The power of inland navigation

The future of freight transport and inland navigation in Europe

2013 - 2014

the Blue Road
duurzaam vervoer over water

Foreword

Promise for the future

Ships, shipping, trade and freight transport have been interwoven with the Dutch economy for centuries. Our convenient location at the mouth of several important rivers gives our country an advantage over other countries. Our central position has provided us with many benefits in the past and will keep doing so in the future. Together we can create a brighter future.

The downturn in the global economy and financial crisis hit the markets hard, as it did in the trade and transport sectors. Still, the markets will recover, with the promise of future prospects. Companies in these sectors are exceedingly flexible, so we are ready to face the future with its enormous challenges for acquiring larger market shares and introducing innovations within sustainable concepts. That is our mission.

This booklet provides facts and figures pertaining to the transport flows on our oceans and the connecting rivers and canals in Western Europe with an emphasis on a country that is ideally suited for water transport: the Netherlands. The Netherlands has so many waterways that virtually all major industrial areas and population centres can be reached by water via inland ports (200) and transhipment terminals (350). There are 25 container terminals in the Netherlands (NW Europe counts 96) especially designed for transport by inland vessel. This number is still ever growing. The share of inland container navigation (currently 33 percent) will also continue to grow to 40-45 percent in the coming years.

The next fifty years, the use of rivers and canals in this part of Europe will not be confronted with capacity constraints when it comes to freight transport. The river Rhine can physically handle seven times more shipping traffic than the present capacity before risking waiting lines. Canals will be able to handle twice as much transport after a small investment has been made in the construction of additional lock chambers in a number of locations.

Transport by inland vessel is the most sustainable mode of transport for the future. The lowest fuel consumption per transported unit guarantees the lowest emission of greenhouse gases. Nowadays, our barges run on clean fuel, the same kind of fuel that lorries use. And the latest barges that have been put into service since 2010 are able to realise a 90 percent reduction in nitrogen oxides and particulates. We are on the right track.

Freight transport by inland vessel is also trendsetting in terms of safety. More than three-quarters of all hazardous substances are already transported safely by water. As most waterways are not near residential areas, inland navigation produces little (noice) nuisance or other restrictions. In short, transport by water holds numerous promises for the future. And so we would like to embark on the future together with you. With this booklet we would like to welcome you on board.

Kees de Vries
Director Royal Schuttevaer / Secretary of the Dutch Inland navigation Information Agency

Table of Contents

Foreword 2

The Blue Road 4

Chapter 1
A world of transport 8

Chapter 2
All modalities together connect Europe 16

Chapter 3
The Blue Road: a golden link in the chain 24

Chapter 4
50,000 kilometres of waterways 34

Chapter 5
The versatile fleet of the Blue Road 48

Chapter 6
The Blue Road: the shortest route to sustainable transport 58

Glossary 68

Organizations 69

The Blue Road

the way of the future

In 2011 Melanie Schultz van Haegen cast off the ropes to officially open the Blue Road, thus launching the umbrella brand for the Dutch Inland navigation. A lot has happened since then. And not without reason. The Blue Road brand emphasises the modern, dynamic and responsible nature of the industry. Therefore, choosing the Blue Road is becoming an increasingly logical choice for shippers.

Water transport pretty much dates back to the dawn of transportation, which is not surprising. Europe has the best waterways for countless centuries. Over time, inland navigation has become a well organized, modern and safe sector, indispensable to the Dutch economy and the Western European import and export markets. It is a logical alternative to all modes of transport and for all types of cargo, even for companies that are not situated directly alongside a navigable waterway, but within a 25-kilometre radius of one. Inland navigation consequently keeps many transport movements off rail and road and helps to relieve congestion on our roads. And, also important, inland navigation substantially reduces CO_2 emissions.

The Blue Road

The Blue Road, an umbrella brand for the entire Dutch inland navigation sector, was launched in 2011 to stress the importance of inland navigation. With the Blue Road brand, inland navigation can present itself as one and show that water transportation is the

most logical and sustainable mode of transport in this day and age. The word 'blue' is a deliberate choice: blue stands for water, of course, but also for sustainability with respect to technology. The Blue Road is a philosophy, a way of thinking for anyone who has anything to transport.

Results of the Blue Road

Much has happened since the introduction of the Blue Road. As an example, various shippers have decided to include inland navigation in their logistics chain, from reefer containers holding fruit and chocolate to containers holding bicycles and metal scrap. Even large companies such as Mars Nederland, Bavaria and Heineken and, recently, the French retailer Casino Group as well, make use of inland navigation. Casino says it is saving hundreds of thousands of road miles and reducing CO_2 emissions by 37 percent by using inland navigation.

In the extensive shippers survey of 2012, inland navigation scored 7.9 for customer satisfaction (up from 6.2) to become the big winner! It scored higher than road, rail, sea or air transport. Additionally, an

inland navigation company received the BlueEFFICIENCY Award, the annual award granted by Mercedes-Benz to the company that produces the best innovation in the field of sustainable mobility.

The future of inland navigation

Sustainable water transport is the future. Both the inland navigation sector and the government are working hard to realise that. Inland navigation is investing in DPF filters (diesel particulate matter filters), catalysts, new propulsion systems and also in the use of new fuels in order to remain the most environmentally friendly mode of transport. The government is cooperating by placing inland navigation on the European agenda via, for instance, TEN-T projects (Trans-European Transport Network) and by investing in Dutch inland ports and harbours. This way, the Blue Road is and will continue to be the way of the future. There are plenty of waterways. There is plenty capacity. So why not ‘take the Blue Road’.

A world of transport

Viewing the globe from a distance, you will see billions of people spread all over the world, many of which are busy with seemingly random and unrelated activities. Yet, in the second decade of the 21st century, the more than 7 billion people on this planet form one large community. That quickly becomes clear when you zoom in on that society. The activities of all those people are indeed closely related; in many cases they are even intertwined.

Source: BVB

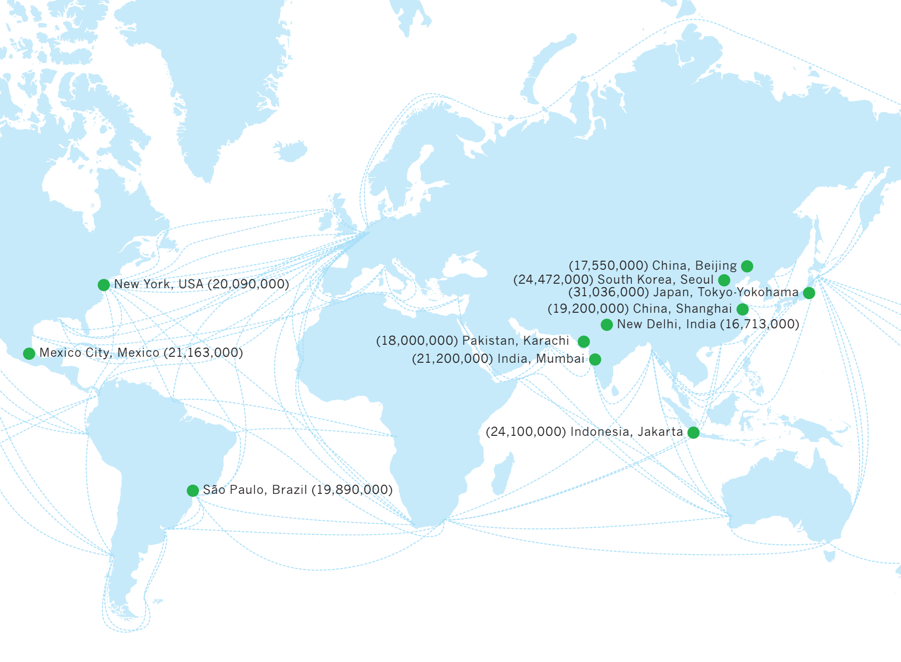
Let's zoom in closely, as if we are in real-time Google Earth with streaming street view. Marieke is on her way to an Italian restaurant where she will meet up with friends. She is enjoying an ice cream cone and holding an iPhone up to her ear, happily chatting with her boyfriend Paul (who was not allowed to come along).
If he were to ask her where her iPhone comes from, she would answer: from the shop. There is a more nuanced answer, of course. The iPhone was designed in California, manufactured in China and then travelled halfway around the world to be delivered to the store where it was purchased by Marieke. The components that make up the iPhone have jointly travelled an even greater distance before being assembled into an iPhone. The Italian restaurant Marieke is headed for uses fresh produce and herbs from all over Europe, Asia and Africa, while the origin of the fish dishes is off the coast of Brazil, the Mediterranean and even further afield. During their meal, Marieke does not dwell on the origin of the food or the products they use on a daily basis (and in the case of the iPhone, all day long). However, she does discuss the fact that her clothes are from India or South America (although many were also made in China). Their bicycle, television, microwave, cars, computers, fuel... everything comes from far-flung places, where they were compiled of raw materials and components which, in turn, came a long way across the world before being turned into the final product.

Marieke does not have to bother about all that. All those goods are 'quietly' transported criss-cross around the world behind the scenes. The figures and graphs on the following pages explain how and why all these complex flows of goods form a worldwide - and for many invisible - web. Transportation is a community on itself, in which thousands of companies, people and organizations work around the clock as efficient and reliable as possible to deliver the goods at the right time to the right place by either sea, air or land. The latter often takes some doing. People use land to live, work and travel on, which often creates friction because freight transport claims space.

To keep tension from running too high, freight transport focuses increasingly on sustainability. All transport has to be done in an environmentally friendly and people-friendly manner and actually in a way that is friendly for the entire world as well. Logistics - the entire organization of the chain: transport, storage, transhipment and distribution – is the driving force behind success. We cannot do without. On the other hand, we don't want logistics to be in our way. By striving for sustainable transport, we can keep our unique, vibrant planet liveable and Marieke and her friends can continue to enjoy their evening out.

The largest urban areas can be found in Asia and America. This has implications for the worldwide flow of goods and for the economy. The largest cities are all situated near water; seas, oceans or rivers.

The world's largest cities, 2011

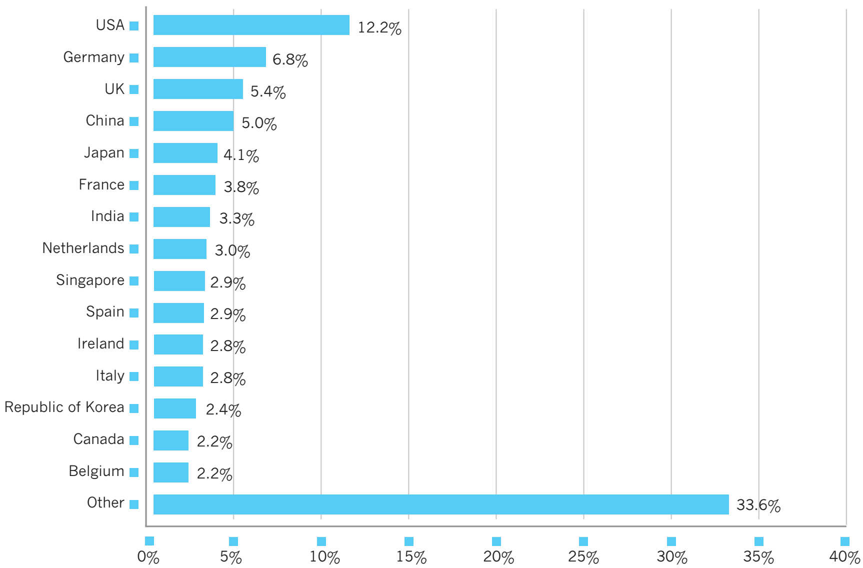


Source: City Mayor Statistics

Note: Population figures for cities and their surrounding urban area

Five European countries are among the top ten trading nations. These five countries combined account for approximately 22% of the total global trade.

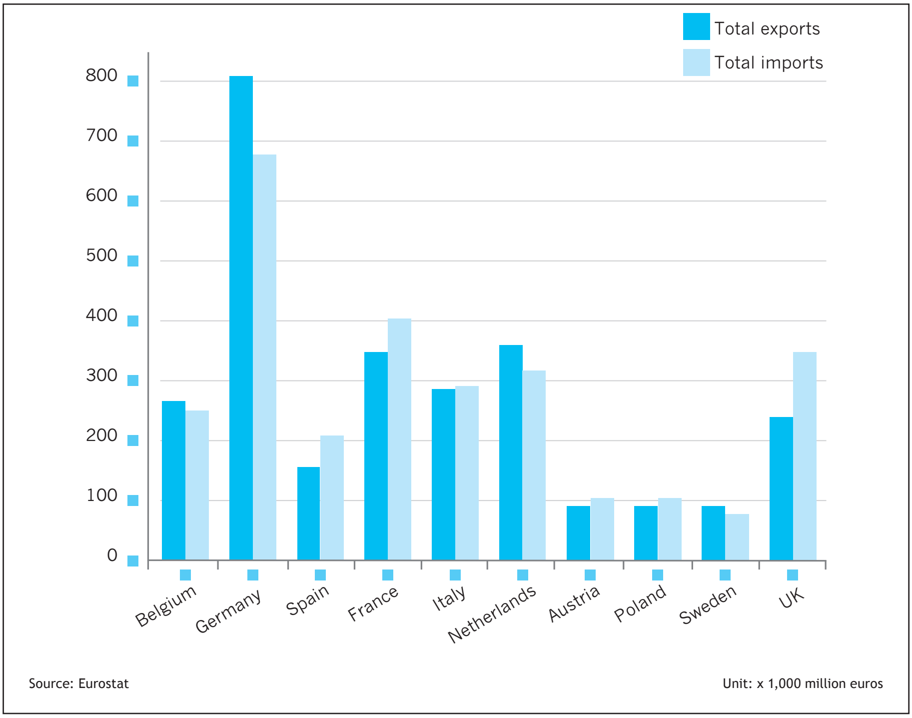
Contribution to global trade per country*, 2010



Source: WTO

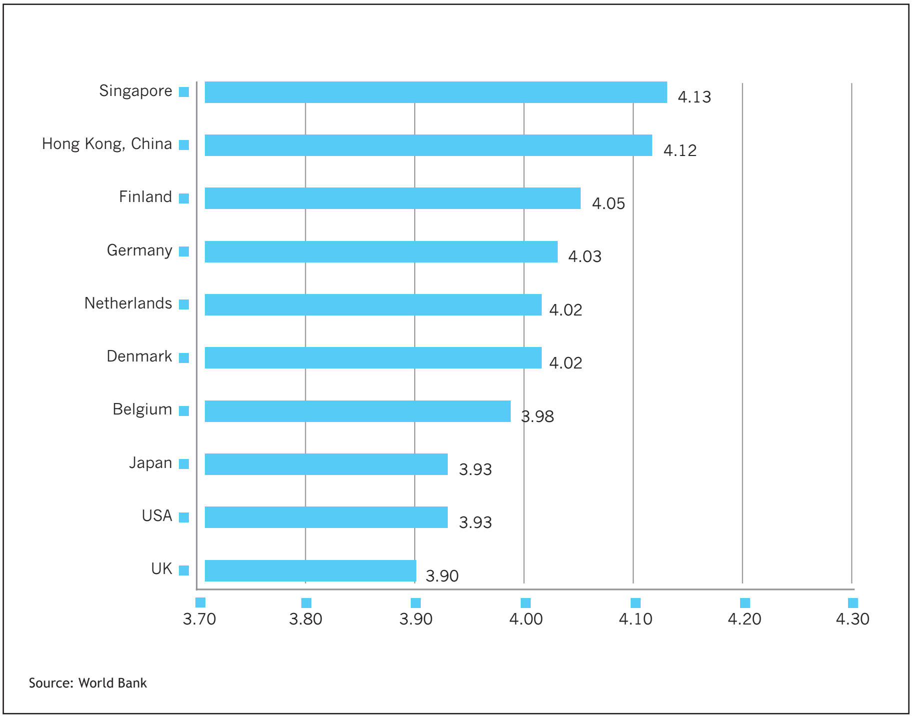
* WTO countries

Value of worldwide import and export of goods by EU countries, 2009



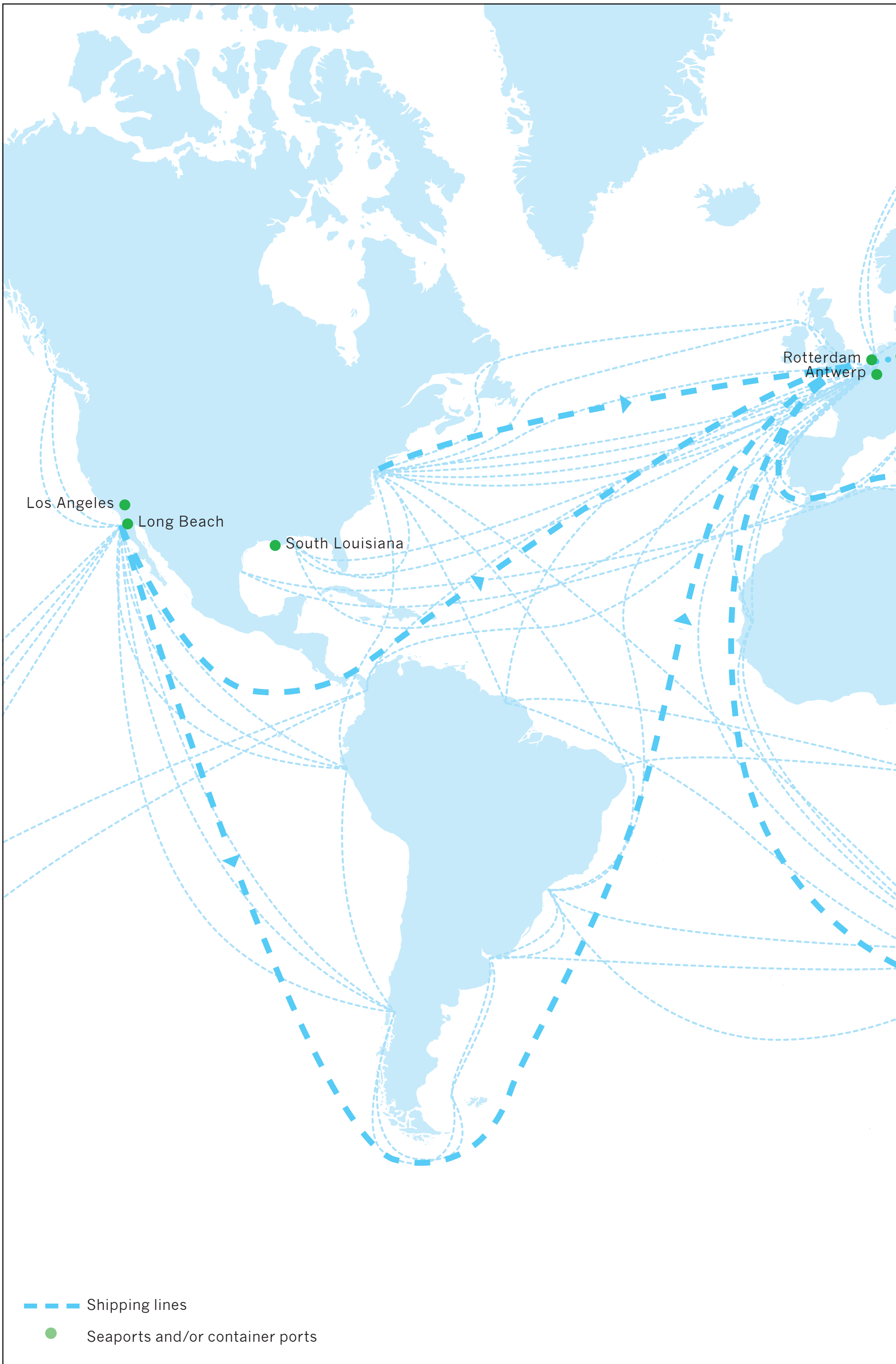
Germany is the largest trading nation within the EU. The Netherlands is here second in rank. The Netherlands also takes the second position when it comes to trade balance surplus. Because of its favourable position and its good hinterland connections, the Netherlands has become a choice location for many large European distributors.

