany
United Nations, Department of Economic and Social Affairs	United Nations, Department of Economic and Social Affairs	World
Voies Navigables de France	Navigable Waterways of France	France
Wasserstraßen-und Schifffahrtsverwaltung des Bundes (WSV)	German Waterway and Shipping Administration	Germany

The Market Observation of European inland navigation is a common project of the CCNR and the European Commission

CONTRIBUTORS

CCNR SECRETARIAT
Norbert Kriedel (Economist)
Angelika Espenhahn (Project coordination)
Lucie Fahrner (Communication)
Kenza Bousedra (Intern, Urban Logistics and Biomass)
Victoire Nagy (Intern, communication)
Contact: ccnr@ccr-zkr.org

IN PARTNERSHIP WITH

Danube Commission
Moselle Commission
Sava Commission
EBU
ESO
IVR
Panteia

DESIGN BY PRESS-AGRUM

Nicolas LAURENT (coordination)
Lucie GANGLOFF (design)
www.press-agrum.com

TRANSLATION

Christophe Hener (French)
Barbara Vollath-Sommer (German)
Pauline De Zinger (Dutch)
Jane Swift (English - Proofreading)

www.inland-navigation-market.org

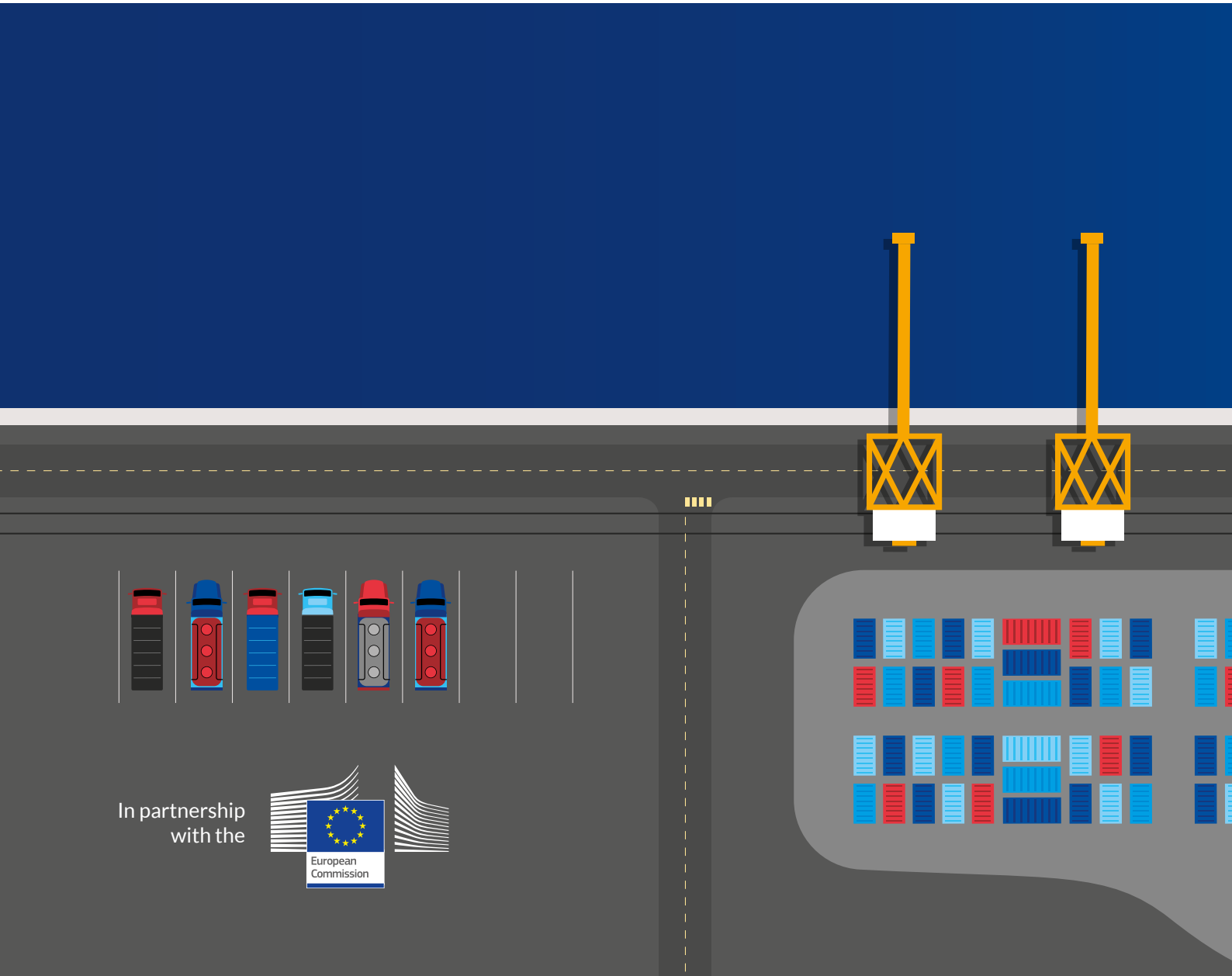
Imprint: September 2018

Published by the Central Commission for the Navigation of the Rhine (CCNR)
2, place de la République - CS 10023 - 67082 Strasbourg Cedex - France
www.ccr-zkr.org - ccnr@ccr-zkr.org
ISSN 2070-6715

ANNUAL REPORT 2018

Please find all our data at:

www.inland-navigation-market.org



In partnership with the European Commission