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THE POWER OF INLAND NAVIGATION

The future of freight transport and inland shipping in Europe 2010 - 2011

Colophon

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Post script fourth edition

Halfway through 2008, large parts of the world got hit by the credit crisis, followed by a decrease in economic activity and world trade by 15 to 20 percent in the first quarter of 2009. Goods transport across world seas, transhipment in maritime ports and the hinterland transport from maritime ports were as a result confronted by a sudden decrease in goods transport. At the going to press of this book, the figures could not yet be processed. Most transport statistics have a processing time of more than a year.

Knowledge of previous recessions has taught us that world trade and goods transport after a recession always grow fast, beyond the level before the recession. In fact goods transport after a recession always plays catch up with extra growth during 1.5 years. Based on this we are confident that the future scenario's outlined in "The power of inland navigation" have sufficient reality value. In addition we express hope that the crisis will be in control soon and our initiatives may be able to contribute to this.

Producers of "The power of inland navigation" (April 2009)

Foreword

The shelves of an average modern supermarket carry 12 to 15 thousand different products. Europe's 460 million consumers consider this a perfectly normal situation, since scarcity is not known here. This raises the question: are we in our modern society sufficiently aware of the actual processes behind the seemingly endless supply of products? And is this something which can continue?

The law of economics dictates that the manufacture and transport of goods takes place at the lowest cost and the highest profit. However, the critical consumer increasingly demands sustainability and the guarantee that products are manufactured and transported under acceptable conditions. What can we do to contribute to these developments and meet these demands?

Traditionally, Northwest Europe is a trade region, due to the geographic position at the coast and in the delta of large rivers. This position has contributed significantly to the economic development of the region, but also led to the processing of physically large flows of cargo, of european origin and destination, through the ports of the Hamburg – Le Havre range. As a result, our resources and the environment are increasingly under pressure. This publication aims to illustrate these cargo flows and to highlight opportunities for making responsible choices and realizing sustainable growth.

We also asked ourselves whether the effects on a global scale of developments like globalization, can make a positive contribution to more sustainable living conditions, the distribution of wealth or the fight against social inequality. eventually we will answer these questions affirmatively, because the positive effects of globalization are deemed greater than the negative effects. still, much remains to be done. A time of recession has definitely started, and seemingly fixed values from the past are being replaced by uncertainty. New roads must be travelled in order to control the financial markets better. The crisis can also be an opportunity to re-assess our economic activities and the flows of goods which are connected to that and to examine whether there are inefficiencies.We hope this publication will contribute by offering new insights in the areas of transport and logistics.

This publication introduces a new view on logistics, whereby sustainable transport techniques will receive special attention. Using the so-called 80/20 method, coined by professors Fransoo and Kiesmüller of TU-Eindhoven in the Netherlands, the use of trucks will be reduced to a minimum and the alternatives of rail, inland shipping and shortsea transport will have extra room for development. Logistic advisors of our European organizations are armed with the expertise necessary to adequately guide enterprises in making these complex choices.

The development of future scenario's is based on studies in this field which have been conducted by the Royal Dutch Shell. The power of inland navigation is a publication of the Dutch Inland Shipping Information Agency (BVB), in cooperation with the European Barge Union (EBU) and the IVR. The publication is financially supported by the European Union and also made possible by the Expertise and Innovation Centre for Inland Hhipping (EICB). We would like to thank the central Bureau of statistics and the IVR for making the necessary data available to us.

C.J. de Vries
director Royal Schutevaer/secretary Bureau Voorlichting Binnenvaart

CHAPTER 1

Sustainable logistical processes.

1. Sustainable logistical processes.

Modern consumers put significant pressure on themselves and the environment. Our society has been structured in such a manner as to meet these high demands at the lowest possible effort and costs. And we have managed to take this very far. In fact, at any given moment of the day, in West Europe we can, if we so desire, access any product we demand. And mostly these products are available at any desired quantity. Hardly ever or never do we realize the considerable and complex organization necessary to grow, manufacture or alter these products and subsequently transport them to the desired location. The process of the source of a product leading to adaptation, packaging, storage, transshipment and transport to the final destination or consumer is called the logistic chain or supply chain.

Long ago at school we learnt that oranges come from spain, coffee from Brazil, olive oil from Italy (or greece), and tea from Ceylon. Would an average West european consumer be aware that asparagus for example might very well come from peru these days, flatfish (plaice) or shrimps from thailand or shoes and clothes from China or Vietnam? No, more and more people think milk, hamburgers and potatoes come from a factory nearby, without realizing the actual source of these products. This is partly understandable, because even though these products often have natural origins, nowadays they tend to form part of an advanced technical process. Before final products reach our stores they have travelled a long road. This publication follows the journey of these products across the world.