Logistics Performance Index 2012



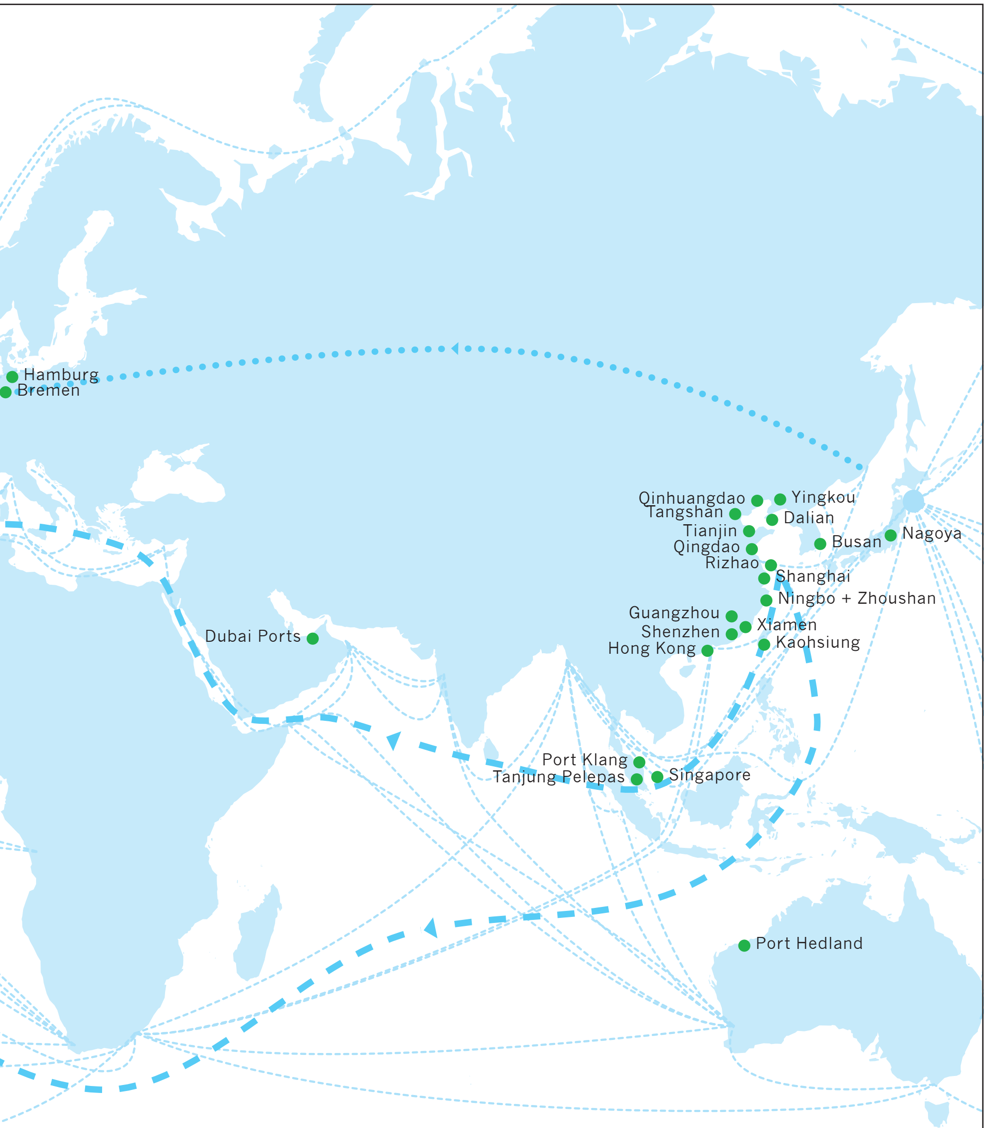
The Logistics Performance Index is a benchmark for logistics, through which 155 countries are reviewed. The Netherlands ranked fifth in 2012. Only Singapore and Sweden score better than the Netherlands with respect to average export time and costs. The differences between the countries are extremely small.

The world's largest seaports and container ports, 2011



Source: Port of Rotterdam

Global trade determines the worldwide maritime flow of goods. The increase in scale in the maritime shipping sector has resulted in such low transport fees that it does not really matter where in the world goods are manufactured. Strikingly, almost all major ports are situated in Asia. Especially Chinese ports are emerging.



Goods transhipment 2011, gross weight x 1 million tonnes

Shanghai [1*]	727.6	Hong Kong [2*]	277.4
Ningbo + Zhoushan	691	Busan	269.9
Singapore	531.6	Yingkou	261
Tianjin	451	Rizhao	252.6
Rotterdam	434.6	Port Hedland	224.3
Guangzhou	429	Shenzhen	223
Qingdao	375	Los Angeles	203.9
Dalian	338	Antwerp	187.2
Tangshan	308	Nagoya	171.4
Qinhuangdao	287	South Louisiana	170.4

Container transhipment 2011, Number x 1000 TEU

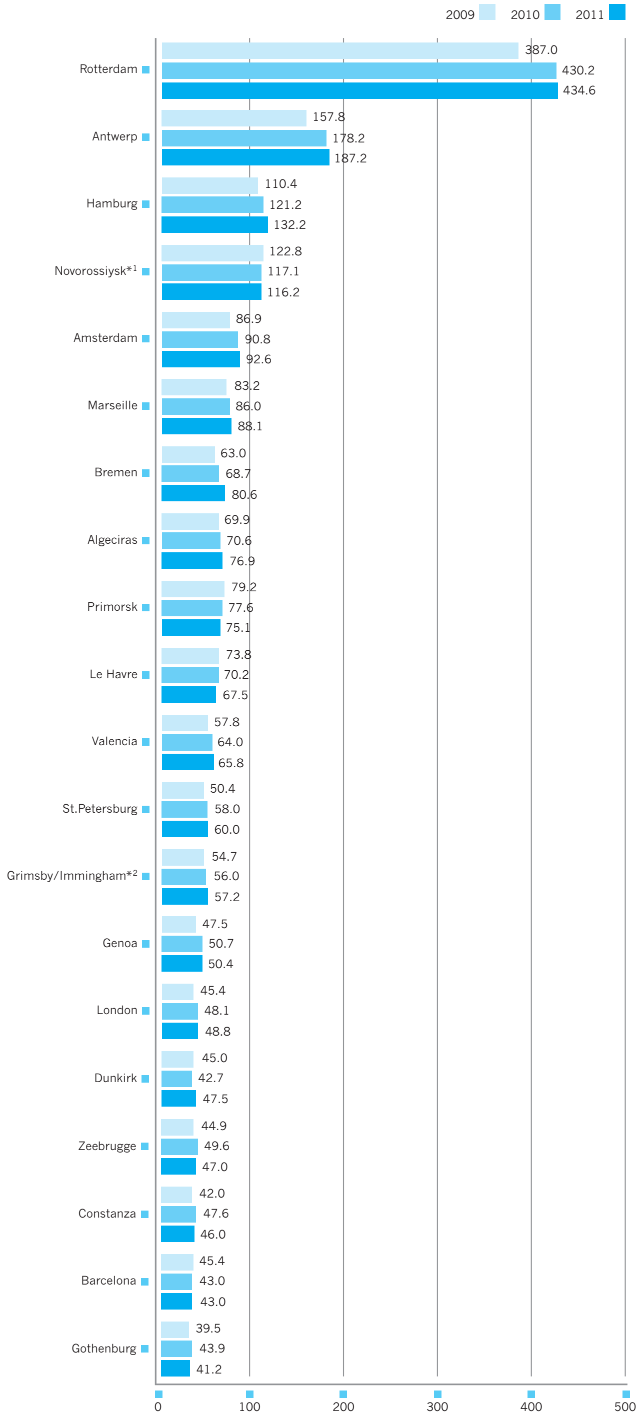
Shanghai [1*]	31,739	Tianjin	11,500
Singapore	29,938	Kaohsiung	9,636
Hong Kong [2*]	24,224	Port Klang	9,604
Shenzhen	22,570	Hamburg	9,014
Busan	16,185	Antwerp	8,664
Ningbo & Zhoushan	14,686	Los Angeles	7,941
Guangzhou	14,400	Tanjung Pelepas	7,500
Qingdao	13,020	Xiamen	6,461
Dubai Ports	13,000	Long Beach	6,061
Rotterdam	11,877	Bremen	5,916

*1 including nationwide transport

*2 including inland navigation

Many Western multinationals have relocated part of their production capacity to Asia. The containerised goods are shipped from the factories in Asia across the world along standard maritime routes. Approximately half of them take the shortcut through the Suez Canal. Ships that are too large for the locks in the Suez Canal take the longer route around Africa.

Principal European seaports, goods, 2009-2011

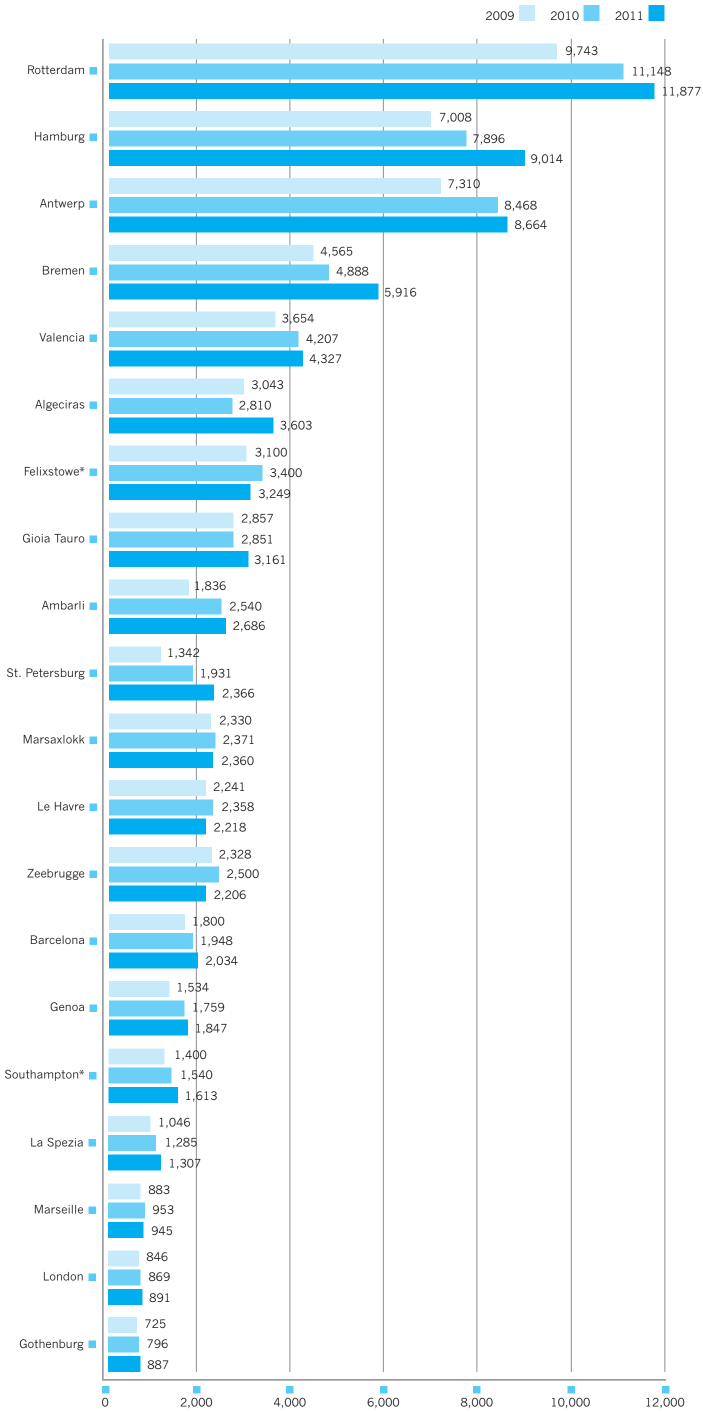


Unit: Gross weight x 1 million metric tonnes
*1: Incl. Caspian Pipeline Consortium Marine Terminal
*2: 2011 provisional figures (Ministry of Transport)

Source: Port of Rotterdam

Rotterdam is by far the largest port in Europe. In 2011 Rotterdam transhipped 130% more goods than Antwerp, Europe's second largest port. The port of Rotterdam can handle the largest maritime vessels. The goods can then be transported effortlessly across the Rhine and its connecting waterways, deep into Europe.

Principal European container ports, 2009-2011



Source: Port of Rotterdam

Unit: Number x 1,000 TEU (Twenty Feet Equivalent Unit)

The largest container ports are in northwestern European countries. The port of Rotterdam occupies a leading position with respect to containers. Rotterdam, Hamburg, Antwerp and Amsterdam are able to ship goods in transit beyond their national borders deep into Europe. Other ports primarily fulfil national/regional functions.

All modalities together connect Europe

A quick study of the maps on the previous pages shows that much of the intercontinental transport is by sea. Thousands of small, large and very large sea-going vessels load and unload their goods in ports along the coast. From there stevedores tranship the goods which are then transported by lorry, train and inland navigation vessel to their final destination somewhere on the content. For obvious reasons maritime shipping companies refer to this inland transportation as ‘land transport', which means transport by road, rail and water.

Source: BVB

It varies from country to country whether and to what extent transport modes or modalities are deployed. Europe demonstrates huge differences in the use of carriers, which reflects the dissimilarities in their natural surroundings. If, for instance, a region has easily navigable waterways inland navigation, or "the Blue Road", is the obvious choice, especially for transporting goods in bulk. In northern Germany, the major seaports of Hamburg and Bremen are more dependent on rail transport because the rivers Elbe and Weser are not suitable for large-scale inland navigation vessels with deep draught. Extending from the western ports in North-west Europe - Antwerp, Rotterdam and Amsterdam – is an extensive network of good, deep waterways with the rivers Rhine, Meuse and Scheldt as its main arteries. Inland navigation has a significant natural share in connecting the seaports to the hinterland (and a much greater potential).

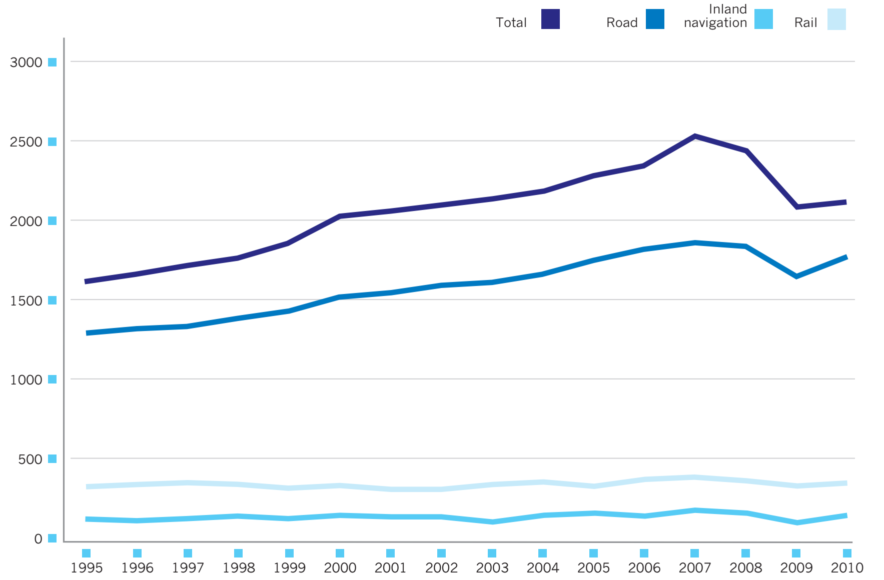
Some types of liquid cargo are pumped via pipelines. As regards all other goods, it is up to the client or shipper whether to opt for rail, water or road transport. Thanks to the extensive road network, lorries beat both rail and inland navigation when it comes to transportation to or from the premises of companies, distribution centres, shops or warehouses. But lorries are an eyesore on highways and having (many) more of them on roads that are already congested is not appreciated. Still, shops and distribution centres need to be supplied. Everyone in the transport sector is all too aware that we must turn our attention to making better use of inland waterways and railways.

The European government, among others, has (re)discovered water transport. The European Commission has announced that, in the coming decades, 30-50 percent of all transport, especially long-distance transport, has to take place by water. The Port of Rotterdam has taken a bold step towards making greater use of water for the transportation of goods to the hinterland: the new terminals on Maasvlakte 2 are expected to ship at least 45 percent of the cargo to the hinterland via the Blue Road.

So as to relieve the roads, clever combinations of road, rail and inland waterways are deployed to transport goods to the hinterland. The Blue Road is vital to the success of this intermodal or synchromodal form of transport. The Blue Road stands for modern, forward-looking inland navigation, which coincides perfectly with the logistical needs of the 21st century. It is not just for one type of vessel or for a certain kind of cargo; across the board, the Blue Road constitutes a part of the transport chains that make up the hinterland transport to and from the seaports. Consequently, the Blue Road is an important building block within the logistics system that is geared up for the challenges of the 21st century.

Growth in freight transport is inextricably linked to economic growth. The dip in the graph is clearly a result of the economic crisis.

EU transport performance per modality

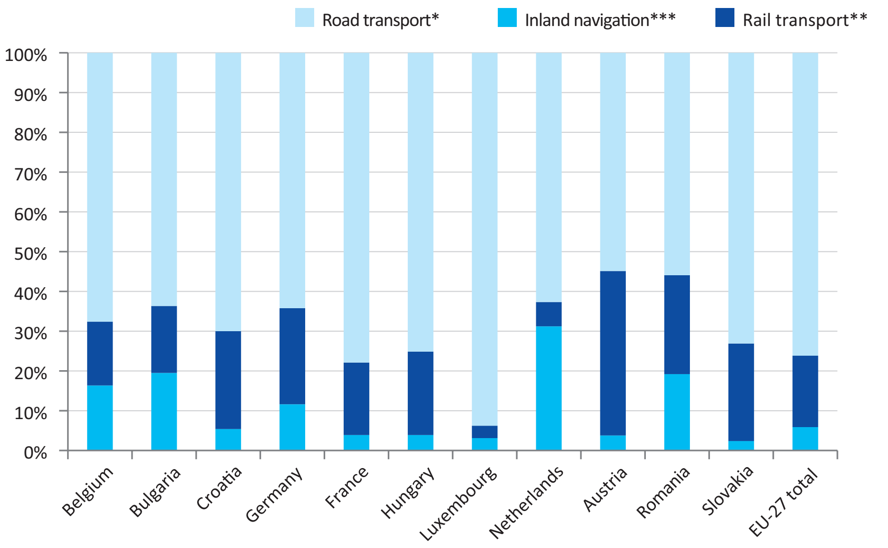


Source: Eurostat

Unit: Quantity x tkm (x billion)

The modal split differs considerably from one EU country to the next. The share of inland navigation is clearly the highest in the Netherlands. In absolute terms, the transport performance in Germany is better than in the Netherlands since the transport distance is greater in Germany.

Modal split per EU country (transport performance), 2009



* Road transport is based on worldwide transport movements of vehicles registered in the reporting country. Rail and inland navigation figures relate to transport within the reporting countries.

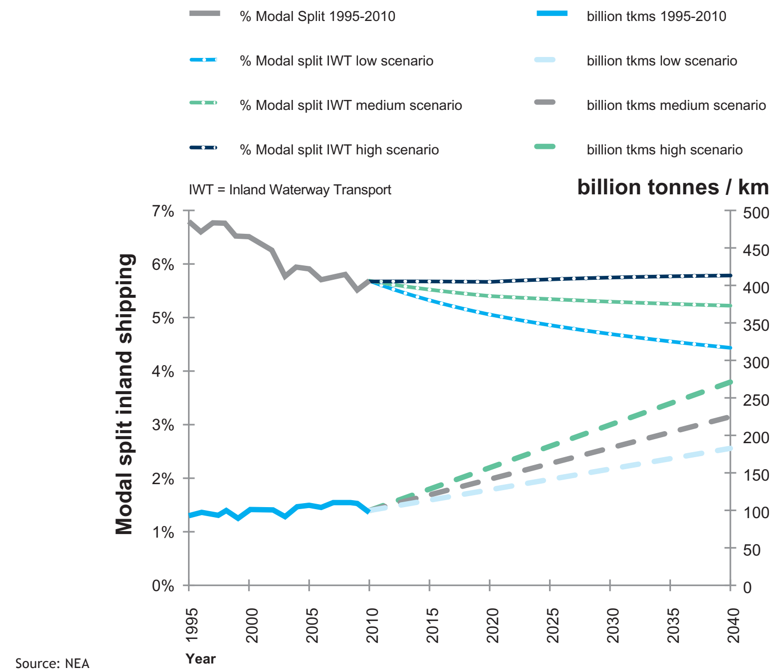
** Rail: 2008 figures

*** Inland navigation: EU-27 and Belgium: 2008 figures

Source: Eurostat

Unit: Quantity x billion tkm

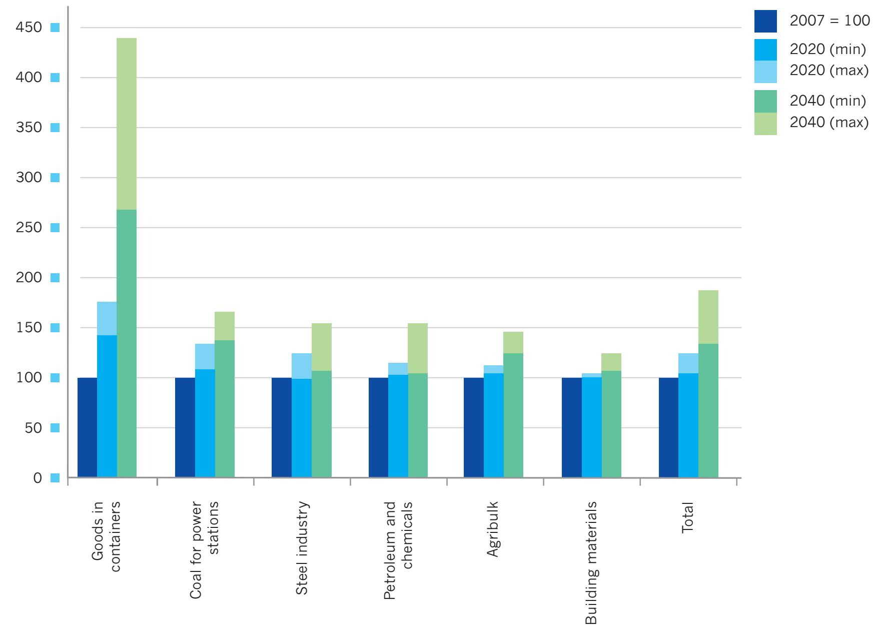
Modal split inland navigation on European level and forecast up to 2040



Source: NEA

The modal split for inland navigation as compared to road and rail transport has decreased over the years. Although transport performance has increased, road transport grew much faster. The forecast for 2040 shows low, medium and high scenarios.