The scale at which some conglomerates produce indicates the involvement of a technologically advanced process. And in fact this is the case for most products which are sold, changed, packaged and sold again on a large worldwide scale by enterprises. There simply is no other system to feed every person in the western world. The advantage of this worldwide network of buying and selling goods through such a company is the guaranteed quality at a relatively low cost. Because bad quality would very quickly lead to the loss of reputation. The quality and food safety of our products is therefore much better now than decades ago. The information on the product, its origin, adaptation and nutritional value, is also ever increasing.

A nice example of this is salmon from norway. In the past, when salmon was still caught in the wild, the salmon had to be checked for taste and quality, before being sold. From these formerly caught in the wild, generally only one in three used to be of good quality. Most salmons sold in retail now were grown (in large, round, floating swimming basins drifting on the sea), which is why they are virtually identical in taste and quality. Their taste and quality in fact do not differ significantly from wild salmon, which in turn benefits from more protection in their natural habitat. Large shrimps and prawns are a hot item on the menu's of restaurants around the world. Whoever journeys through Thailand or Vietnam sees hundreds of grow ponds along the coast, where these shellfish generally come from. This explains why every day in all restaurants in the world sufficient salmon and prawns are available to satisfy our hunger. But it also works the other way around. On the West European market it is virtually impossible to sell a pig's ear or leg, but in parts of asia or africa these are considered a delicacy. so nowadays entire shiploads of legs and ears go from Europe to these continents!

When a farmer in Nigeria or Peru grows spring onions or asparagus for retail in West Europe, this means a transference of a piece of wealth to Africa or South America. Modern techniques make it possible to transport products which are manufactured elsewhere in the world, and to transport them under climatologically advantageous conditions, so that the ripening process can be interrupted during transport. Because of this, supermarkets are able to offer many fresh exotic fruits and vegetables in the past few years.

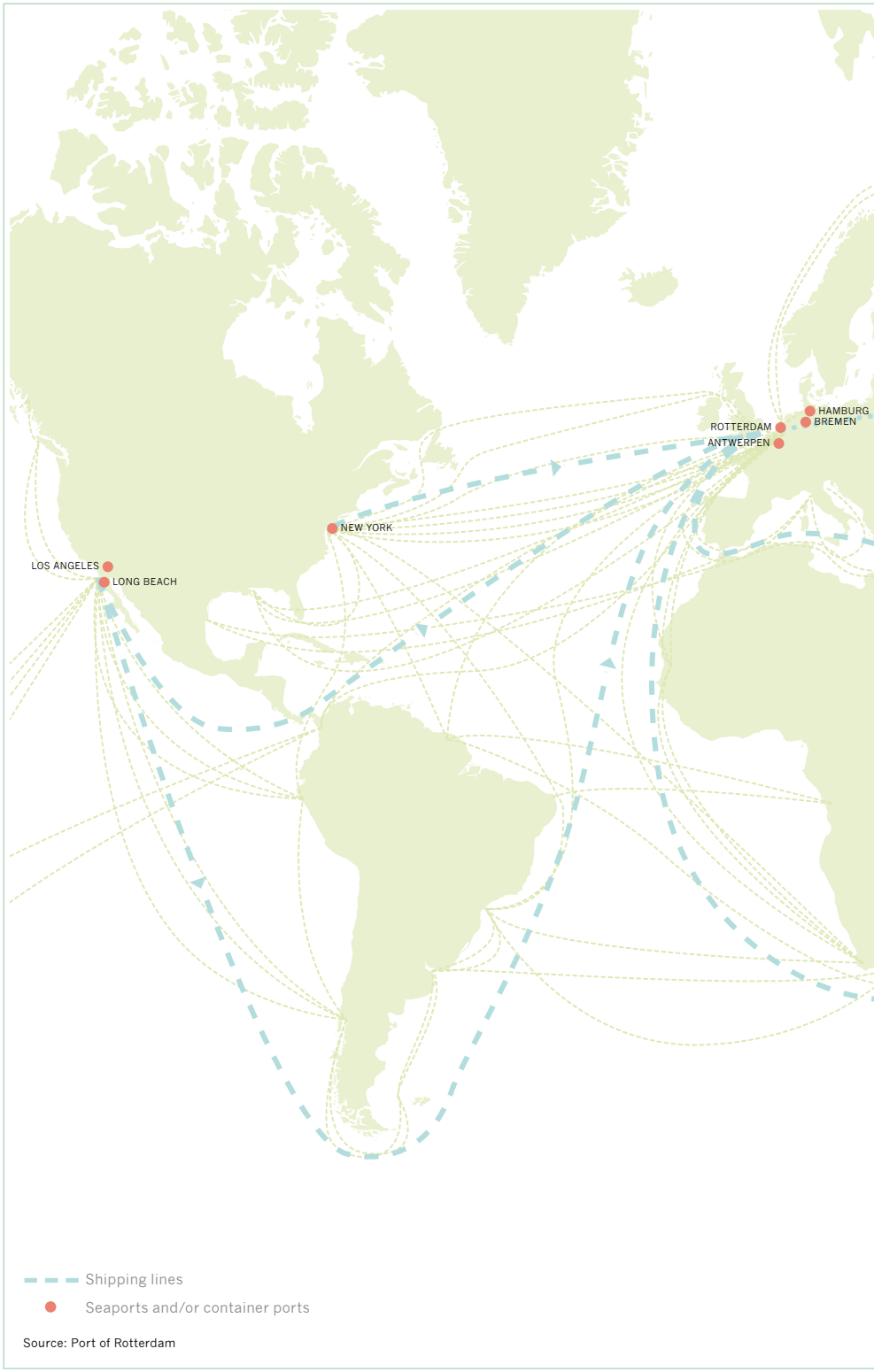
The term “logistic” stems from the science of warfare but has also been used from 1970 to plan and execute transport services. In short, it is the execution of all activities to move a product from its origin to its final destination. Companies specialized in this call themselves “Logistic service provider”. Movements of goods within a company are called “internal logistics”. Logistics nowadays is a separate and valuable branch of science. The top ten best logistical countries in the world are: Singapore, the Netherlands, Germany, Sweden, Austria, Japan, Switzerland, Hongkong, the United Kingdom and Canada. Belgium, France and Italy take 13th, 18th and 22nd place (source: World Bank).

The world has gotten smaller in many ways and not only because of Internet. It actually does not matter anymore where you grow or manufacture something in the world, because the maritime transport costs per product are so low that the West European consumer will hardly notice it in the retail price. In the meantime, the factory now stands in Asia, especially in China, Vietnam and India, but also closer to home in Eastern Europe. Furthermore, the south American countries are promising for the future. And for now, this is unlikely to change, despite the economic challenges posed by global (financial) crisis. If we wish to keep feeding almost five billion people in this world, spreading of manufacture becomes a necessity. Transport then of course becomes indispensable.

Halfway through 2008, large parts of the world were affected by the financial crisis, followed by a decrease in economic activity and world trade by 15 to 20 percent in the first quarter of 2009. Goods transport across world seas, transshipment in maritime ports and the hinterland transport from maritime ports were as a result confronted by a sudden decrease in goods transport. Knowledge of previous recessions has taught us that world trade and goods transport after a recession always grow fast, beyond the level before the recession. Goods transport after a recession always plays catch up with extra growth during 1.5 years. The future scenario’s outlined in this book are therefore also in times of recession sufficiently relevant.

We have only discussed a fraction here of the products and cargo which are transported across our globe on a daily basis. As more parts of the world become involved in the manufacture and growth of the products we purchase, eventually a better distribution of wealth will follow. In theory, the production on a global scale would have to bring in enough to be able to feed and clothe all of humanity. the problem lies in the distribution. By spreading the manufacturing more globally, more opportunities than threats ensue for the areas which have been left behind. By making conscious choices as a critical consumer and by making demands about the quality and the manner of manufacturing we can prevent negative effects and excesses.

The world's largest seaports and container ports, 2007



Source: Port of Rotterdam

Global trade determines the worldwide maritime flow of goods. Increases in the scale in the maritime shipping sector have resulted in such low transport fees that the question of where in the world goods are manufactured has become subsidiary. Strikingly, more than half of the largest ports are situated in Asia. Chinese ports in particular are remarkably.