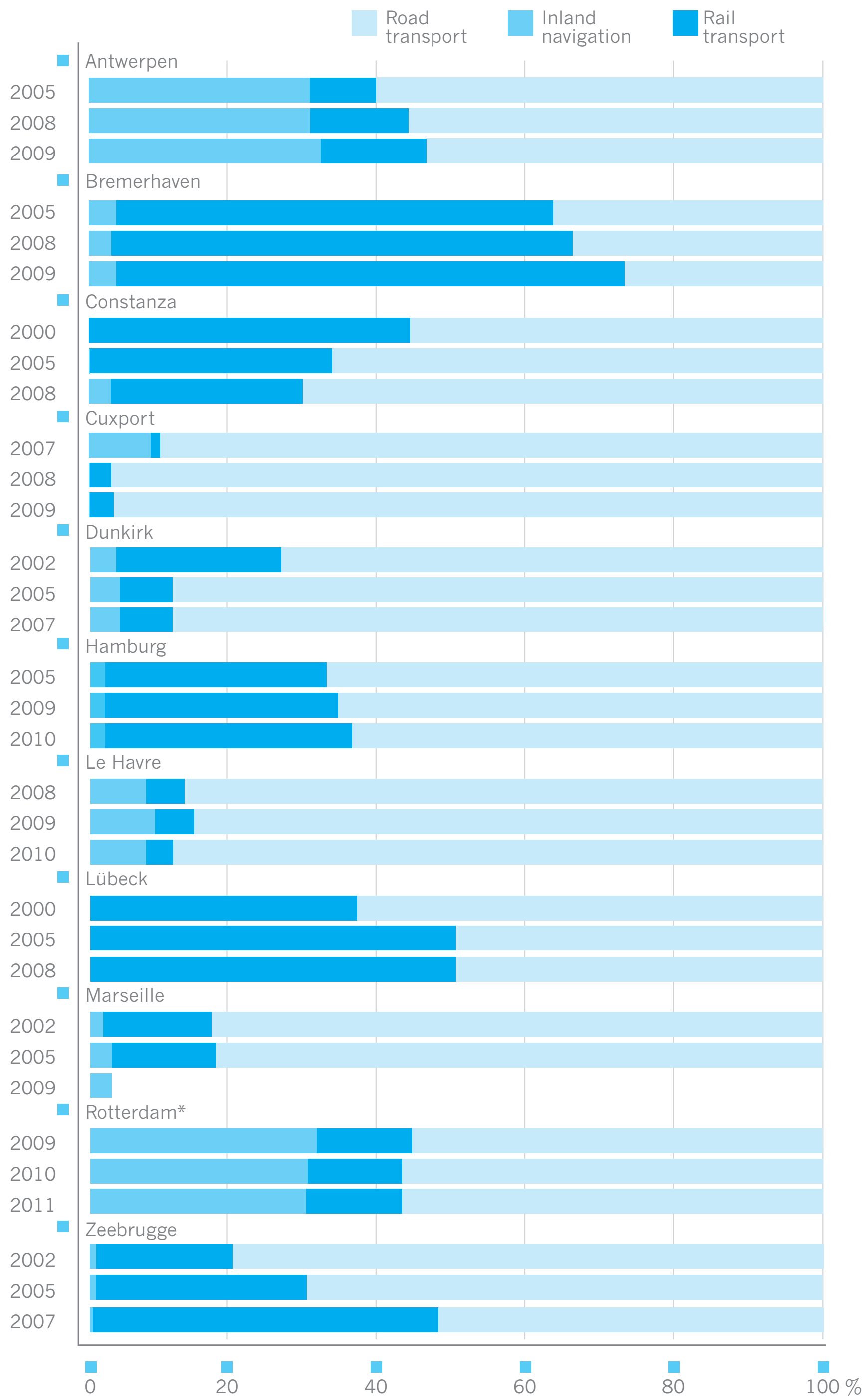
Average forecast for freight transport per types of goods



Source: Medium and long term perspectives of IWT in the EU - NEA et al

Regarding product groups, the expected growth for inland waterway transport is the largest for the container transport product group.

Modal split hinterland container transport of EU seaports



* Source: Rotterdam figures: Port of Rotterdam Authority

Source: Eurostat

For container ports in north-western European seaports, road transport plays a primary role in reaching the hinterland. At German seaports the focus is also on rail, in addition to road transport. In Rotterdam and Antwerp the emphasis lies on inland navigation instead.

Modal Split Container terminals in the hinterland, 2011

	Road transport		Inland navigation		Rail transport		Total
	TEU		TEU		TEU		
Germany							
Aschaffenburg	19,391	53.1%	7,295	20.0%	9,836	26.9%	36,522
Berlin	17,585	18.2%	63	0.1%	78,867	81.7%	96,515
Braunschweig	10,169	16.3%	41,394	66.3%	10,873	17.4%	62,436
Duisburg	1,199,000	47.9%	466,000	18.6%	836,000	33.4%	2,501,000
Emmerich	0	0.0%	97,092	90.5%	10,225	9.5%	107,317
Frankfurt	0	0.0%	28,495	42.3%	38,927	57.7%	67,422
Halle/Saale	21,389	29.8%	0	0.0%	50,287	70.2%	71,676
Hanover	0	0.0%	32,347	54.2%	27,333	45.8%	59,680
Karlsruhe	30,210	59.0%	20,991	41.0%	0	0.0%	51,201
Kehl	48,537	62.6%	27,157	35.0%	1,804	2.3%	77,498
Koblenz[1]	25,956	31.9%	54,148	66.6%	1,148	1.4%	81,252
Krefeld[1]	17,568	63.3%	9,897	35.7%	267	1.0%	27,732
Ludwigshafen	no data	no data	72,491	93.0%	5,450	7.0%	77,941
Mannheim	no data	no data	99,088	56.5%	76,280	43.5%	175,368
Minden[2]	29,474	66.4%	14,773	33.3%	159	0.4%	44,406
Neuss-Düsseldorf	365,609	48.3%	158,537	20.9%	233,567	30.8%	757,713
Nurnberg	471,944	62.3%	0	0.0%	285,379	37.7%	757,323
Regensburg/Passau	92,536	50.0%	0	0.0%	92,536	50.0%	185,072
Stuttgart	no data	no data	22,207	27.0%	59,934	73.0%	82,141
Weil am Rhein	5,058	16.0%	25,143	79.3%	1,494	4.7%	31,695
Wörth[2]	no data	no data	120,511	100.0%	0	0.0%	120,511
Switzerland							
Basel	no data	no data	85,287	100.0%	no data	no data	85,287
Belgium							
Brussels[2]	413	2.3%	17,774	97.7%	0	0.0%	18,187
Meerhout (WTC)[1]	11,500	4.8%	225,000	93.8%	3,500	1.5%	240,000
Liège	0	0.0%	28,982	100.0%	0	0.0%	28,982
France							
Lille	24,693	31.5%	53,598	68.5%	0	0.0%	78,291
Lyon Terminal[2]	77,815	50.0%	56,840	36.5%	20,976	13.5%	155,631
Mulhouse Ottmarsheim	61,453	42.5%	49,789	34.4%	33,375	23.1%	144,617
Paris Terminal SA[2]	224,847	65.9%	102,876	30.2%	13,281	3.9%	341,004
Strasbourg	215,981	56.1%	103,904	27.0%	65,356	17.0%	385,241
Austria							
Enns	136,640	49.3%	402	0.1%	139,981	50.5%	277,023
Krems	32,018[3]	no data	536	1.6%	32,018[3]	no data	32,554
Vienna[2]	318,870[3]	no data	120	0.0%	318,870[3]	no data	318,990

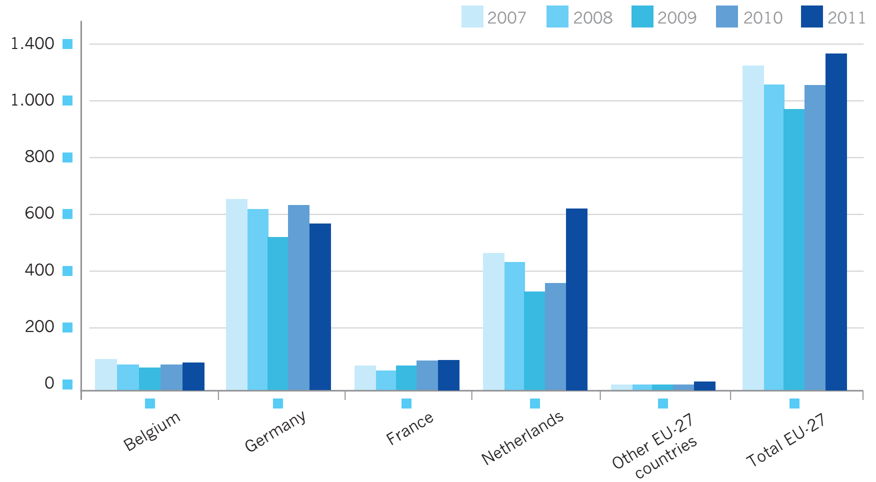
[1] Figures for 2009
[2] Figures for 2010
[3] Collective road and rail figures

Total transhipment quantities of other major container terminals (modal split unknown):
* Germany: Bonn - 182,985 TEU, Cologne - 514,183 TEU, Mainz - 107,896 TEU
* The Netherlands: Oosterhout - 160,000, 's-Hertogenbosch - 120,000 TEU, Born - 125,000 Venray (Wanssum) - 95,000, Hengelo - 90,000, Nijmegen - 85,000, Utrecht - 70,000, Zaanstad - 45,000 Meppel - 37,000

Source: Schiffahrt, Hafen, Bahn und Technik and NVB

On average, the inland navigation sector represents a large percentage in container terminals in the hinterlands of seaports.

EU-27 Inland navigation container transport performance per country

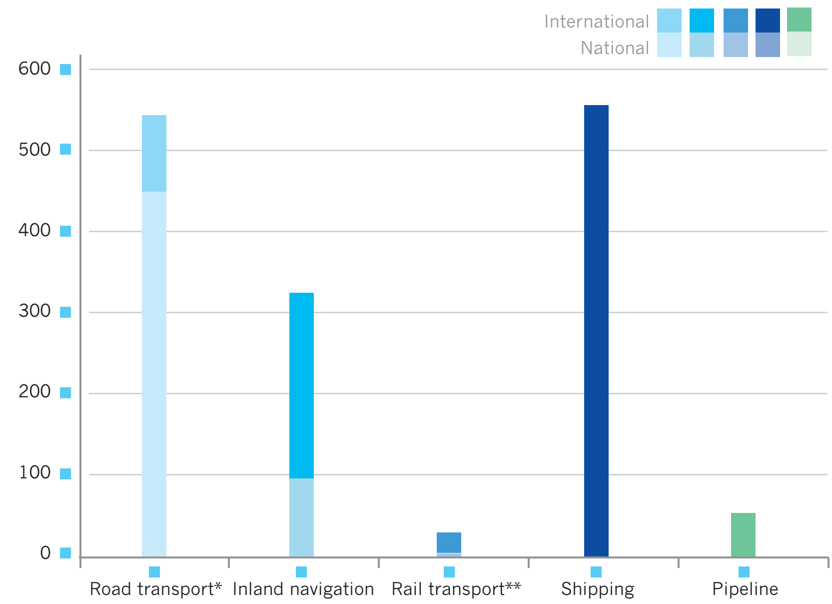


Source: Eurostat

Unit: number x million TEU-km

In 2008 and 2009, there was a significant drop in European container transport via inland shipping. In 2011, the transport performance exceeded the 2007 level. Most container transport occurs in Germany and the Netherlands. Germany scores higher than the Netherlands based on tkm, but the Netherlands ships more tonnage in containers by water. Seventy-nine percent of all containers transported via inland navigation in the EU-27 countries crosses Dutch territory.

Freight transport per modality from a Dutch perspective, 2010



* International: bilateral

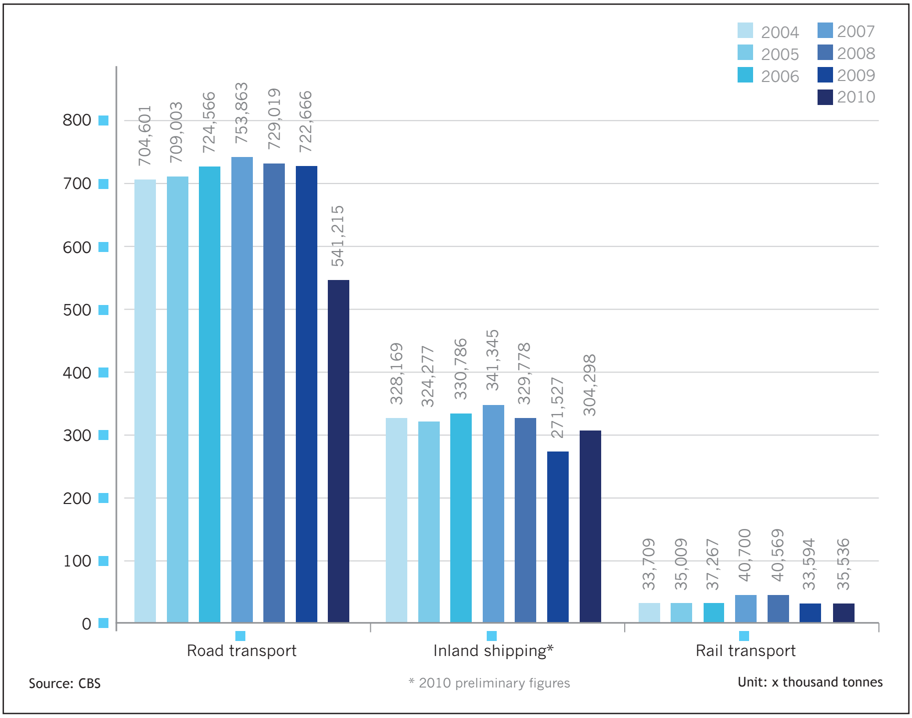
** Estimation based on most recent figures (2007)

Source: CBS

Unit: Millions of tonnes

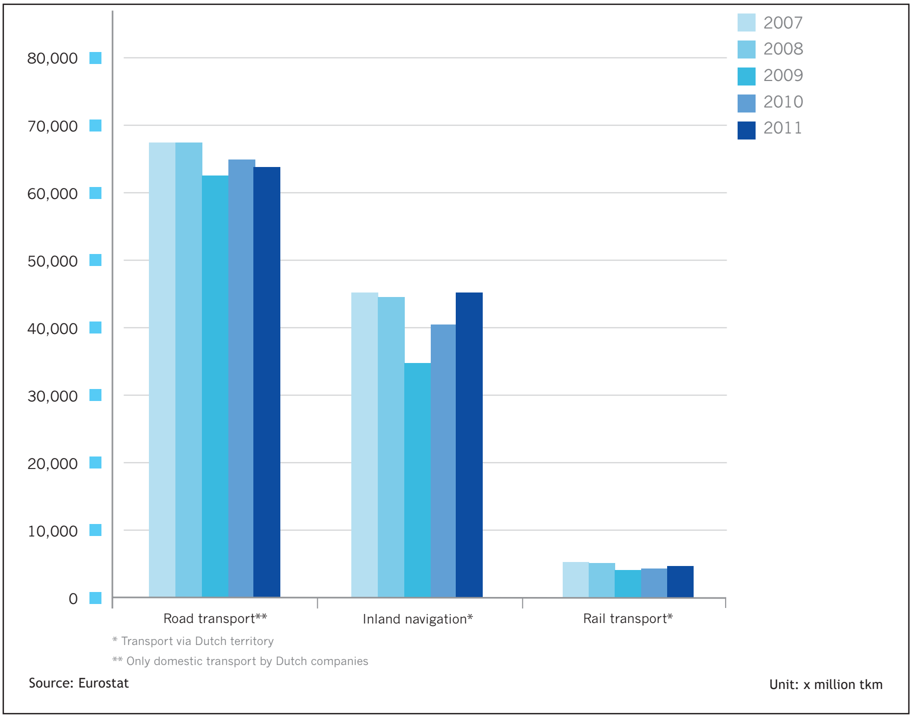
Seventy percent of inland navigation that crosses Dutch territory has an international destination. The percentage of international rail transport in the Netherlands is even higher, up to 86 percent. Most road transport on Dutch territory carried out on behalf of Dutch companies (bilateral transport) is national transport (82%).

Transported weight in the Netherlands



Road transport, inland navigation and rail transport are usually compared to each other on the basis of the transported weight (tonnage), in which case road transport contributes the most. In 2011, the volume of inland navigation grew to 344 million tonnes.

Tonne-kilometre load performance in the Netherlands



Performance of modalities can best be compared on the basis of tonne-kilometre, which boosts the importance of inland navigation. Unfortunately, the basis of the statistic is not entirely comparable. For a proper comparison, the volume of foreign road transport via Dutch territory should be added.

The Blue Road: a golden link in the chain

Whether for reliability, on-time delivery or customer friendliness, inland navigation is always awarded high, if not the highest, scores of all the modes of transport.

Source: Via Donau

The European continent has a free transport market with a vivid competition between road transport, rail transport and inland navigation, not to mention between the companies themselves in those sectors. In the recent economic crisis, transport companies were struggling to keep their heads above water due to the fierce competition. Free market competition has both positive and negative sides to it: the law of supply and demand keeps transport rates down and, consequently, transport companies are eager to optimise their performance. The Blue Road has an indisputable advantage here with lower direct transport costs and (much) lower CO_2 emissions per tonne kilometre than any other mode of transport – ideal for adding value to any supply chain. The Blue Road: a golden link in the transport chain.

As explained in the previous chapter, the Blue Road is part of a wide spectrum of modalities. No longer is inland navigation used only for transporting bulk goods such as sand, gravel, fodder, oil products and coal from A to B. Off course bulk is still transported by water on a large scale - the roads would be permanently blocked if all that cargo were transported by road - but there are more complex transport systems of which the Blue Road forms an integral part. Witness the overwhelming quantity of products that are transported via the Blue Road and the various supply chains that involve the Blue Road. Inland navigation vessels transport refrigerators, televisions, beer, car parts, bicycles, coffee, lamps and even chilled products such as flowers, Mars bars, cheese and fruit. It is quite possible that, at some stage, all of Marieke's items mentioned in Chapter 1 saw the inside of an inland navigation vessel. The transport of 'fast moving consumer goods' by water is, of course, linked with the leading role the Blue Road claims in container transport, but there are other supply chains for bulk products such as salt and fodder that, nowadays, are even managed by inland navigation companies.

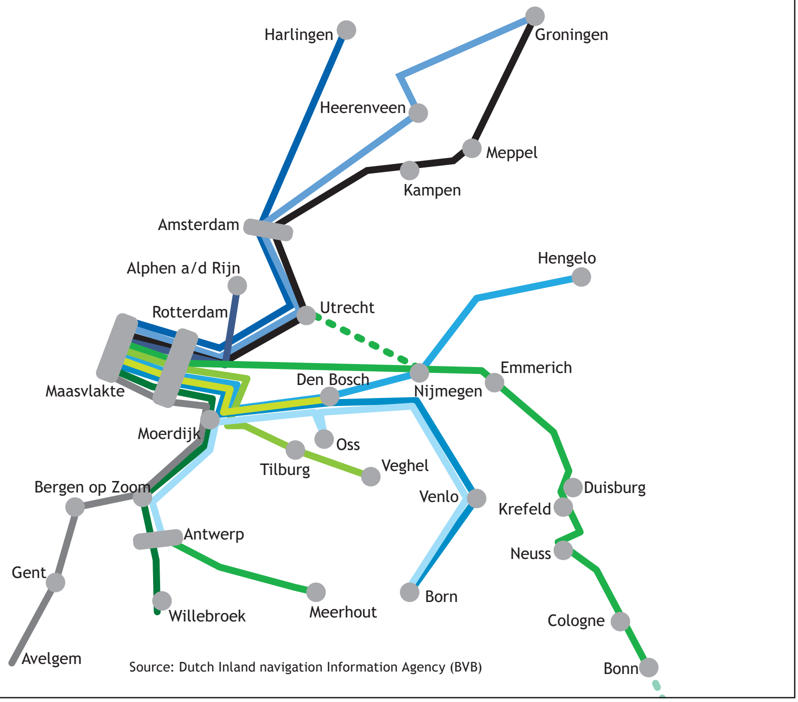
The success of the Blue Road has not come out of the blue. It is no coincidence that now when things are at their worst forwarders, shipping companies and other clients are turning to inland navigation for their inland transport needs. Moreover, at closer inspection, many logistic chains can be carried out in a more economical, efficient and reliable manner by giving the Blue Road a (large) share in the transport chain. There are plenty of practical cases in which cooperation with road transport has resulted in a win-win situation. This is certainly true for the transport to and from the hinterland of goods that are shipped in and out by sea, such as the rapidly increasing flow of containers. Lesser known is the transport between production companies and customers on the same continent. A change is starting to set in there too. Those who manage these transport chains appreciate the obvious benefits of the Blue Road. The Dutch Inland navigation Information Agency (Bureau Voorlichting Binnenvaart/BVB) and the Dutch Logistic Advisory for Inland Navigation (Maatwerk Voorlichting Binnenvaart) have booked remarkable results in this respect.

Facts and figures for inland navigation, 2010/2011

The Netherlands	Northwest Europe
7,000 vessels (Dutch flag)	13,500 vessels
8.8 million tonnes cargo capacity	15.2 million tonnes cargo capacity
35% transport share in tonnage vs. road and rail	6.5% transport share in tonne kilometres vs road and rail
344 million tonnes transported in 2011	521 million tonnes EU-27 in 2011
Via Dutch territory in 2011: - 4.5 million TEU - 611 million TEU-km	Via EU territory in 2011: - 5.7 million TEU - 1,360 million TEU-km
Inland navigation transported 2.4 million TEU from/to Rotterdam in 2011	
Jobs in inland navigation: 13,250 – Cargo transport: 7,620 - Oil transport: 1,260 - Towage/pushing navigation: 1,480 - Passenger transport: 2,880	
Turnover inland navigation: 1.52 billion euros	
Number of companies: 3,720	

Source: CBS, Eurostat, IVR, ZBBD, VNF, Stichting Nederland Maritiem Land

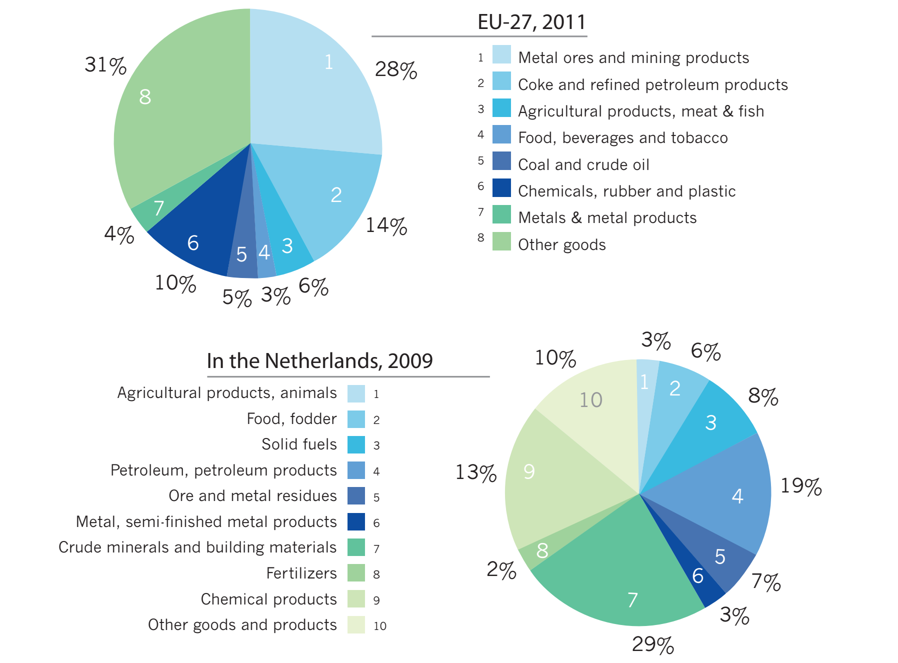
Possibilities with terminal connections for inland container navigation



Source: Dutch Inland navigation Information Agency (BVB)

The geographical range of inland container navigation is growing as more container terminals and lines are brought into service. The network offers the potential of transferring to other lines at the terminals, providing more opportunities for continental container transport.