Goods transhipment, gross weight x 1 million tonnes

Shanghai *	561	Qingdao	265
Singapore	483.6	Hongkong *	245
Rotterdam	406.8	Dalian	220
Ningbo	344	Shenzhen	199
Guangzhou	340	Nagoya	197.8
Tianjin	309	Antwerpen	182.9

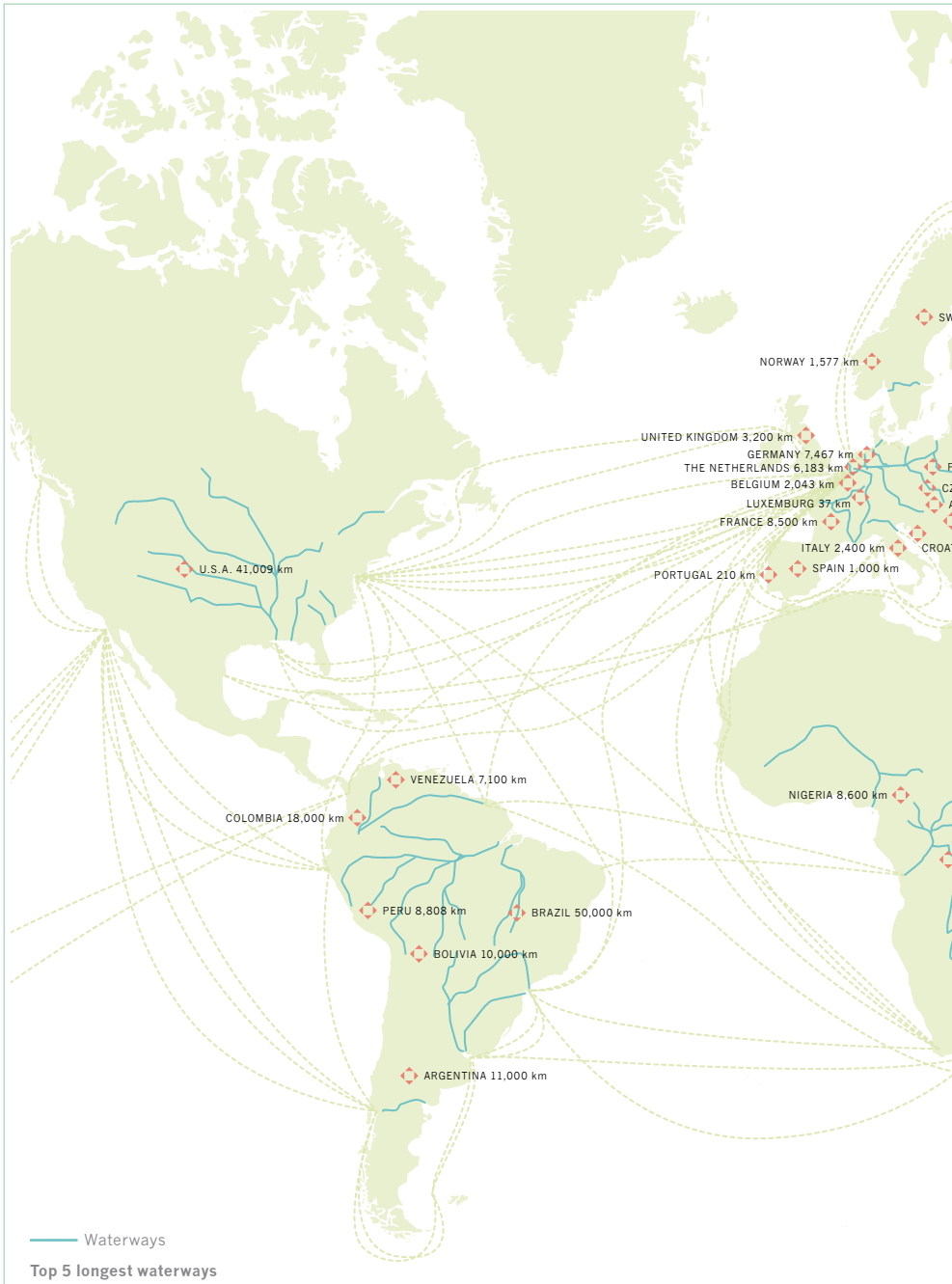
Container transhipment, x 1,000 TEU's

Singapore	27.932	Dubai	10,653	Los Angeles	8,355	New York	5,400
Shanghai *	26,150	Kaohsiung	10,257	Antwerpen	8,176	Bremen	4,912
Hongkong *	23,881	Hamburg	9,890	Long Beach	7,312		
Shenzhen	21,099	Qingdao	9,462	Kelang	7,118		
Busan	13,260	Ningbo	9,360	Tianjin	7,103		
Rotterdam	10,791	Guangzhou	9,200	Tanjung	5,500		

* Inc. Inland shipping

Branded products of western origin often have relocated part of their production capacity to Asia. From Asian factories, goods are shipped in containers across the world, along standard maritime routes. About half of them take a shortcut through the Suez Canal. Vessels that are too large for the locks in the Suez canal take the longer route around Africa.

Total length of navigable waterways per country



Waterways

Top 5 longest waterways

China	124,000 km
Rusland	102,000 km
Europa	51,668 km
Brazilië	50,000 km
Verenigde staten	41,009 km

Source: Nation Master 2008

The waterways network in the European Union represents 5,668 kilometres of canals, rivers and lakes, of which around 20,000 kilometres is concentrated primarily in the zone with the busiest waterways, i.e. the Netherlands, France, Germany, Belgium and Austria.

Over 50 countries around the world have navigable waterways networks of more than 1,000 kilometres. On most of these waterways, the inland shipping sector is underdeveloped. China takes the lead, with more than 110,000 navigable kilometers. The European inland shipping sector appears to be able to deliver an export product to the rest of the world in a growing number of cases.

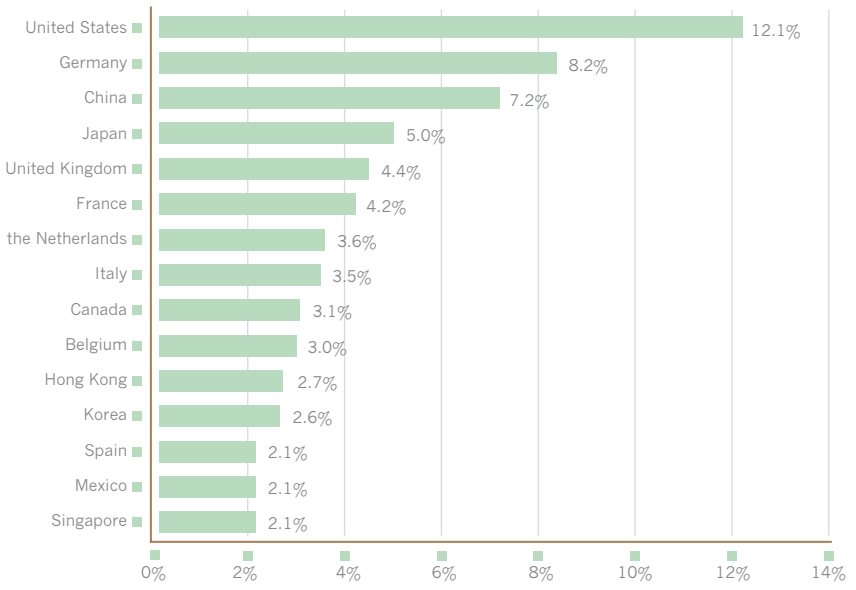
The world's largest cities, 2006

Source: City mayors Statistics

NB: Population size within cities and the surrounding urban areas

Large civilizations have come and gone throughout the centuries. Recently, the balance has tipped to Asia and the USA. This has consequences for the economy and the flow of goods in West Europe as well.

Contribution to global trade per country, 2006

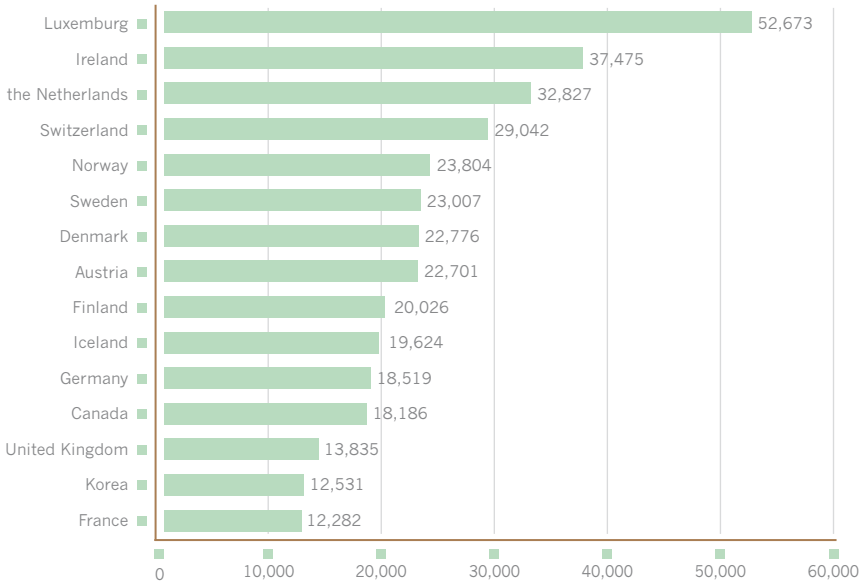


Source: World Trade Organisation

NB: Only WTC-countries are included

Among the top 10 trading countries in the world are seven European countries. Together, these seven countries account for 27 percent of the total global trade.