Types of goods transported via inland navigation

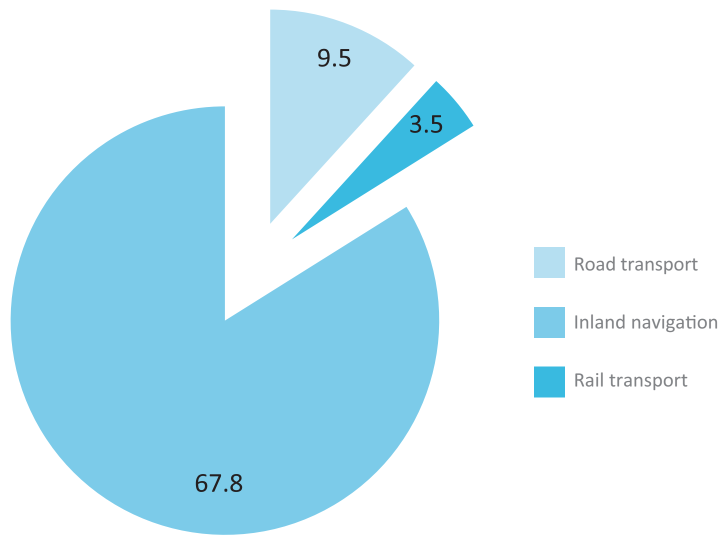


Source: Eurostat, CBS

Unit: Percentage transported

Inland navigation transports virtually all kinds of cargo. Large quantities of metallic ores, crude minerals, chemicals, petroleum and petroleum products and semi-finished products are transported safely via the Blue Road. Inland navigation is also regularly used to ship hazardous substances (68 million tonnes as compared to 9.5 million tonnes via road transport). Agricultural products, food products and fresh products all arrive at their destination via the inland waterways.

Transport of hazardous substances by modality, 2010

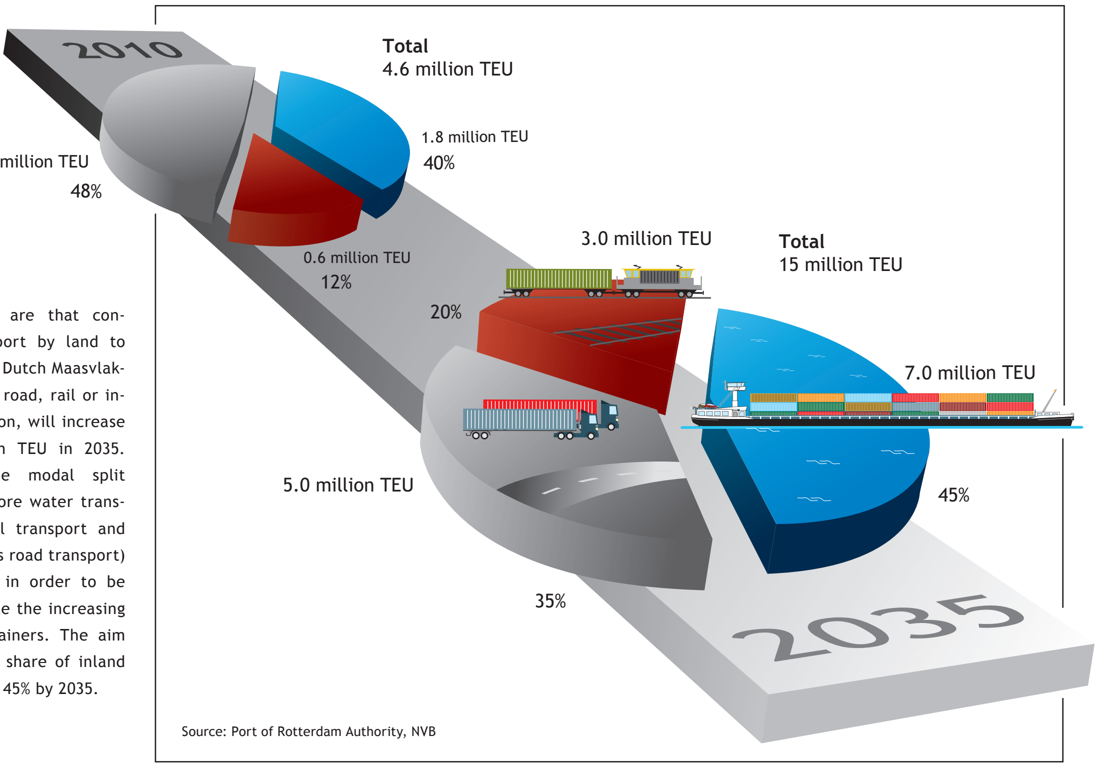


Source: Inspection Transport and Water Management

Unit: millions of tonnes

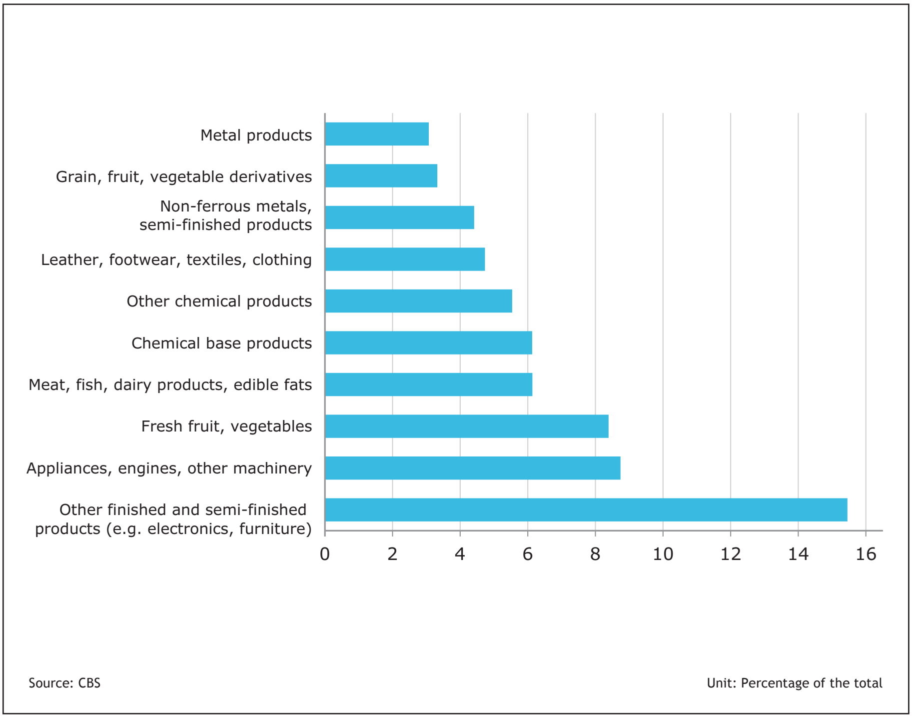
Most hazardous substances are transported by pipeline. In addition, inland navigation is a trendsetter in safely transporting hazardous substances. Inland navigation accounts for more than 80 percent of all transport of hazardous substances by road, rail and water.

Modal split development container transport on the Maasvlakte, the Netherlands



Expectations are that container transport by land to and from the Dutch Maasvlakte, either by road, rail or inland navigation, will increase to 18 million TEU in 2035. Changing the modal split (relatively more water transport and rail transport and relatively less road transport) is necessary in order to be able to handle the increasing flow of containers. The aim is to lift the share of inland navigation to 45% by 2035.

Top 10 groups of cargo in maritime container transport, 2011



More than half of container goods consist of products destined for everyday use. In 2011, semi-finished products, electronics and furniture accounted for 16 percent and fresh fruit, vegetables, meat, fish or dairy products accounted for 14.5 percent of the container goods. Almost 5 percent of container goods consist of leather, footwear, textiles and clothing.

Freight transport by water: a natural choice!

For shippers who have already included inland navigation in their supply chain, the Blue Road (inland navigation transport) is a very obvious choice, which has provided much satisfaction. In the extensive shippers survey conducted in 2012 by EVO (shippers organization for logistics and transport), shippers give inland navigation the highest customer satisfaction score of all the modalities, namely 7.9.

Still, shippers who do not yet use inland navigation might find it difficult to grasp the benefits of inland navigation for their specific situation. What needs to be taken into account and what does inland navigation cost? Transporting cargo by water usually costs (significantly) less than transport by road or rail. For a proper comparison, however, one must examine the total costs in the supply chain. The total 'door-to-door' transport costs of inland navigation are influenced by several, often related, factors, such as:

- Quantity/volume (per unit of time)
- Loading unit & packaging
- Process time & frequency
- Infrastructural factors
- Storage and transhipment
- Required pre-transportation and/or post-transportation

Quantity/volume

The annual quantity to be transported determines the total cost and type of waterway transport. If a shipper has enough cargo to fill a vessel several times a week, a 'dedicated barge' can be deployed, in other words a barge solely for the use of that shipper. If lower quantities are involved per run, the shipper can deliver partial loads, in which case he is dependent on other shippers in the region as to whether the total capacity of the vessel is put to maximum use. An efficient combination with partial loads in the region increases the load factor and reduces the transport costs per tonne. Partial loads are often transported in containers. Many regions have inland container terminals that run regular container shipping lines.

Loading unit & packaging

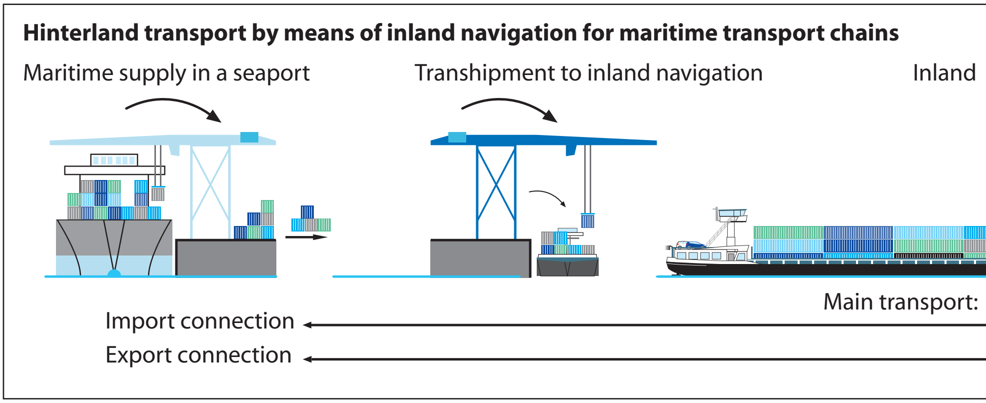
The loading unit or packaging in which the goods are delivered for transport determines the transport costs and the choice of modality. The lowest inland navigation transport costs are usually achieved through bulk transport (liquid or solid). Traditionally water transport is an excellent solution for transporting sand, gravel, grains, oils, etc.
More and more standardised packaging is being used for the transportation of other goods. For instance for transporting goods in (refrigerated) containers or on separate pallets. These containers and separate pallets can easily be transported by ship. The dimensions of holds on container ships ensure optimal loading.

Process time & frequency
The current logistic chains are designed for the least possible amount of finished goods in the chain. Stored goods and goods in transit are kept to a minimum. Transport time, production time, maximum stock, working capital and peaks in demand all affect the shipping frequency and the relevant process time. Inland navigation is perfect for transporting products that are produced in batches (e.g. a production frequency of once every three days or once a week) or for goods that can be transported during the night. In addition inland navigation can offer an interesting option for the transport of fast-moving consumer goods (FMCG) and continental flows.

Storage and transhipment
Inland navigation is able to transport at low cost. Costs drop if more tonnage is carried per departure. Similar to road transport, the costs for loading and unloading the vessel must be included in the transport costs. Additional storage costs can apply if a ship transports a large quantity at one time. It is therefore important to find the optimal balance between storage and the vessel's transport capacity.

Pre-transport and post-transport
Companies do not have to be located directly at a waterway to benefit from the advantages of inland navigation. Pre-transport and post-transport bridge the distance to the water. However, the distances to and from the quay can have a major impact on the total cost.

Example of cost calculations
The next two calculations provide a more practical insight into of the costs of inland navigation. Normal transport routes and types of cargo were taken for these examples. The calculations are based on the cost price that applied when this publication was being compiled. Also please note that cost prices differ from current commercial market prices. These calculations should be considered as indicative and no rights can be derived from them.



Bulk Cargo	40 ft. containers
Transporting dry cargo from the port of Rotterdam to a recipient in the port of Mannheim (Germany). The transport quantity is 2,500 tonnes per week. A Class V vessel (110 x 11.40 metres) that runs 18 hours a day was selected.	In this example, the shipper has opted to have his 400 containers (40 ft.) per year transported by inland navigation on a regular shipping line from Groningen to Rotterdam. The containers are shipped in empty and shipped back loaded.
Running costs per tonne € 8.80 Transhipment costs per tonne € 2.10 Total costs by inland navigation per tonne € 10.90	Roundtrip running costs per container € 240.00 Transhipment costs per container* € 80.00 Post-transport container € 120.00 Total costs by inland navigation per container € 440.00 * Excluding handling costs in Rotterdam

The following calculation shows the annual savings of the amount of greenhouse gas emissions by inland navigation transport as compared to road transport:

	Lorry	Vessel	% Difference		Lorry	Vessel	% Difference
Kg CO_2/tonne	17	8	52%	Kg CO_2/container*	687	355	48%

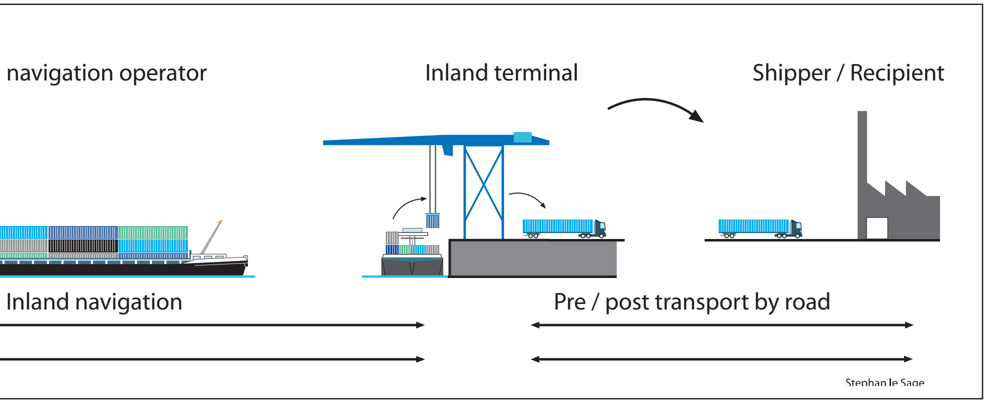
* Based on 26.4 tonnes per container

Tailored advice

Transport by waterway is the most logical choice. Whether and how inland navigation provides an attractive option for a specific shipper depends on numerous aspects. The Dutch Logistic Advisory for inland navigation (Maatwerk Voorlichting Binnenvaart) was initiated to give shippers relevant professional support and advice. Experienced logistics consultants who are fully acquainted with the possibilities that inland navigation has to offer, give shippers practical support. They are at your service!

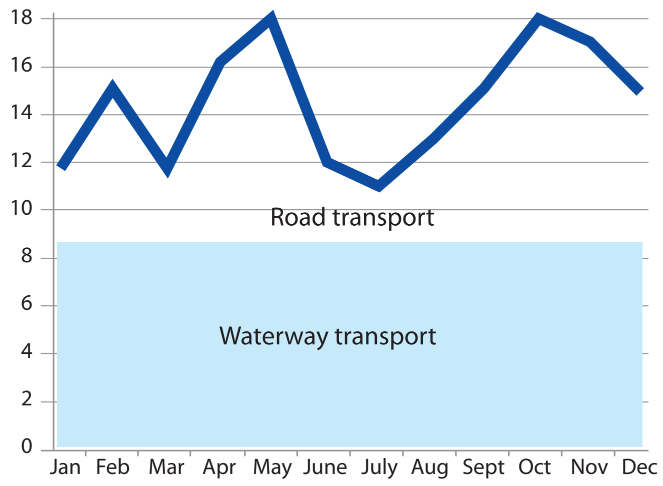
The Blue Road: if not quick, then clever!

Customers are often late in placing orders, yet want quick delivery. Order quantities per customer can vary in the course of time. Under these circumstances, shippers usually opt for road transport. Still, it is quite possible they can benefit under these circumstances from the possibilities and advantages of inland navigation, as explained in the next two paragraphs.



Ship to forecast

Taking a closer look at the ordering behaviour of the customer from a 'ship to forecast' perspective, it could be that inland navigation offers attractive options. The following graph shows the ordering behaviour of a fictitious customer. Even if the customer orders late, there is usually a certain regularity and minimum quantity. The customer's order always ranges, for example, between 11 and 18 units to be delivered within two days. In this example, the client always orders at least 11 units. When applying the 'ship to forecast' principle, the shipper dispatches nine units even before the customer has ordered. These nine units are transported by inland navigation at low costs to a location (inland terminal) in the vicinity of the customer. As soon as the customer places his order, these nine units are delivered from the nearby location on the same day. The remaining two to nine units are transported by road within two days. By applying 'ship to forecast' the shipper has achieved a shorter delivery time and lower logistics costs. Furthermore, the customer can reduce his 'safety' stock because the shipper is able to deliver partial orders within a shorter period of time.



When applying the 'ship to forecast' principle, the shipper dispatches nine units by ship to a nearby location even before the customer has ordered. The other two to nine units are delivered by lorry within two days.

Synchromodal

Another way to cope with fluctuating order patterns is a synchromodal solution. This is particularly attractive when containers are involved. The logistics service provider or the terminal determines on the basis of the customer needs which modality can best be used in order to meet the agreed delivery time. Depending on the specific and actual situation, the cargo can be distributed over several modalities, enabling the shipper to benefit from the advantages of the Blue Road. This often results in an attractive, lower price as inland navigation is an economical way to transport containers.

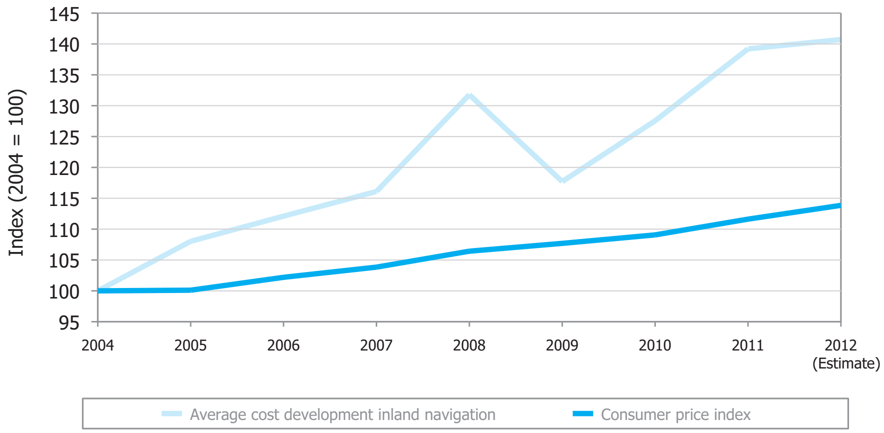
Dry bulk inland navigation costs per hour (at 2008 prices)

Cargo capacity (in tonnes)	Loaded sailing hour (€)	Empty sailing hour (€)	Waiting for loading/ unloading (€)	Waiting for chartering (€)
150	58.46	54.02	34.78	30.33
370	75.50	64.70	39.75	35.15
540	96.54	81.00	44.37	39.66
730	106.59	95.47	50.40	45.58
900	140.88	109.54	56.26	51.34
1,150	171.69	133.48	73.24	67.06
1,360	205.11	155.32	80.47	74.17
1,910	236.75	186.90	106.65	99.09
2,410	298.03	237.08	126.73	118.87
3,900	387.07	294.61	164.69	155.97
5,500	464.75	354.05	189.14	179.73

Source: NEA

The official cost price table of research institute NEA provides an indication of the costs per hour of an inland vessel.

Cost price development index inland navigation



Source: NEA

The costs for inland navigation decreased significantly between 2008 and 2009, the main reason being the 31 percent drop in gas oil prices. Prices rose again by 27 percent in 2010 and 25 percent in 2011.

50,000 kilometres of waterways

Previous chapters already mentioned that the Blue Road has natural advantages. Wherever suitable waterways are available, inland navigation scores points off any other mode of transport. By using inland navigation, companies contribute to corporate social responsibility (CSR).

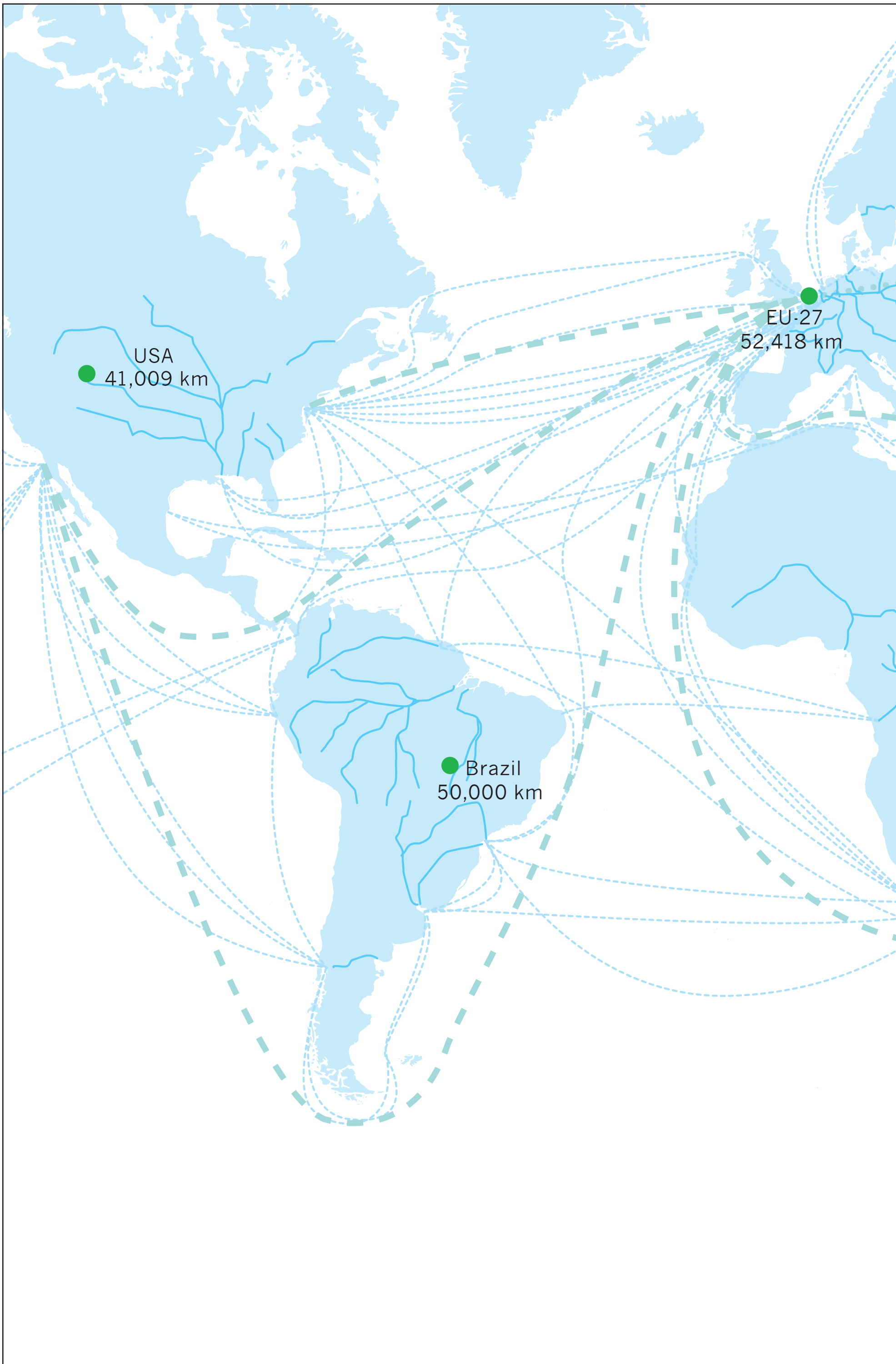
Source: Bundesverband der Deutschen Binnenschiffahrt e.V.

It would be a shame not to make use of wide, deep and slow-flowing rivers that interlink economic centres. Especially now that we know the advantages water transport can bring for people and the environment when properly fitted into the logistic chain. Furthermore, nine out of ten economic centres in Europe are situated near a river or coast, not because of the environmental benefits of the Blue Road, but because there was no other form of transportation than via waterways when they were formed. That makes inland navigation the archetype of transport.
At the same time, the Blue Road is the future of transport. That is a fact.

Canals have a slightly different character, as they are man-made. Can one still speak of a natural advantage? Yes, because they were not always excavated just for navigation. All waterways serve multiple purposes, from drinking water and land irrigation to drainage, recreation and, of course, transportation. Large parts of the Netherlands and Flanders would simply be flooded if no sophisticated system of drainage canals had been constructed. Partly thanks to the ingenuity, vision and courage of our ancestors we now have an impressive, intricate network of waterways, interconnected rivers and canals, lakes and streams throughout Northwest Europe. The Benelux, France, Germany, Switzerland and Austria have 20,000 kilometres of waterways; all of Europe totals 50,000 kilometres of waterways (more than the circumference of the earth). Those 20,000 kilometres are navigated relatively intensively but there is still enough room on average, to transport twice as much cargo by water. The only condition is that the waterways are kept navigable and bridges, locks and banks are maintained. Sometimes it is necessary to adapt to new conditions, such as the expansion of the fleet. Given the importance of inland navigation in absorbing the anticipated increase in the flow of goods, social and political support for giving waterways priority is increasing.

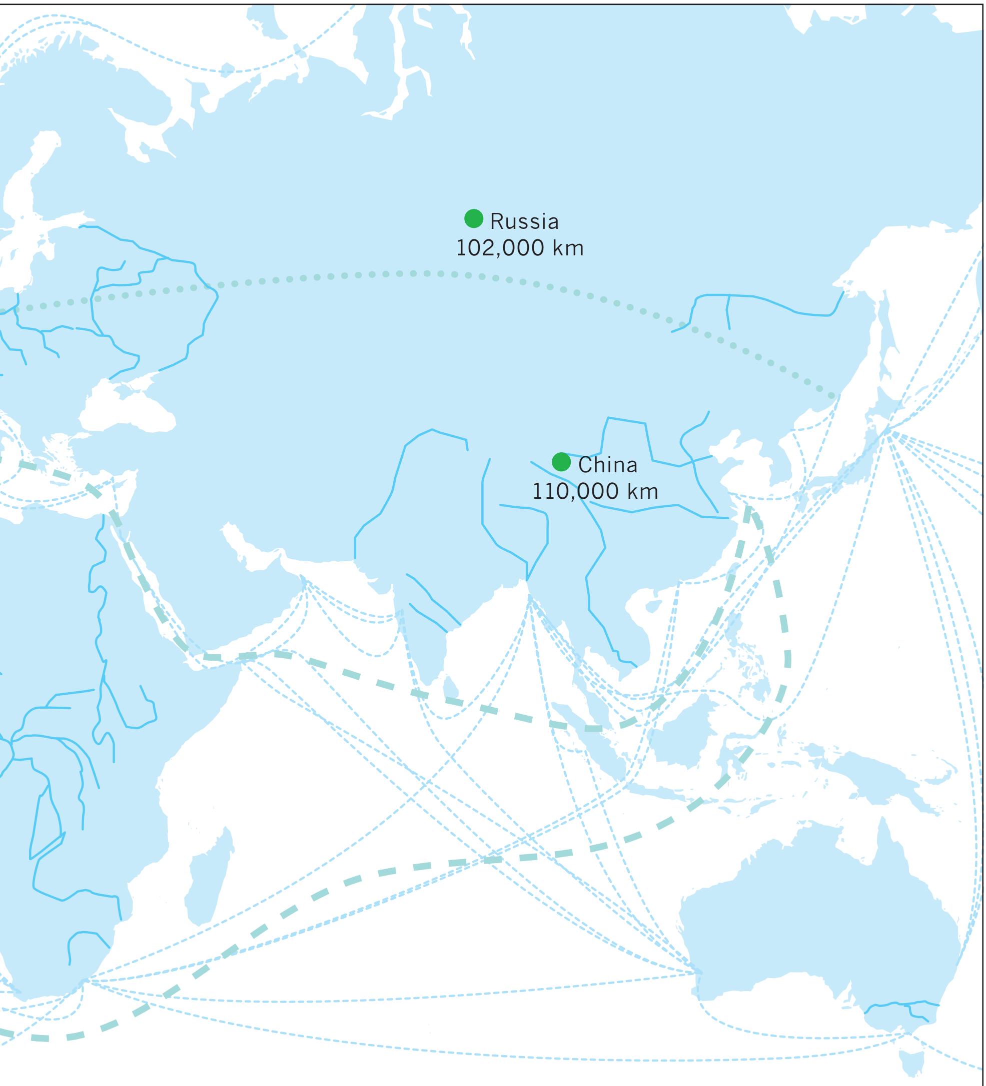
But what about the connections to this fine network of waterways? What about the terminals and the logistics systems? Because transport via waterways has been of such long-standing importance in the transportation of goods, transhipment locations have been established on all waterways. In recent decades, dozens of container terminals have been added, especially in Northwest Europe, and are still growing in number. The European Union anticipates several improvements and the construction of new waterways within the Trans-European Transport Network. Also, the business community is striving for a larger share of European transport on the Blue Road. As an example, several major economic centres have started up a project aimed at CO_2-free transport within those centres by 2030. The project is run under the name of “Connecting with Waterways: a Capital Choice”, a name that makes it instantly clear that the Blue Road harbours attractive opportunities for transport within urban areas. Measuring 50,000 kilometres, the Blue Road is a major transport artery that is here to stay in Europe.

The top 5 longest waterways



Source: Nation Master 2012

More than fifty countries around the world have navigable waterway networks of 1,000 kilometres or more. Inland navigation is on most of these waterways underdeveloped. China takes the lead with 110,000 navigable kilometres. More and more countries wanting to develop their inland navigation are turning to Europe to learn from its inland navigation know-how.

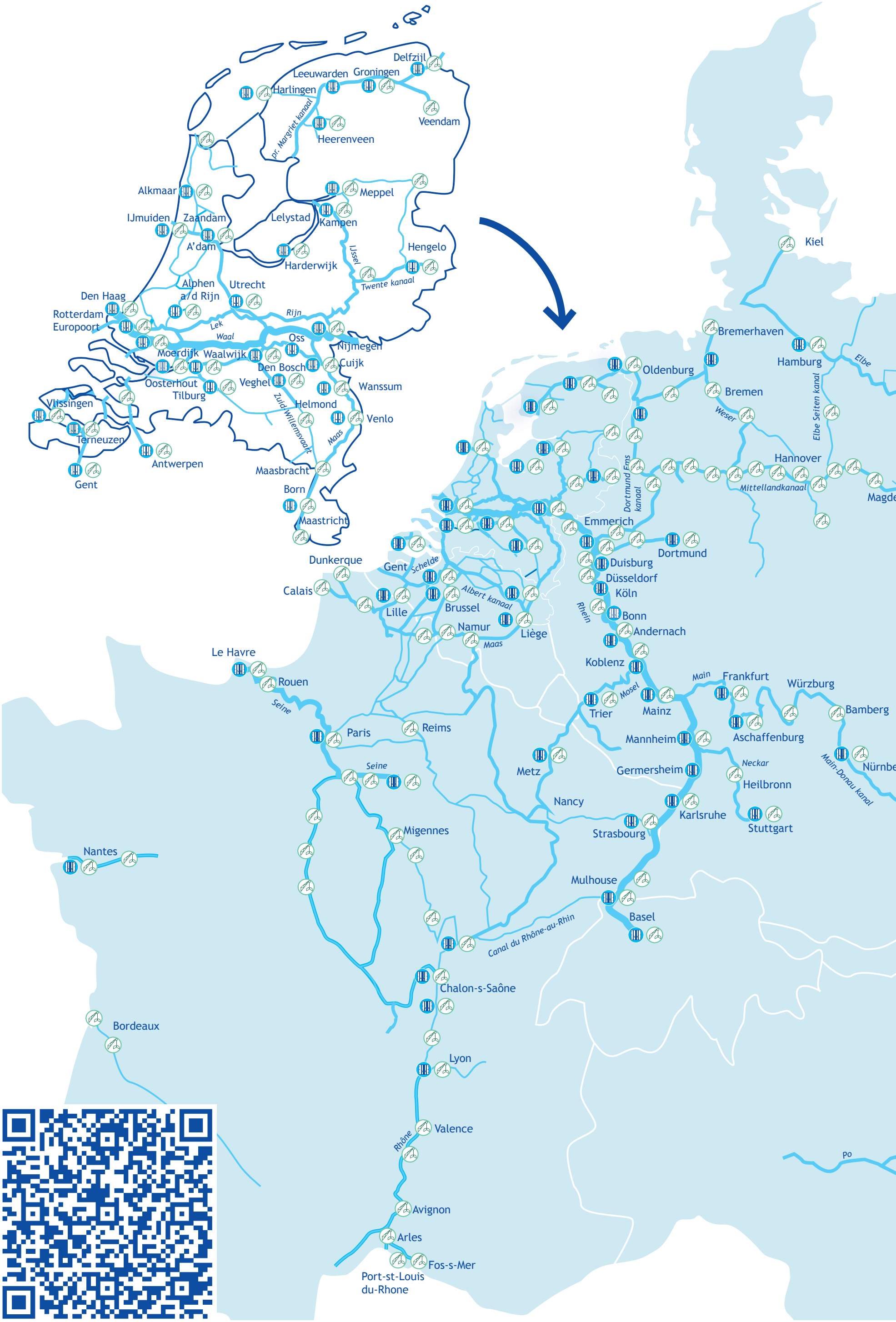


The Top 5 longest waterways

China	110,000 km
Russia	102,000 km
EU-27 Member States	52,418 km
Brazil	50,000 km
USA	41,009 km

The waterways network within the European Union represents 52,418 kilometres of canals, rivers and lakes, of which approximately 20,000 kilometres are largely concentrated in the region with the busiest navigable network of waterways, i.e., the Netherlands, Germany, Belgium, France and Austria.

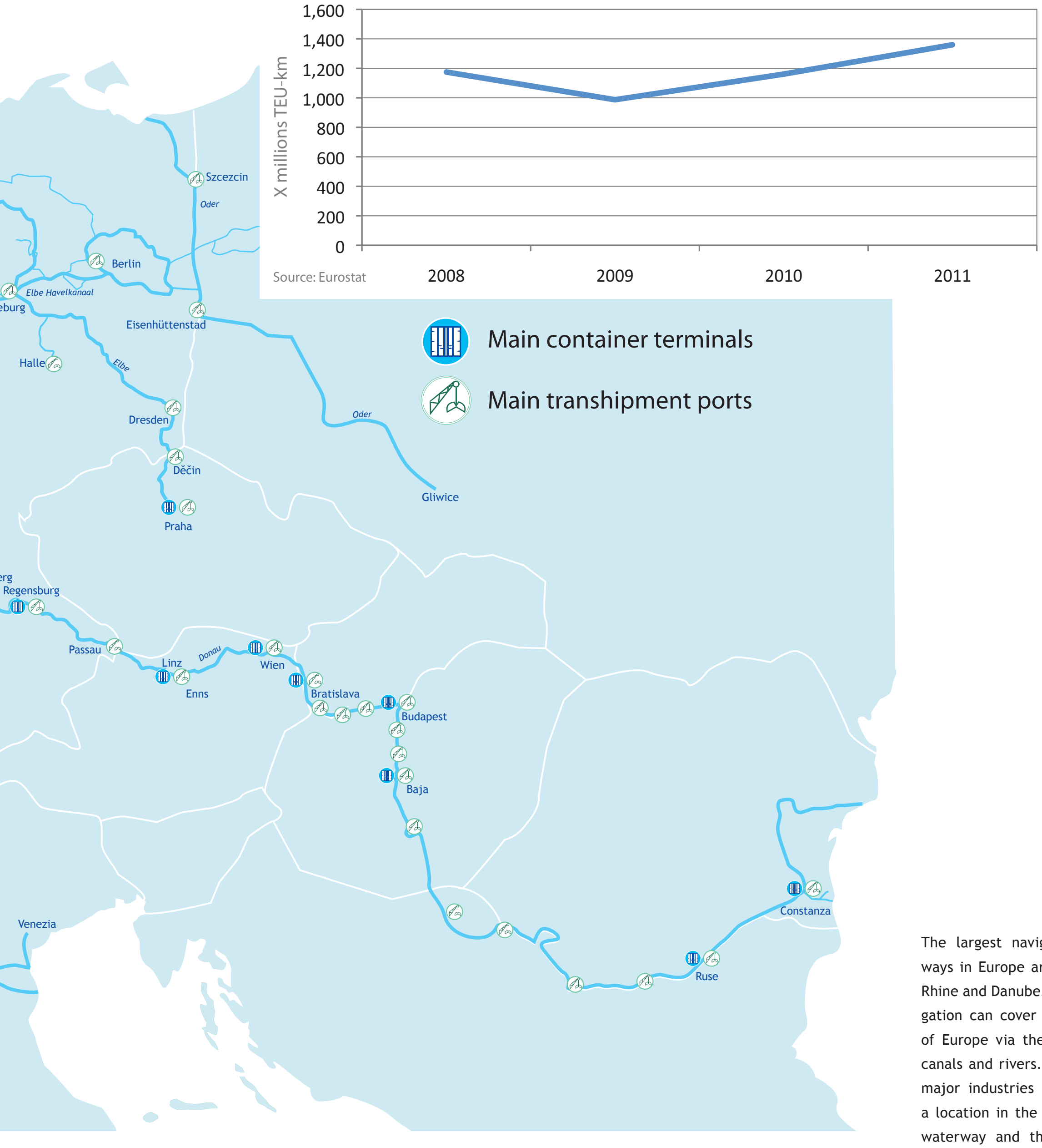
European waterways and their transhipment locations



Although all the main transhipment sites are shown on the map, there are so many loading and unloading locations that it is impossible to include them all. The container transhipment terminals in the hinterland of the seaports situated on the North Sea are concentrated along the waterways, ensuring reliable just-in-time transport at attractive rates. If necessary, the terminals can provide storage facilities in the vicinity of the customer.

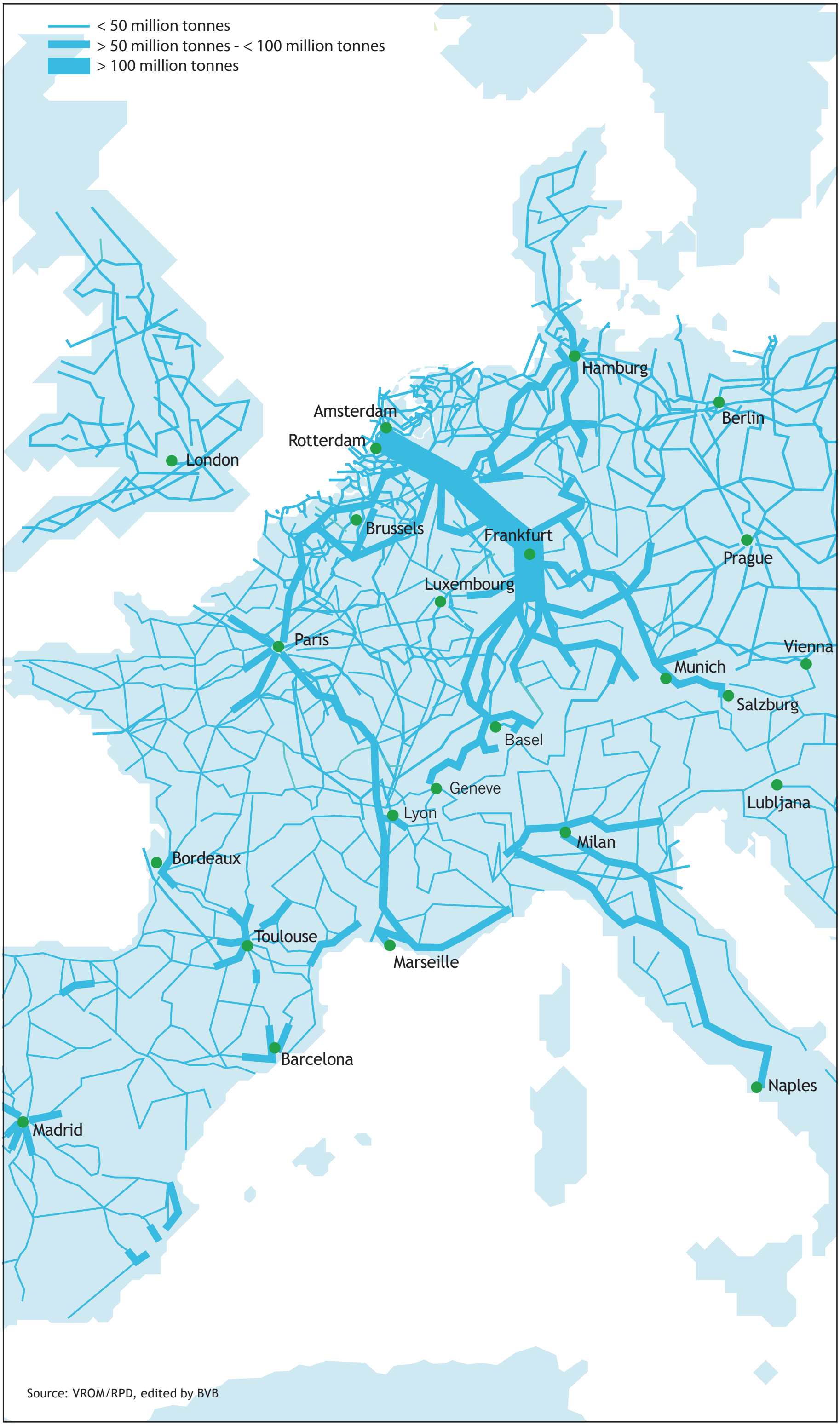
Scan this QR code and use the Blue Road map app to locate terminals and transhipment sites. Information on container shipping lines is also available per terminal.