Trade of goods per capita, 2006

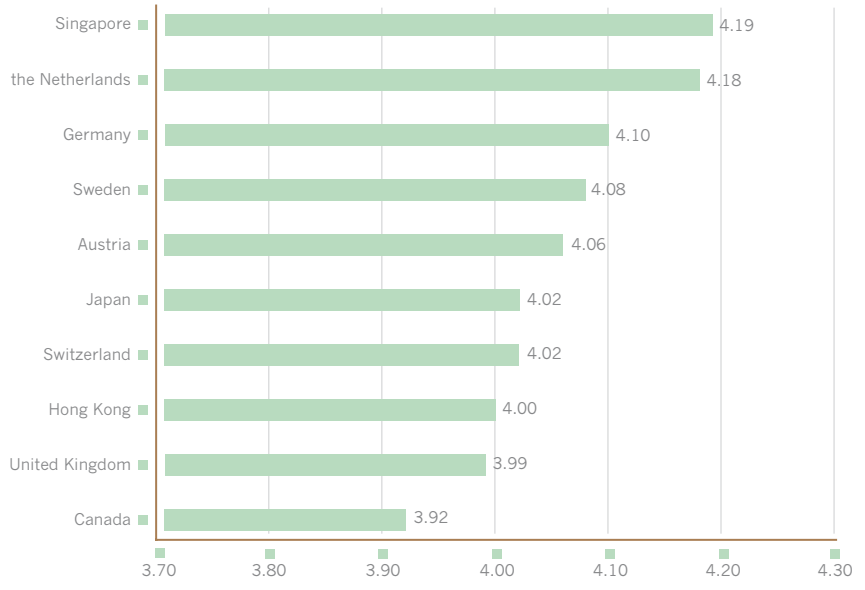


Source: nationmaster.com

Unit: trading value in dollars

The Dutch have a thing for transport and water. Because of its favorable position and its good hinterland connections, the Netherlands has become a choice location for many large European distributors.

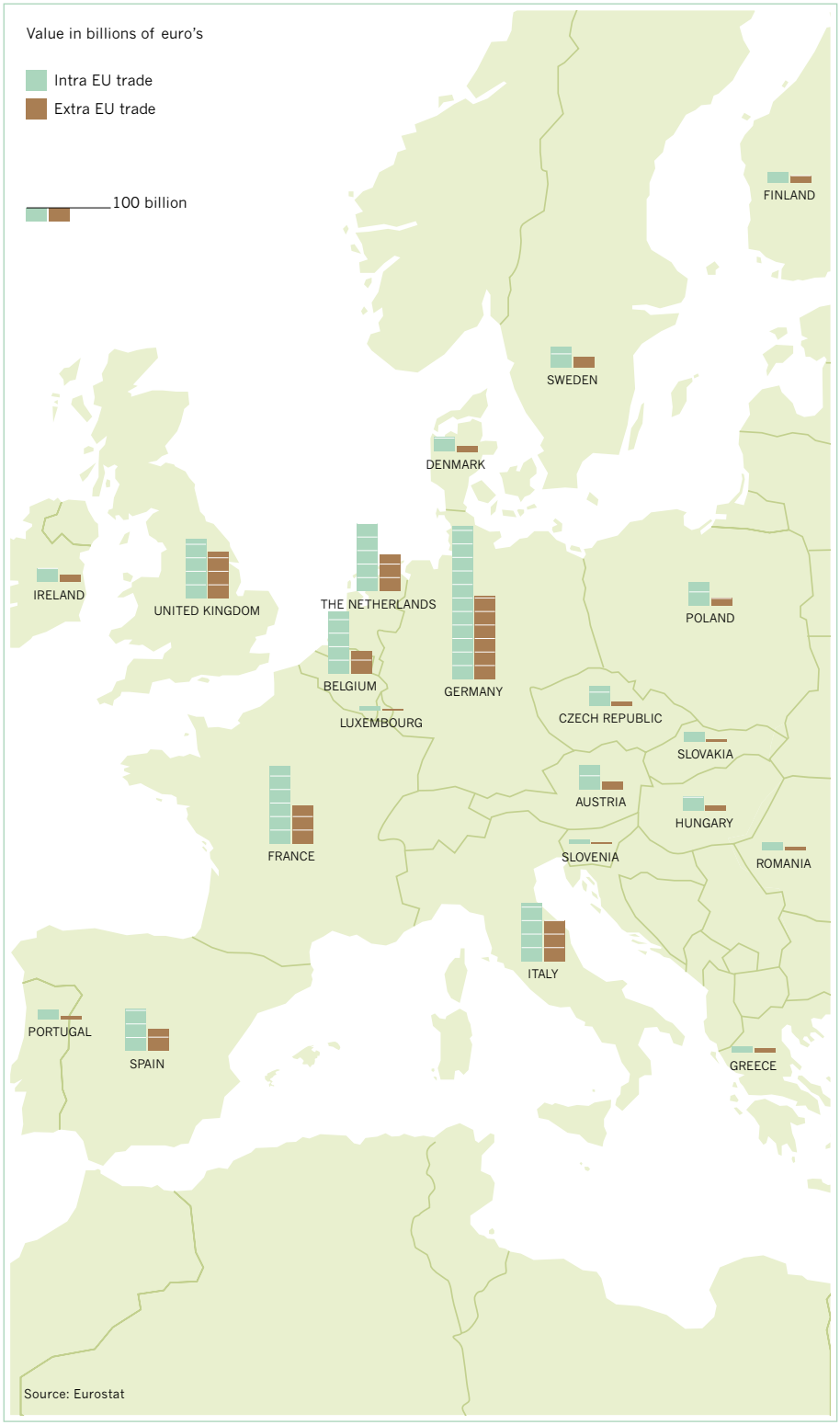
Logistical performance index, 2007



Source: World Bank

The logistical performance index evaluates logistical achievements in 150 countries, based on global research. The Netherlands has the highest score in Europe, in terms of efficiency and effectiveness of customs and other procedures at its borders, the quality of transport and the ICT infrastructure permeating logistics.

European trade, 2007



Large countries like Germany, France and the United Kingdom dominate European trade. However, a number of smaller countries like Belgium and the Netherlands also show relatively large trade volumes.

CHAPTER 2

Sustainable development is a conscious choice.

2. Sustainable development is a conscious choice.

Just like the climate is always a subject to change, the level of wealth of a population also changes constantly. It is rare for a civilization to experience more than two hundred years of economic boom. Chances of getting a boom start with advantageous circumstances and with people who make conscious choices. The presence of water is almost always decisive in this case. Recently, other regions of the world have seen much faster population growth than West Europe. Eventually this will lead to economic areas shifting in the direction of these concentrations of people, because where many people live, new developments will follow.

Great civilizations in the past almost always arose at sea, or at least a river. The sea and the rivers have been used as a trade route for cargo since the beginning of this era. Roads and railways were only added later. A vessel is therefore the oldest transport modality. The maritime shipping sector remains an important cork on which the world economy stays afloat, and still to this day 50 percent of the world population lives next to delta's, coastal areas and river estuaries.

An ever increasing part of the products we use every day are delivered from across the sea. Only a fraction of the world trade flows of cargo takes place by airfreight. Every hour an average of 1,000 containers is loaded or unloaded in our seaports (double the quantity of ten years ago). After 2020 this number is expected to have tripled.

2009 represents a period during which the global crisis led to a significant decrease in maritime container transport, probably by 15 to 20%. All precious crisis situations after 1945 never led to a decrease in the total goods transport by more than 20%. The need for basic products destined for consumption will remain unchanged even in crisis situations. The crisis is most felt in the motorcar supply industry (steel sector) and the iron ore transport which is dependent on it, followed by the building sector and the transport of sand and gravel which depends on it. At the going to press of this book the first indicators of recovery have been seen.

The flow of cargo across the world is limited to several large main routes. On the routes Asia – Middle east – Europe, the ports (of origin) Shanghai en Shenzhen in China, as well as Rotterdam, Hamburg, Antwerp and Le Havre in Europe are considered the largest transshipment ports. As transit ports the positions of Hong Kong, Singapore and Dubai are remarkable. They are the logistic hubs turning the flows of cargo in the world around and have in time undergone an incredible "boost". Dubai is especially remarkable because this port managed to attain the position of transit point in many areas, within just ten years. Being an important link in the chain of worldwide networks brings a number of complementary activities with it, like the establishment of main offices of international enterprises and tourism, as well as additional employment opportunities and financial services.