EU-27 Inland navigation container transport performance



The largest navigable waterways in Europe are the Rivers Rhine and Danube. Inland navigation can cover a large part of Europe via the network of canals and rivers. Historically, major industries have chosen a location in the vicinity of a waterway and that is where the industrial centres will remain well into the future.

Main goods flows within Europe



The width of the line of the goods flows represents the transport intensity via the various corridors. Nowhere in the world are goods flows so massively concentrated as on the river Rhine. This enabled the Netherlands to become the gateway to Europe. The waterways reached still far from their maximum capacity; the busiest waterways can still handle twice as much cargo on average.

New waterways

Source: BVB, TENtec GIS System - European Commission

The European Commission intends to carry out a number of infrastructural improvements. The map shows the waterways of the Trans-European Transport Network (TEN-T). This network comprises all class IV waterways. New canals and improvements to the existing infrastructure are depicted on the map.

Navigable waterways and main inland ports in the Netherlands

Source: NVB, Ecorys, edited by BVB

The inland ports in the Netherlands fulfil an important logistics function with employment worth 66,700 jobs and a direct added value of 8.2 billion euros. The inland ports of Utrecht, Cuijk and Hengelo handle the largest volumes of bulk transhipments.

Key figures

389 inland ports in Netherlands

150 larger inland ports

344 million tonnes of goods transhipped annually via Dutch inland ports

66,700 direct jobs in Dutch inland ports

Added value in the Netherlands

Direct + indirect = total added value of Dutch inland ports

8.2 + 5.0 = 13.2 billion total added value of Dutch inland ports (2011)

Direct + indirect = total added value of Dutch inland shipping

0.74 + 0.25 = 0.99 billion total added value of Dutch inland navigation (2010)

Main inland ports, by typology

Top 10 for bulk transhipment

1. Utrecht
2. Cuijk
3. Hengelo
4. Oss
5. Gennep
6. Delftzijl
7. Maastricht
8. Stein
9. 's-Hertogenbosch
10. Geertruidenberg

Main terminals for container transhipment, 2011 (TEUs)

Oosterhout	160,000
Born	125,000
Den Bosch	120,000
Venray (Wanssum)	95,000
Hengelo	90,000
Nijmegen	85,000
Utrecht	70,000
Zaanstad	45,000
Meppel	37,000

Source: NVB (CBS, TNO, Ecorys, BCTN)

Amount of inland navigation vessel traffic per lock in the Netherlands

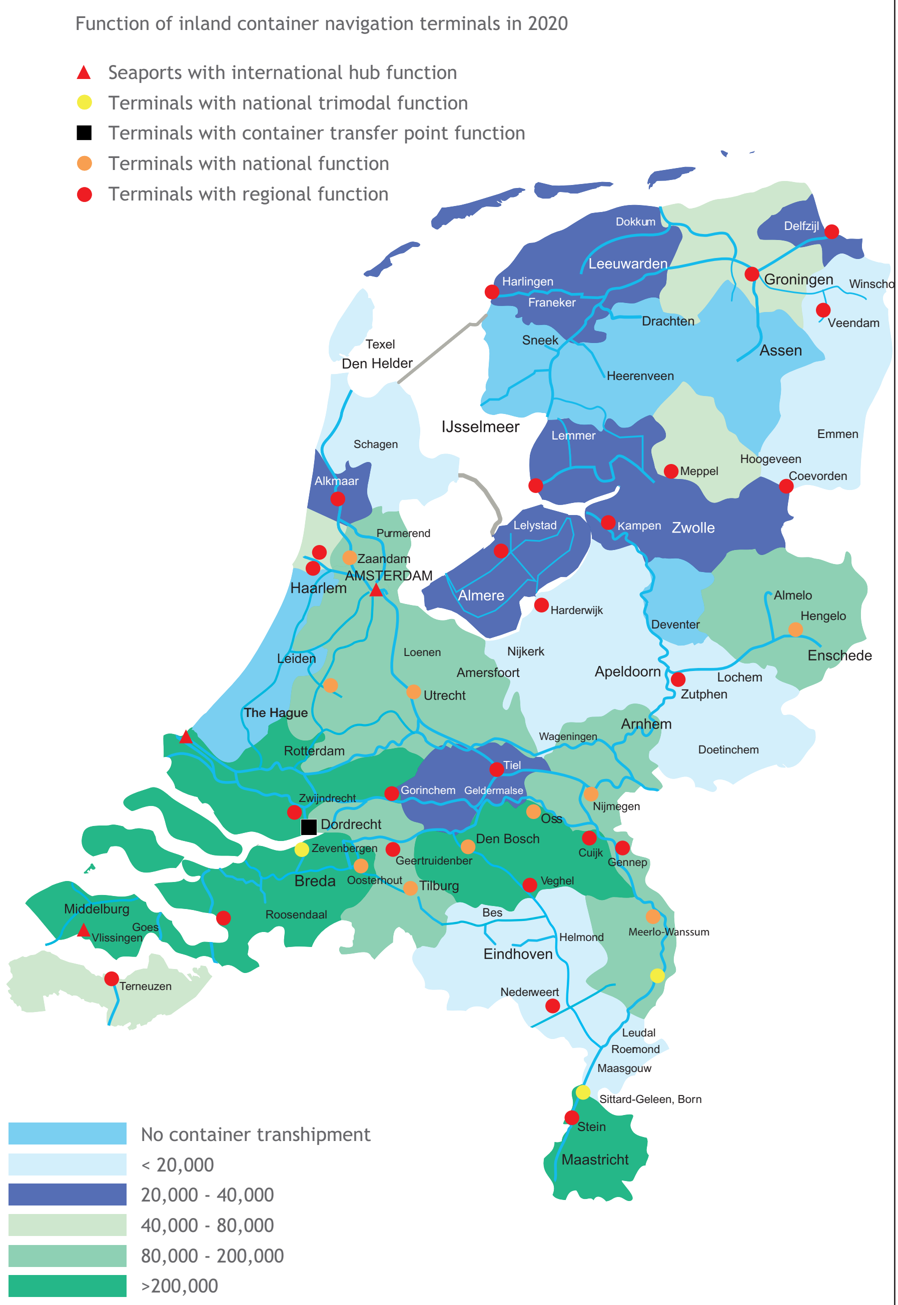
Counting point	Waterway	2009	2011
Zeesluis Farmsum	Eemskanaal	11,321	11,716
Oostersluis	Van Starkenborgkanaal	12,963	13,799
Gaarkeukensluis	Van Starkenborgkanaal	13,679	14,293
Prinses Margrietsluis	Prinses Margrietkanaal	18,202	17,696
Tsjerk Hiddessluizen	Van Harinxmakanaal	3,328	3,956
Sluis Eefde	Twentekanaal	12,040	13,801
Spooldersluis	Ramsdiep	6,609	5,966
Sluis Driel	Neder Rijn	8,650	8,528
Sluis Hagestein	Lek	7,595	7,752
Sluis Weurt	Maas-Waalkanaal	32,902	34,157
Henriettesluis	Gekanaliseerde Dieze	12,261	13,212
Sluis15	Zuid- Willemsvaart	2,133	2,723
Sluis Panheel	Kanaal Wessem-Nederweert	6,903	no data
Kreekraksluizen	Schelde-Rijnverbinding	65,097	72,412
Sluis Terneuzen	Kanaal Gent-Terneuzen	49,638	58,169
Sluis Vlissingen	Kanaal door Walcheren	4,081	6,107
Sluis Hansweert	Kanaal door Zuid-Beveland	41,566	43,661
Volkeraksluizen	Schelde-Rijnverbinding	105,798	114,412
Krammersluizen	Schelde-Rijnverbinding	40,647	41,636
Sluis Belfeld	Gekanaliseerde Maas	21,442	23,330
Sluis Sambeek	Gekanaliseerde Maas	26,279	29,244
Sluis Grave	Gekanaliseerde Maas	14,671	15,677
Maximasluis	Maas	16,248	17,990
Sluis Born	Julianakanaal	21,154	23,474
Sluis Maasbracht	Julianakanaal	6,903	24,814
Sluis Heel	Lateraalkanaal	19,470	21,379
Algerasluis	Sluis te Krimpen a/d IJssel & Voorth	no data	119
Julianasluis	Gouwekanaal	7,557	7,744
Prinses Irenesluis	Amsterdam-Rijnkanaal	37,316	38,083
Prins Bernhardsluis	Amsterdam-Rijnkanaal	28,568	22,879
Prinses Beatrixsluis	Lekkanaal	48,127	50,610
Houtribsluizen	IJsselmeer	30,165	32,581
Oranjesluizen	Binnen-IJ	43,372	44,142
Krabbergatsluizen	IJsselmeer	5,276	5,961
Lorentzsluizen	IJsselmeer	2,102	2,708
Stevinsluis	IJsselmeer	1,531	2,015
Lobith (CBS)	Boven-Rijn	116,965	124,774

Source: RWS, DVS

Container transport via the Dutch inland waterways 2011

The Netherlands has a good network for transporting containers by water. The map shows the distribution of the inland container navigation in the Netherlands. Some waterways transport more than one million TEU. The short-distance transport of containers by inland navigation is proving to be increasingly more profitable.

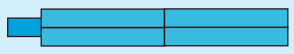
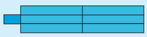
Impression of Dutch inland container navigation terminals in 2020



Source: Bückman et al (2010)

Bückman (2010) expects that the Dutch container terminals will have sufficient capacity to handle container transport up to 2020. This is partly due to the planned investments in almost all major terminals.

Categories of European waterways (ECMT)*

Category	Type of motorized vessel	Tonnage (tonnes)	Formation push convoy	Tonnage (tonnes)	Length (m)	Width (m)	Draught (m)	Height (m)
0	Leisure	< 250	-	-	-	-	-	-
I	Spits	250 - 400	-	-	38.5	5.05	1.8 - 2.2	4
II	Campine vessel	400 - 650	-	-	50 - 55	6.6	2.5	4.0 - 5.0
III	Dortmund-Eems canal vessel	650 - 1,000	-	1,250 - 1,450	67 - 80	8.2	2.5	4.0 - 5.0
IV	Rhine Herne canal vessel	1,000 - 1,500		1,600 - 3,000	80 - 85	9.5	2.5 - 2.8	5.25 / 7
Va	Large Rhine vessel	1,500 - 3,000		3,200 - 6,000	95 - 110	11.4	2.5 - 2.8	5.25 / 7
Vb	Push convoy (2 barges)	-		3,200 - 6,000	172 - 185	11.4	2.5 - 4.5	9.1
VIa	Push convoy (2 barges)	-						
VIb	Push convoy (4 barges)	-		6,400 - 12,000	185 - 195	22.8	2.5 - 4.5	7.1 - 9.1
VIc	Push convoy (6 barges)	-		9,600 - 18,000	270 - 280	22.8	2.5 - 4.5	9.1
VIc	Push convoy (6 barges)	-		9,600 - 18,000	193 - 200	33 - 34.2	2.5 - 4.5	9.1

Source: ECMT

* European Conference of Ministers of Transport

Standard push barge dimensions: 76.5 m x 11.40 m

The official categories of the European waterways network is based on the ECMT standards as drawn up during the European Conference of Ministers of Transport in Paris.

Length of waterways per country by ECMT category in Rhine corridor, east-west corridor and north-south corridor

Country:	I	II	III	IV	V	VI	VII	Total
Belgium	533	484	127	6,936	792	591		9,463
France	6,692	580	149	194	2,891	200	196	10,902
Germany	1,012	395	388	2,989	4,396	3,292		12,472
Netherlands	240	1,567	306	1,197	1,581	1,337		6,228
Luxembourg					37			37
Austria						360		360
Switzerland					17	5		22
Poland	110	1,761	1,905	275		151		4,202

Source: NEA

Unit: Kilometres

The versatile fleet of 'the Blue Road'

The fleet that uses all those waterways is just as versatile as the diversity of the waterways network itself. Many vessels are perfectly designed to make optimal use of the waterways on the routes they cover. Some types of vessels are even named after the waterways. Well-known examples are the Campine vessels (named after the canals in the Campine in Belgium) and the Dortmund-Eems canal vessels (named after the trade on the Dortmund-Eems canal). The Spits is specifically designed for the locks on most of the French canals.

Source: INE/Migalski

The large rivers Rhine and Danube are the ultimate waterways as far as size is concerned. The Rhine is not obstructed by locks anywhere between Rotterdam in the Netherlands and Karlsruhe (and beyond) in southern Germany, enabling the longest ships to navigate it. Some coupled formations - motor vessels with a pushed lighter - can measure up to 200 metres in length, something that even an sea-going ship would be proud of. The river Danube can play a similar role for its neighbouring countries in Central Europe as the Rhine does for Western Europe. The two majestic rivers are linked by the Main-Danube Canal.

Upscaling typified inland navigation in the twenty years prior to the 2008 financial crisis. The size of some of the new vessels in the two main sectors – tanker trade and dry cargo including containers - increased rapidly. Prior to 1998, there was only one exceptionally long vessel on the Rhine, measuring 125 meters. Now there is a fleet with vessels that are measuring 135 metres in length and varying in width from 11.40 metres to more than 22 metres and in 2012 two 150-metre long tankers came into service.

The following pages show this development and also how upscaling helped diversify the fleet. There are concerns in the sector about the declining number of vessels under 1,000 tonnes. Everyone in inland navigation, as well as the relevant authorities, is aware that this is not a positive development. These smaller vessels serve the capillary network and are indispensable for the industry and trade situated on those smaller waterways. Furthermore, they are a good alternative to lorries, even for shorter distances. There are various plans to set up projects with smaller vessels, such as a French/Belgian/Dutch project with small pushed barges and ditto pusher vessels that can even supply inner cities.

Diversity is not limited to the size of the vessels. There are specialised vessels, such as for chemical products, vegetable oil, bunker oil and gas, or those specialised in dry cargo for container transport. Much of the fleet is multifunctional. The size of the ships and applied techniques and designs - such as a more hydrodynamic hull and specialisation of the cargo area - experienced a revolutionary development. Between 2000 and 2011, 2100 new vessels came into service in Western Europe. Consequently, the most modern fleet in the world operates in Northwest Europe, ready to fulfil the demands of the shippers as the Blue Road. With its innovative techniques the Blue Road contributes on two fronts to more sustainable freight transport: on the one hand by taking more cargo away from the road and to the water with a versatile fleet, thus reducing pressure on the environment and society. On the other hand by using much cleaner propulsion fuels and thus offering the shippers an even better performance. The following chapter contains more information on the revolutionary changes in the engine room of inland navigation vessels.

Types of vessels

ECMT Category	Vessel	
I	 Spits Length 38.5 m - width 5.05 m - draught 2.20 m - cargo capacity 350 t	 14 x
II	 Campine vessel Length 55 m - width 6.60 m - draught 2.59 m - cargo capacity 655 t	 22 x
III	 Dortmund-Eems canal vessel Length 67 m - width 8.20 m - draught 2.50 m - cargo capacity 1,000 t	 40 x
IV	 Rhine-Herne canal vessel (Europe vessel) Length 85 m - width 9.50 m - draught 2.50 m - cargo capacity 1,350 t	 54 x
Va	 Large Rhine vessel Length 110 m - width 11.40 m - draught 3.00 m - cargo capacity 2,750 t	 120 x
Va	 Large Rhine vessel Length 135 m - width 11.40 m - draught 3.5 m - cargo capacity 4,000 t	 160 x
Vb	 Two lighter pushing unit Length 172 m - width 11.40 m - draught 4 m - cargo capacity 5,500 t	 220 x
VIb VIc	 Four or six lighter pushing unit Length 193 m - width 22.80 / 34.20 m - draught 4 m - cargo capacity 11,000 / 16,500 t	 440 / 660 x
Va	 Standard tank vessel Length 110 m - width 11.40 m - draught 3.50 m - cargo capacity 3,000 t	 120 x

Types of vessels

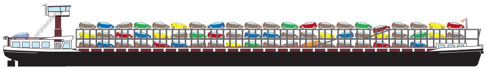
ECMT Category

Vb

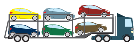
Large tank vessel
Length 135 m - width 21.80 m -
draft 4.40 m - cargo capacity 9,500 t

380 x

Va



Car vessel
Length 110 m - width 11.40 m -
draught 2.00 m - cargo capacity 530 cars



60 x

III

Container vessel (Campine class)
Length 63 m - width 7 m -
draught 2.50 m - cargo capacity 32 TEU

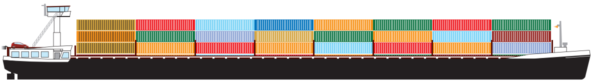
16 x

Va

Standard container vessel
Length 110 m - width 11.40 m -
draught 3.00 m - cargo capacity 200

100 x

Vb



Large container vessel
Length 135 m - width 17 m -
draught 3.50 m - cargo capacity 500 TEU

250 x

Va

Ro-ro vessel
Length 110 m - width 11.40 m -
draught 2.50 m

72 x

VIb

Coupled formation (vessel with pushed lighter)
Average length 185 m - width 11.40 m -
draught 3.50 m - cargo capacity 6,000 t

240 x

VIb

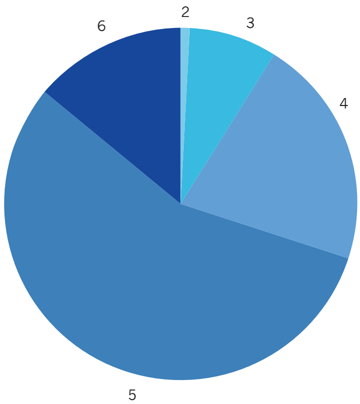
Coupled formation (vessel with pushed vessel)
Average length 185 m - width 11.40 m -
draught 3.50 m - cargo capacity 6,000 t

240 x

Designer: © Stephan le Sage

Flag share in West European inland navigation in percentages, 2012

The Northwest European inland navigation fleet has a total cargo capacity of more than 15 million tonnes. More than half of the cargo capacity sails under the Dutch flag.

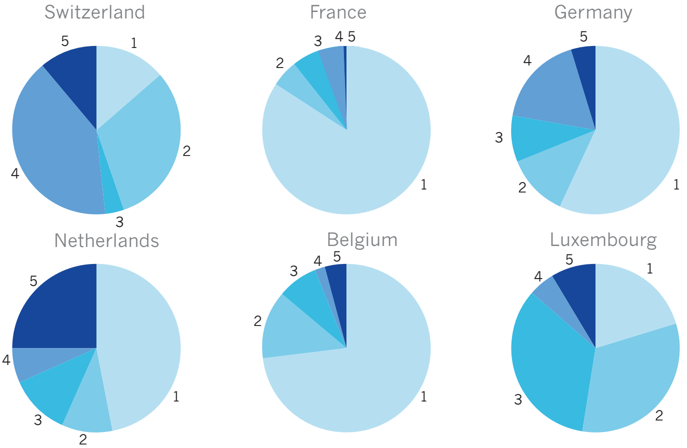


	Countries	Tonnage	Percentage
1	Luxembourg	56,404	0%
2	Switzerland	170,439	1%
3	France	1,155,664	8%
4	Germany	2,949,871	20%
5	Netherlands	8,814,666	58%
6	Belgium	2,031,403	13%
	Total	15,178,447	100%

Source: IVR, ZBBD

Flag distribution of the West European fleet, 2012

The pie charts show a clear difference in fleet structure per country. In France, Germany, the Netherlands and Belgium the majority of the fleet comprises dry cargo vessels. Luxembourg and Switzerland have considerably smaller fleets, as well as a different distribution in types of vessel.

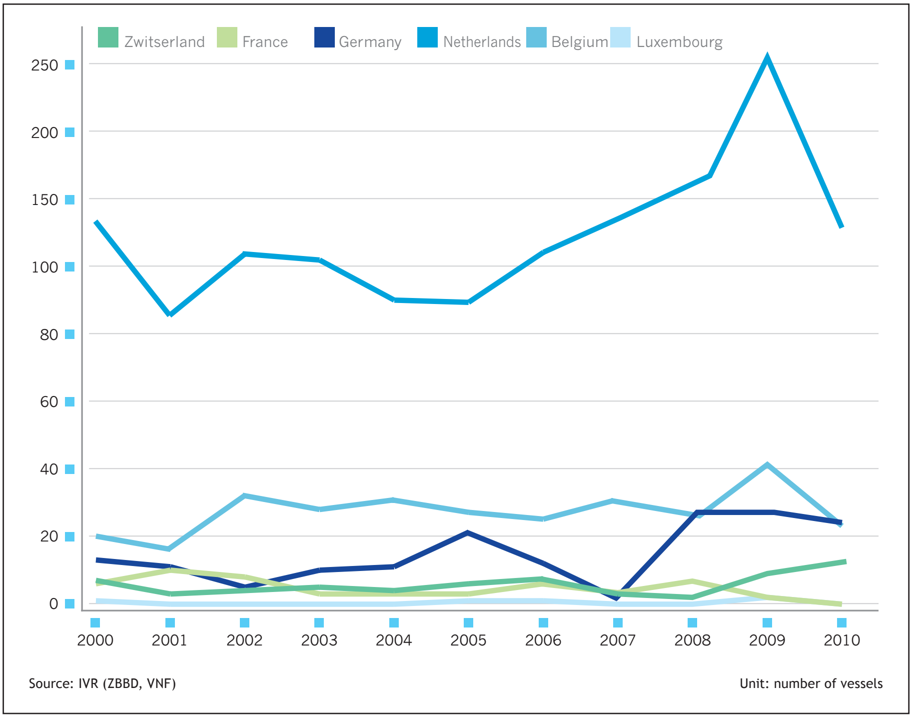


	Cargo	Switzerland	France	Germany[1]	Netherlands	Belgium	Luxembourg
1	Dry cargo fleet	19	1,435	1,882	4,658	1,352	9
2	Tank cargo fleet	51	115	585	1,122	264	23
3	Push and tug vessels	7	158	425	1,188	160	12
4	Passenger vessels	66	493	1,032	725	47	3
5	Others[2]	15	3	0	2,489	133	7
	Total	158	2,204	3,924	10,182	1,956	54

Source: IVR

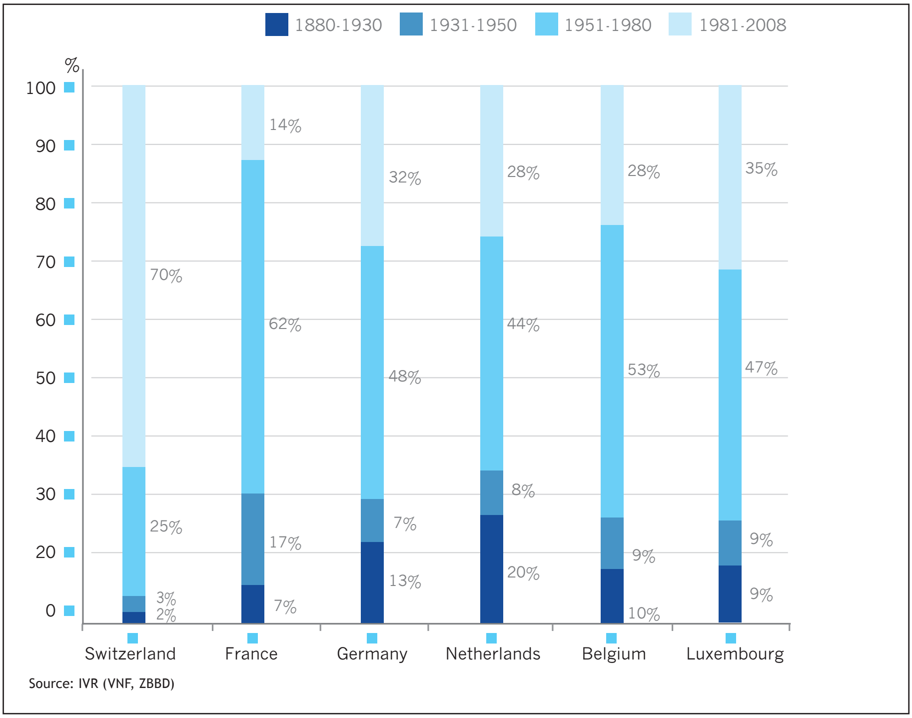
[1] Source: 2010 ZBBD
[2] including pontoons, deck barges and professional sailing vessels

Number of new vessels in West European inland navigation



Between 2000 and 2010, 2,100 new vessels were added to the West European inland navigation fleet. The graph clearly indicates that the Netherlands leads in the number of new vessels with the addition of almost 1,500 vessels during that period. Most of those vessels (334) were added in 2009.

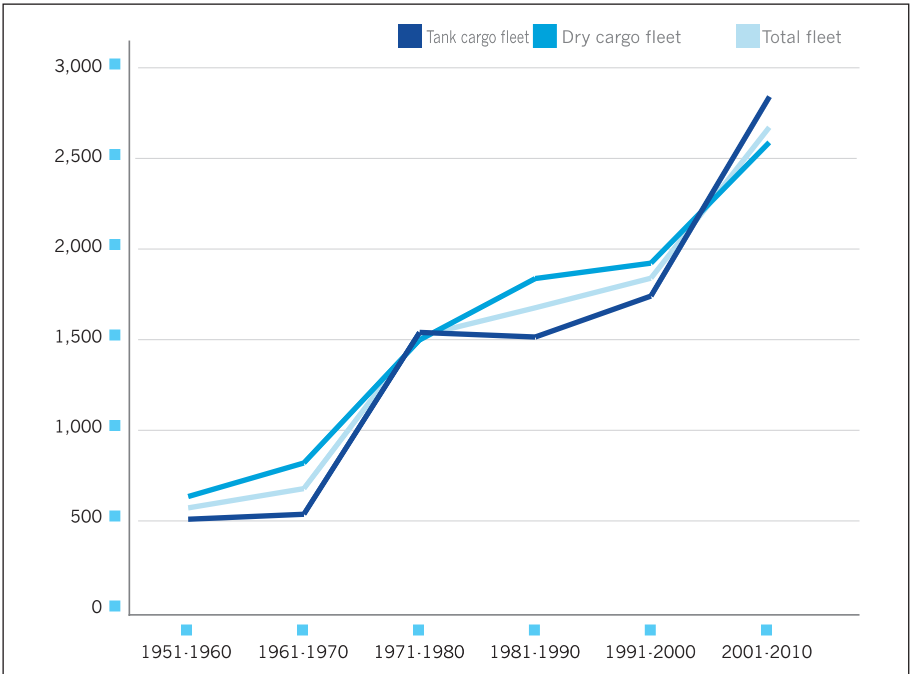
Dates of construction of the inland navigation fleet by country, 2011



Vessels are very sustainable. Provided they are well maintained and regularly invested in, vessels tend to have a lifespan of more than 50 years. Over a quarter of the Northwest European fleet consists of new vessels of up to 20 years old.

Upscaling has been the main trend in the inland navigation sector during the last fifty years. Upscaling firstly occurs in the tanker segment, as it is easier to adapt loading and unloading facilities for these vessels.

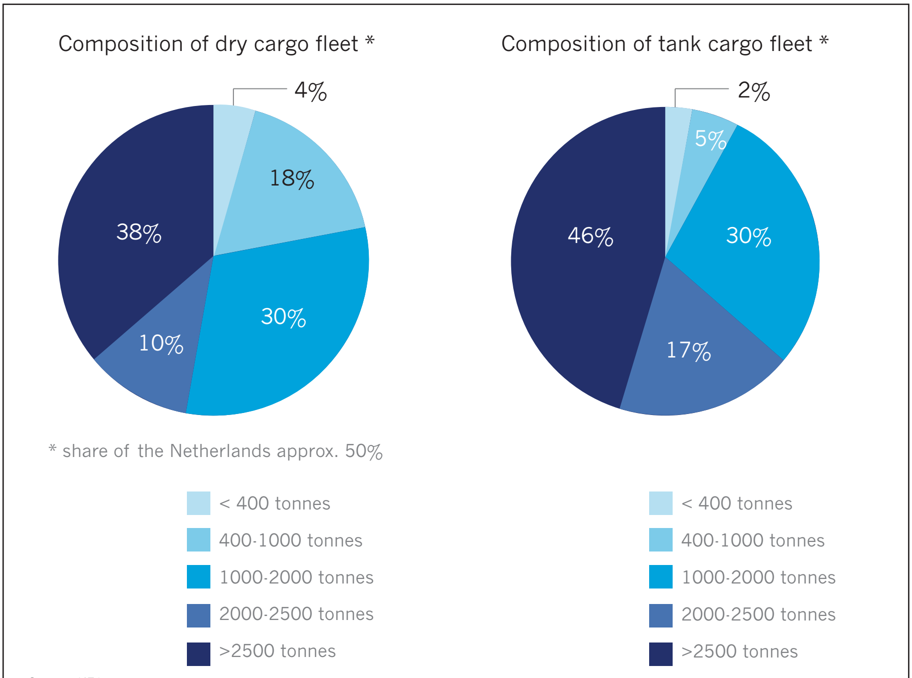
Average increase in tonnage in the Western European fleet



Source: IVR

The pie charts clearly show more upscaling in the tank cargo fleet than in the dry cargo fleet. Many large tankers (> 5,000 tonnes) were added to the fleet, particularly in 2008 and 2009. These are mainly deployed in the ARA region (Amsterdam - Rotterdam - Antwerp).

Composition of the European Inland navigation fleet, 2010



Source: NEA

Total European inland navigation fleet, 2012

	Motorized freight vessels	Freight push barges	Motorized tankers	Tanker push barges	Towing vessels	Pushing boats
West European inland navigation fleet						
Germany	916	789	419	44	140	285
Belgium	806	230	216	8	10	94
France	860	383	44	47	93	93
Luxembourg	8	0	16	2	0	11
Netherlands*	3,993	1,135	1,240	51	479	649
Switzerland	17	4	55	3	2	no data
Poland (2010)	109	431	2	0	no data	no data
Czech Republic	44	145	0	0	89	89
Total	**6,753**	**3,117**	**1,992**	**155**	**813**	**1,221**
East European inland navigation fleet						
Austria	6	54	5	15	0	10
Slovakia	26	119	4	32	1	41
Hungary	78	300	2	4	53	26
Romania	75	984	4	97	69	183
Bulgaria	26	161	4	5	13	38
Moldova	8	26	5	0	10	1
Croatia	8	98	5	21	32	10
Serbia	62	345	5	37	82	40
Ukraine	84	472	3	22	15	73
Total	**373**	**2,559**	**37**	**233**	**275**	**422**

* May differ from IVR figures due to differences in definition.

Source: Central Commission for Navigation on the Rhine

Motorized freight vessels account for the largest number of vessels in the entire fleet of the Northwest European member states. Within the fleet of the Danube countries the number of pushing and towing vessels is highest.

Spits

362 tonnes of dry cargo

14x

Dimensions:

39 x 5.09 metres,

draught 2.42 metres

The advantages of the 'Westropa'

- Efficient and environmentally friendly transport of both bulk freight and general cargo deep into the European hinterland, from Hamburg to Marseille and from Dunkirk to Vienna.
- High level of service, efficient planning and punctual arrival at its destination.
- Clients can receive relatively small shipments of cargo at a time.
- Clients use the time that the vessel is en route as 'free storage time'.
- Flexibility of a privately owned family business in terms of working hours and finances.
- High level of involvement in the job.
- The cooperative ELV (European Logistic Transport Cooperation) offers clients a complete service package and transport security thanks to the affiliated inland navigation operators (over 40,000 tonnes in total).

Tanker

4,038 tonnes or 5,175 m3

Cargo: liquid chemical products

160x

Dimensions:

135 x 11.45 metres,

draught: 3.82 metres

The advantages of 'Experience'

- Suitable for German canals based on its cargo efficiency and ballast options.
- Sealed and fully automated loading system.
- Double-hulled, coated and equipped with the latest gadgets to ensure the safest and most environmentally friendly transport of chemical substances.
- Gas-proof computer screen on the roof of the loading zone to ensure efficiency and safety during loading and unloading.
- Equipped with certified quality system (DNV).
- The cargo is optimally protected by the double hulls.
- Can transport a wide range of chemical cargoes thanks to the coating on the tanks.
- Different products can be loaded and unloaded separately.

500 containers with everything the modern consumer could wish for on board!

Container vessel
5,407 tonnes or 500 TEU
250x

Dimensions:
135 x 17 metres,
draught: 3 metres

The advantages of 'Zembla'

- Each container can hold a different kind of cargo, from clothing to high-tech equipment.
- Conditioned transport (cold-storage containers) is possible, as is the transport of chemical products.
- Efficient and environmentally friendly transport, just-in-time.
- Runs 24 hours a day, 7 days a week, 365 days a year.
- Goods reach their destination safely and undamaged.
- Goods can be tracked & traced, service levels are high and planning is good.
- Container shipping is a reliable link in the logistics chain.
- Bundling of logistic chains increases of scale linked to flexibility.

11,000 tonnes of iron ore/pit coal on board!

Pushing unit
11,000 to 16,000 tonnes
440 to 660x

Dimensions:
Four lighter pushing unit:
193 x 22.8 metres
Six lighter pushing unit:
269.5 metres x 34.2 metres,
draught: 3 metres

The advantages of 'Veerhaven IX' ('Dolphin')

- Large-scale transport of 11,000 to 16,000 tonnes of dry cargo at a time.
- Runs 24 hours a day, 7 days a week, 365 days a year.
- Each lighter can hold various types of ore and/or coal.
- The vessel is environmentally friendly and safe.
- Never encounters traffic jams or delays.
- Offers the just-in-time system for the German steel industry.

The Blue Road: The shortest route to sustainable transport

Concern for the environment provides inland navigation with opportunities to distinguish itself. Although marine engines are usually a bit bigger than lorry engines, vessels carry much more cargo at once. So, relatively speaking, vessels will always win from lorries in terms of fuel consumption and environmental impact and they will also win from trains but then in a slightly different ratio. A comfortable lead.

Source: Bundesverband der Deutschen Binnenschiffahrt e.V.

Before we go on, let us say that this still holds true. Because inland navigation transports freight on a much larger scale, its fuel consumption per tonne per kilometre is one-third to one-sixth the fuel consumption of a lorry. It is unlikely that this will ever change, leaving aside that ships are safer, produce less noise pollution and do not cause congestion on the motorways. But we must be careful in concluding that every vessel is automatically cleaner than any lorry.

The development of 'environmentally friendly' diesel engines in lorries resulted in social and political demand for inland navigation engines to be improved as well. The inland navigation sector did not need to be told twice. The engine rooms of the inland vessels were revolutionised, causing a stir similar to that of the upscaling. Ever since 2006, new vessels and vessels retrofitted with a new engine have met the strict European emission requirements. Those requirements are due to become even stricter, requiring new marine engines to emit hardly any nitrogen oxides (NO_x), sulphur oxides (SO_x) and particulate matter (PM) at all. The emission of CO_2 has more to do with fuel consumption. Dutch programmes such as Voortvarend Besparen (‘Dynamic Saving’) and high-tech equipment in the wheelhouse will enable barge owners to significantly reduce fuel consumption and thus CO_2.

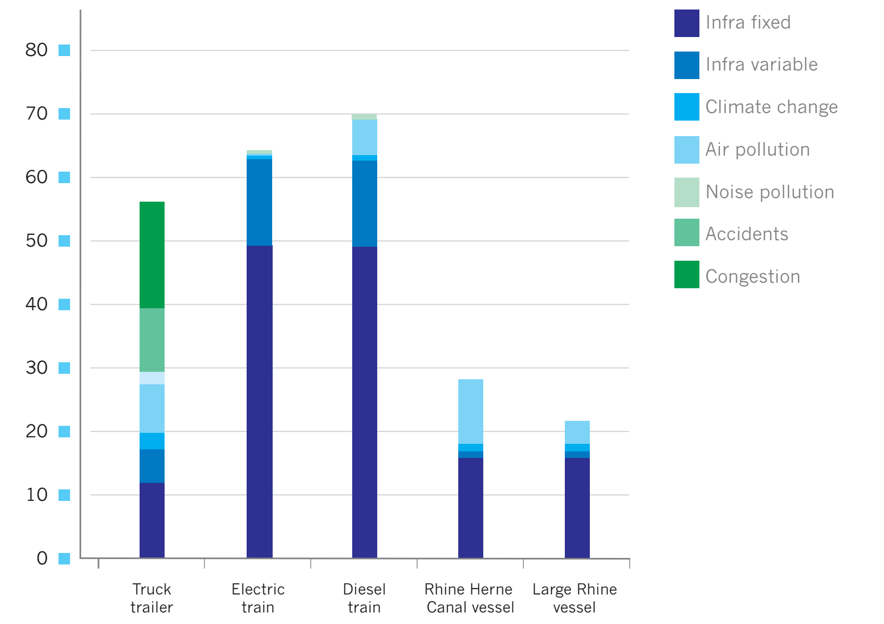
To acknowledge those vessels that meet the latest requirements and whose owners take effective measures to reduce environmental damage, the foundation that already successfully established the Green Award for sea transport has now introduced the Green Award for inland navigation. More than a year after its introduction in 2011, the Green Award certificate has been awarded to more than 300 vessels.

The introduction in 2011 of the Argonon, an inland vessel that runs on a mixture of 80% natural gas (LNG), was revolutionary. Expectations are that owners of new vessels will opt for a technique with an even higher percentage of LNG for their propulsion fuel. The vessels Amulet and Duandra also came into service, the former diesel electrically powered and the latter hybrid-powered. More vessels with these techniques are projected. Plans are already on the drawing board for a vessel that runs on both electricity and natural gas. Techniques have also been developed to adapt the existing fleet to the new emission requirements. The exhaust gases will undergo a special treatment, which will make them 'harmless'. The first vessels fitted with this so-called ‘exhaust aftertreatment’ are already in service. Another initiative is to offer CO_2-neutral transport and to plant trees in return for a small price increase.

Considering all these innovative efforts, inland navigation can continue to meet the high expectations as a sustainable shipper. The Blue Road: the shortest route to sustainable transport.

Construction and maintenance of roads is relatively inexpensive but the cost to society is high, due partly to the congestion problem. Construction and maintenance of railways is the most expensive, but with a low cost to society. Waterways score well in both respects. Countries with many waterways are therefore attractive for inland shipping.

Average external costs and infrastructural costs of container transport in 2009

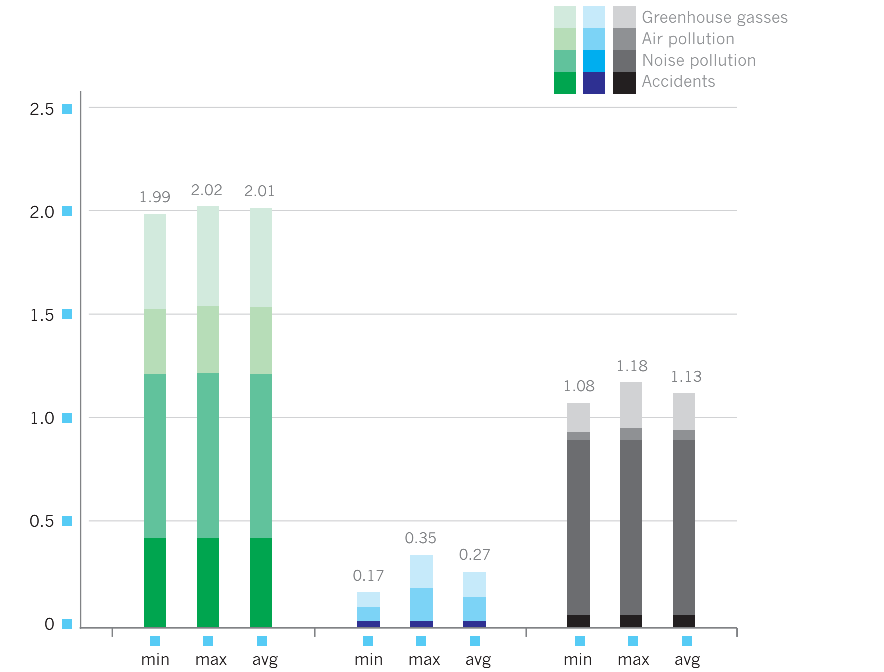


Source: NEA et al

Unit: EUR per 1000 tkm

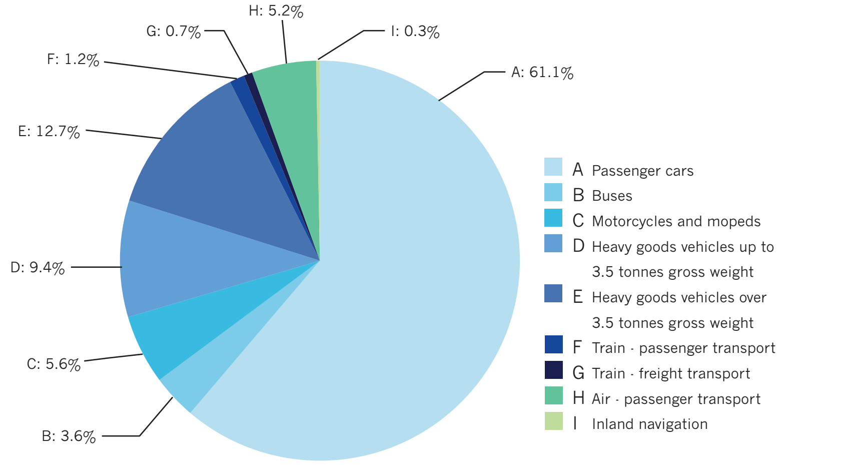
Upon closer inspection of the external costs (excluding construction), inland navigations' external costs are low in comparison to the other two modalities. Inland navigation scores favourably, particularly with respect to accidents and noise pollution.

External costs of modalities



Source: Planco 2007

Modal split total external costs in 2008 for the EU-27 * (excluding congestion)

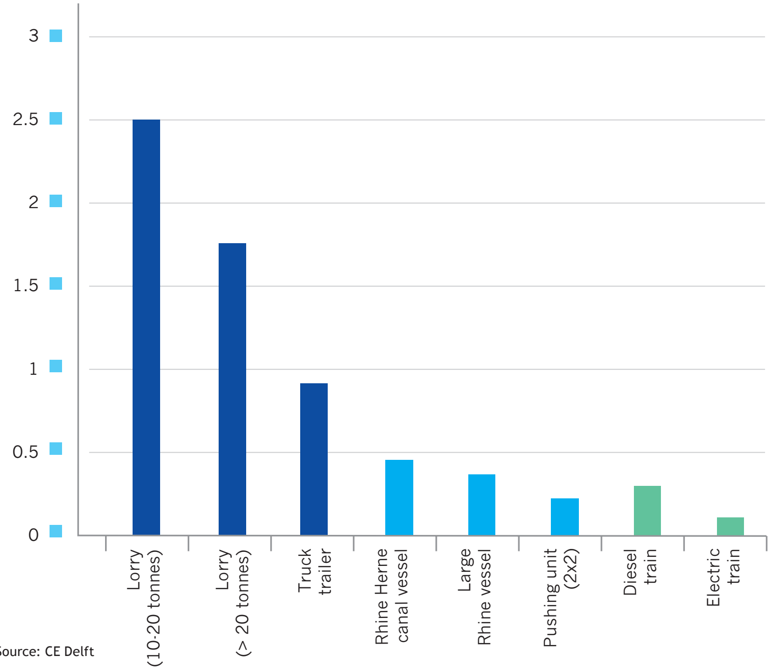


Source: CE Delft, INFRAS, Fraunhofer ISI

• EU-27 excluding Malta and Cyprus, including Norway and Switzerland

Freight transport accounts for 39 percent of the external costs of transport in the EU, excluding costs caused by congestion. The lowest cost within the EU-27 is for inland navigation, which accounts for 0.3 percent of the external costs.

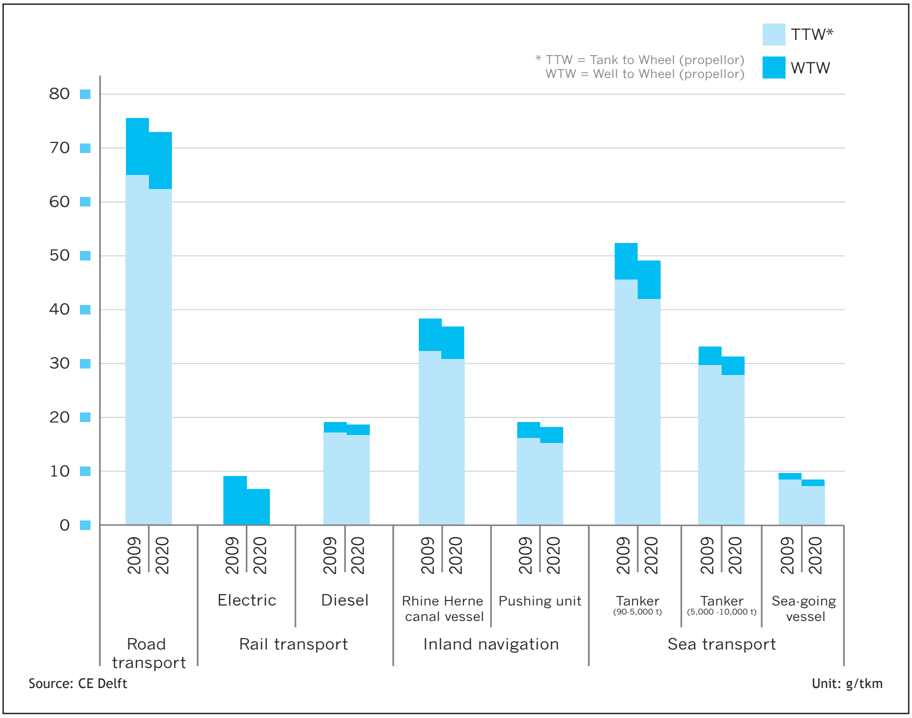
Energy consumption modalities, 2011



Source: CE Delft

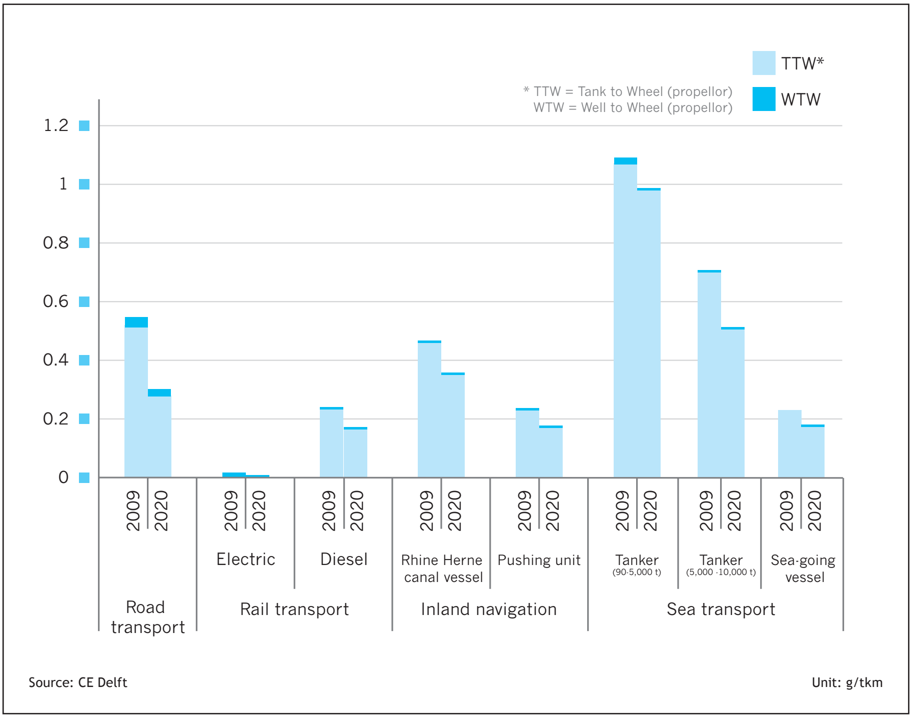
Inland navigation is by nature a low-energy form of transport. An average vessel transports 1,500 tonnes of freight, or 60 lorry loads, at a time and relatively speaking uses much less energy than a lorry. The energy consumption per tonne-kilometre is approximately one-third of what a truck trailer consumes.

CO_2 emissions cargo transport in 2009 and 2020 (average bulk and general cargo)



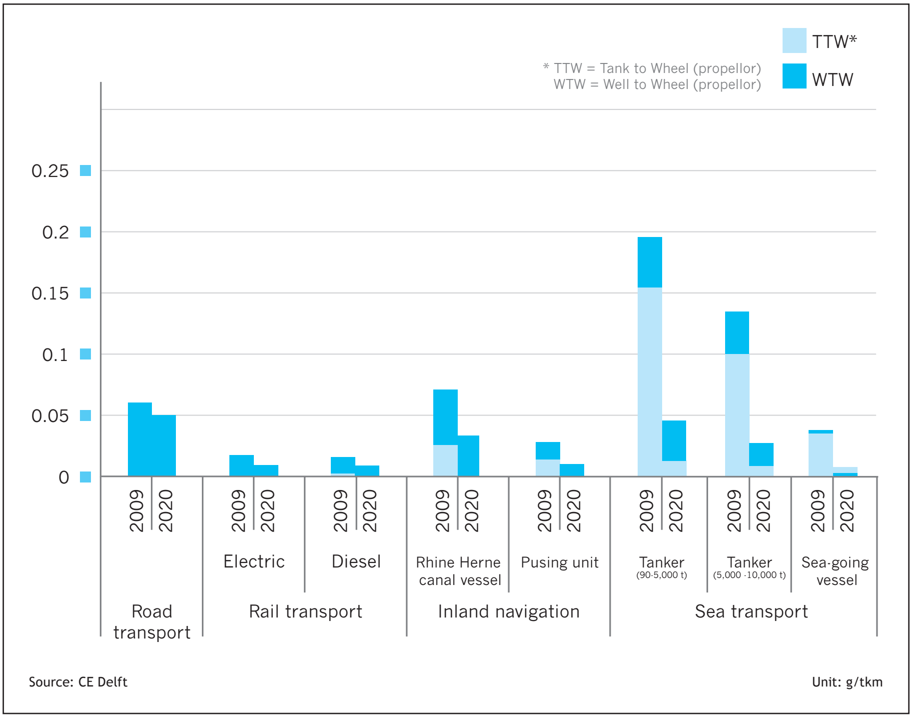
CO_2 (carbon dioxide) is the most important greenhouse gas. The capacity of a modality has a significant impact on the emissions.

NO_x emissions cargo transport in 2009 and 2020 (average bulk and general cargo)



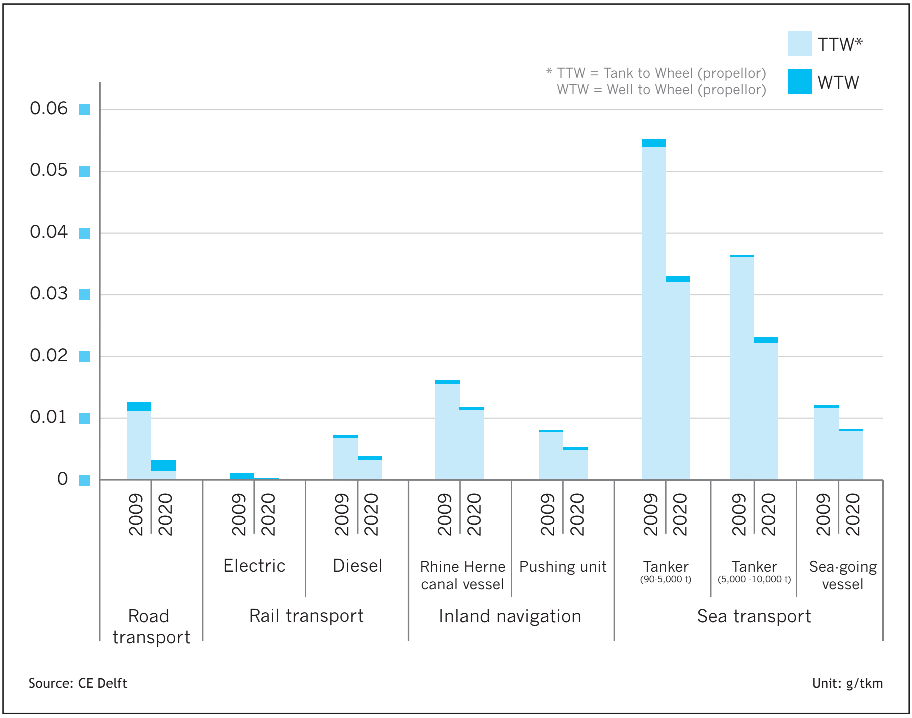
NO_x (nitrogen oxides) contributes, among other things, to acid rain and smog. Inland vessels can be equipped with SCR-catalysers, which can reduce NO_x emissions by 85%.

SO_2 emissions cargo transport in 2009 and 2020 (average bulk and general cargo)



The level of emissions of SO_2 (sulphur dioxide) has been reduced significantly since 2011, when the same low-sulphur fuel used for road transport came available for inland navigation. This chart provides a distorted picture, as it includes figures pertaining to the old situation in 2009.

$PM_{2.5}$ emissions cargo transport in 2009 and 2020 (average bulk and general cargo)



$PM_{2.5}$ stands for fine particulate matter. The level of the emissions of particulate matter depends partly on the sulphur content in the fuel. Since 2011, the sulphur content in fuel has been greatly reduced. Consequently, the emission of particulate matter is also much lower. In the newest vessels, most of the emission of particulate matter can be prevented (see descriptions on the following pages).

LNG (Liquid Natural Gas)

Argonon

Facts

Dimensions:	110 x 16.20 metres
Type:	Tanker type C (chemicals)
Cargo capacity:	6,100 tonnes = 244 tank lorries

Dual fuel

The Argonon runs on ‘dual fuel’, i.e., 80% gas and 20% diesel. The vessel has two micro turbines in addition to the dual fuel engines. These gas turbines replace the conventional diesel generators that generally speaking generate the electricity on board. Gas turbines have the advantage of producing electricity with very little horse-power. Also, with their clean combustion their emission of pollutants such as NO_x and CO_2 is low. The micro turbines provide the living areas on board with hot water and central heating.

LNG

LNG (Liquid Natural Gas) is natural gas liquidised at a temperature of -162 C°. As a result, its volume is up to 600 times less and can therefore be stored in a double-hulled tank, which keeps the temperature at the required low level.

At present, international approval has been given for the construction of four vessels with LNG. Another five vessels are in the pipeline.

Environmental benefits of Dual Fuel:*

↓ -/- 20% CO_2 (carbon dioxide)
↓ -/- 40% NO_x (expected final saving approximately 70%!)
• A yield of 85% (compared to 45% by generators)
• Fuel cost savings between 20% and 25%
↓ -/- 80% SO_x (sulphur)
↓ -/- 90% PM_{10} (particulate matter)

* Relative to CCR2 reduction requirements (2007)

Amulet

Facts

Dimensions:	135 X 14.15 meters
Type:	bunker tanker type C
Load capacity:	6,752 tonnes / 7,145 m^3 product = 270 tank lorries

Diesel-electric

The Amulet is a diesel-electric-powered tanker. This means that the vessel is equipped with two electric motors for propulsion and four Volvo diesel generators. The latter generates the power for the propulsion and all electrical equipment on board, including lighting, the bow thruster and the cargo pumps. Because the energy can be better regulated, energy consumption is reduced by 30 to 40 percent. The released emissions are cleaned as well as possible by means of particulate filters and catalysers.
This eventually results in minimum emissions of PM_{10} Pand NO_x.

Environmental benefits of diesel-electric:*

↓ -/- tot 32% CO_2
↓ -/- tot 67% NO_x
↓ -/- tot 98 % PM_{10} (particulate matter)

* Relative to CCR2 reduction requirements (2007)

Aftertreatment equipment

Anda

Facts

Dimensions:	135 x 11.45 metres
Type:	dry cargo / container ship
Cargo capacity:	3,878 tonnes = 155 lorries
	264 TEUs = 132 lorries

After-treatment technology

The Anda was one of the first ships to use aftertreatment technology in the engine room. The main engines of the Anda are equipped with an aftertreatment installation for exhaust gases. It comprises a particle filter that filters out soot and particulate matter from the exhaust gases and a SCR (Selective Catalytic Reduction) catalyst, which reduces the emission of NO_x. With this, the vessel meets the toughest emission standards. As the particle filter and the catalyst are part of a high efficiency muffler system, they also meet the most stringent noise requirements set by the Shipping Inspectorate.

Environmental benefits of aftertreatment:*

↓ -/- 90% NO_x

↓ -/- 97% PM_{10} (particulate matter)

* Relative to a conventional vessel

Duandra

Facts

Dimensions:	110 x 16.20 m
Type:	Tanker
Cargo capacity:	6,000 tonnes (= 240 tank lorries)

Hybrid

As a characteristic feature of hybrid vessels, they are propelled by two power sources combined, in this particular case by both a diesel engine and an electric motor. This enables more efficient use of the vessel's total power, which can be regulated as required at any specific moment in time. Additionally, the residual heat of the engines is used to heat several rooms on board. It is therefore fuel efficient and low on emissions.

Environmental benefits of hybrid:

↓ -/- 10% CO_2
↓ -/- 40% PM_{10} (particulate matter)
↓ -/- 70% NO_x*

* Meets future CCR (Continuous Catalyst Regeneration) objectives as from 2016

Do you also want sustainable transport? Go to www.bureauvoorlichtingbinnenvaart.nl/duurzaamtransport

Glossary

Inland navigation vessel
An inland navigation vessel is a non-seaworthy vessel for the transport of cargo on inland waters (such as rivers, lakes and canals).

ECMT classification
In order to align the dimensions of the West European waterways network, the inland navigation in Europe is divided into ECMT categories. Each category specifies the maximum dimensions of the ships. The classification is determined by the members of the European Conference of Ministers of Transport.

CO_2: Carbon dioxide
Carbon dioxide (CO_2) is the most important greenhouse gas. CO_2 is part of a natural cycle. CO_2 surplus occurs after combustion of fossil fuels such as oil, gas and stone coal.

Emission
Emission means 'substances discharged into the air'. Polluted parts can penetrate the soil, water and air. Emission relates to the discharge of carbon dioxide (CO_2), nitrogen oxide (NO_x), particulate matter (PM_{10}) and/or sulphur dioxide (SO_2).

Inland terminal
A location in the European hinterland where local container flows come together and are subsequently transported onwards by train or inland vessel.

Intermodal transport/co-modality
Involves the transportation of freight in a container or vehicle using multiple modes of transportation without any handling of the freight itself when changing modes.

Modality
A type of transportation for moving goods. Modes of transportation are lorries, trains and inland vessels.

Modal shift
The shift of cargo flows from one modality to another.

Modal split
The division of the shifts of goods over the modes of transport (modalities).

NOx: nitrogen oxide
Nitrogen oxide is one of the substances that contribute to the acidification of the environment. Nitrogen oxide is released during any kind of combustion at high temperature.

$PM_{10,}$ $PM_{2.5}$: particulate matter
Particulate matter is a form of pollution that has an unfavorable effect on our health. Particulate matter includes floating parts in the atmosphere that are smaller than 10 micrometres or 2.5 micrometres.

SO_2: sulphur dioxide
Sulphur dioxide is a combination of oxygen and sulphur. Fossil fuels contain high quantities of sulphur. Combustion causes sulphur dioxide. It is harmful for man, animal and nature.

Synchromodal transport
Based on the customer's needs, deciding at every stage which modality can best be used at the specific moment in time and depending on the actual situation.

TEU
TEU is the designation for the dimension of containers. The abbreviation stands for Twenty feet Equivalent Unit. 1 TEU is a container measuring 20 feet long, 8 feet wide and 8 feet deep.

Tonne-kilometre
Unit of measure for goods transport which represents the transport of one tonne of cargo over one kilometre.

Tank to Wheel/Propeller (TTW)
Emissions generated by a means of transportation. When emission is generated by a vessel, it is referred to as Tank to Propeller.

Shipper
A company or person who has cargo transported by a carrier.

Well to Wheel / Propeller (WTW)
Well-to-wheel emissions are all emissions combined for the use of a mode of transportation. This means that emissions generated by the means of transport itself (Tank to Propeller in case of a vessel), as well as the emissions released during the extraction and refining process or the production of electricity (Well-to-Tank) are included.

European organizations

European Barge Union
T: +31 10 411 60 70
W: www.ebu.uenf.org

European Skippers Organisation
T: +32 50 47 07 20
W: www.eso-oeb.org

Inland Navigation Europe
T: +32 25 53 62 70
W: www.inlandnavigation.eu

IVR
International Association for inland navigation and insurance in Europe
T: +31 10 411 60 70 W: www.ivr.nl

National organizations

Belgian / Luxembourg organizations

Algemeen Aktiecomité der Belgische Binnenvaart-organisaties V.Z.W. [2)]
T+32 36 51 71 12

Association de Maitres bateliers des regions de Liège, Limbourg, Namur et Charleroi [2)]
T: +32 42 27 17 10

Promotion Office for Inland Navigation in Flanders [4)]
T: +32 11 23 06 06
W: www.binnenvaart.be

UCV Union of Continental Navigation [3)]
T:+32 92 51 12 01
W: www.ucv-vzw.be

DPVNI, Service Public de Wallonie [4)]
T: +32 42 20 87 20
W: http://voies-hydrauliques.wallonie.be

Fedil 2)
Business Federation Luxembourg
T: +352 43 53 66-1
W: www.fedil.lu

Dutch Organizations

Central Bureau for Rhine and Inland navigation [3)]
T: +31 10 798 98 00
W: www.cbrb.nl

Dutch Association of Insurers, Transport department [1)]
T: +31 70 333 85 00
W: www.verzekeraars.nl

Dutch Inland navigation Information Agency [4)]
T:+31 10 412 91 51
W: www.bureauvoorlichtingbinnen-vaart.nl

FOV, Federation of Mutual Insurance Companies in the Netherlands [1)]
T: +31 30 656 71 60
W: www.fov.nl

NBKB, Dutch Association for Inland Navigation Inspection [1)]
T: +31 10 411 60 70
W: www.nbkb.nl

NPRC, Commercial partnership for inland waterway transport[1)]
T: +31 78 789 09 00
W: www.nprc.nl

Royal Barge Owners Association Schuttevaer[4)]
T:+31 10 412 91 36
W: www.koninklijkeschuttevaer.nl

BinnenvaartBrancheUnie Association for inland navigation
T: +31 10 206 06 00
W: www.binnenvaartbrancheunie.nl

German / Austrian / Swiss organizations

Bundesverband der Deutschen Binnenschiffahrt e.V. [3)]
T: +49 20 38 00 06 50
W: www.binnenschiff.de

Bundesverband der Selbständigen, Abteilung Binnenschiffahrt
T: +49 302 80 49 10
W: www.bds-dgv.de

Berufsgruppe Schiffahrt Wirtschaftskammer Österreich [2)]
T: +43 59 09 00 31 70
W: www.wko.at

Gesamtverband der Deutschen Versicherungswirtschaft [1)]
T: +49 30 20 20 50 00
W: www.gdv.de

Verein für Europäische Binnen-schiffahrt und Wasserstraßen e.V.
T: +49 20 38 00 06 27
W: www.vbw-ev.de

Via Donau Wasserstraßen Gesellschaft [4)]
T: +43 50 432 11 000
W: www.via-donau.org

Schweizerische Vereinigung für Schiffahrt und Hafenwirtschaft [3)]
T: +41 61 631 29 19
W: www.svs-online.ch

French organizations

Bureau Veritas [1)]
T: +33 800 43 42 41
W: www.bureauveritas.fr

CAF, Comité des armateurs Fluviaux [3)]
T: +33 14 260 36 18
W: www.caf.asso.fr

Féderation Française de Sociétes d'Assurances [1)]
T: +33 14 247 90 00
W: www.ffsa.fr

Voies Navigable de France [4)]
T: +33 32 163 24 30
W: www.vnf.fr

Central and East European organizations

AVP-CZ 2)
T:+42 48 512 24 605
W: www.avpcz.cz

CRUP, Inland Navigation Development Centre [4)]
T: +385 16 31 44 45
W: www.crup.hr

AAOPF
Danube information and development
W: www.aaopf.ro

Note:
1) Member of IVR
2) Member of European Barge Union (EBU)
3) Member of IVR and EBU
4) Member of Inland Navigation Europe

Colophon

A publication of Dutch Inland navigation Information Agency (BVB)
PO Box 23005
3001 KA Rotterdam
Vasteland 12e
3011 BL Rotterdam
The Netherlands
T: +32 10 412 91 51
Fax: +32 10 433 09 18
www.bureauvoorlichtingbinnenvaart.nl
info@bureauvoorlichtingbinnenvaart.nl
@BVBinnenvaart

In cooperation with IVR
PO Box 23210
3001 KE Rotterdam
Vasteland 12e
3011 BL Rotterdam
The Netherlands
Phone: +31 10 411 60 70
Fax: +31 10 412 90 91
www.ivr.nl

Design and layout
Wubbe, www.wubbe.nl

Printed by
Samplonius & Samplonius BV

Development and coordination
M.A. Rook-Poetsma, W.T.G.A. Volker, S. le Sage, P. J. Figee

Text
MG Redacties

Initiative
C.J. de Vries (BVB)

This publication was made possible by:

Bureau Voorlichting Binnenvaart

European Barge Union

Stichting Watertransport

Nederlandsch BinnenvaartBureau

+ 500 inland navigation entrepreneurs

Take The Blue Road