On the European mainland the situation of Rotterdam is comparable to that of Hong Kong and Singapore in Asia. The ports serve a need for the delivery and transit of flows of cargo from all of Northwest Europe and therefore are attractive in many other ways, for example as choice location for head offices and distribution centres. The ability of countries to differentiate on these factors is however decreasing.

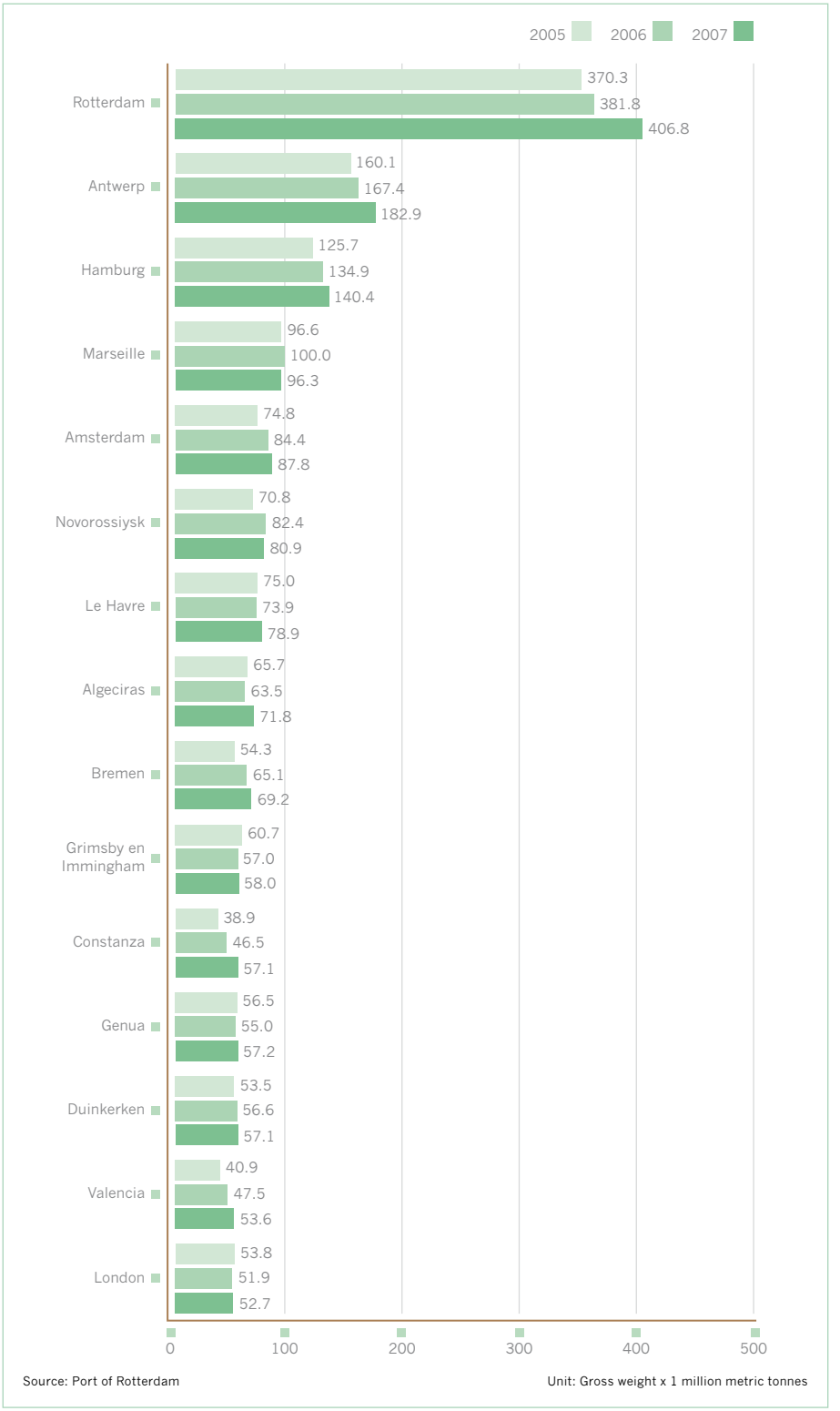
The great advantage of Rotterdam lies in the possibility to handle the deepest maritime vessels in the world and carry out the hinterland transport due to its exceptional geographic location at the mouth of the large European rivers Rhine and Maas. Rotterdam, but also Antwerp and Amsterdam, can therefore access unlimited possibilities for transport by water, like across the river Rhine. If the Rhine for example had flooded into the sea by Hamburg, then Hamburg would have been the largest port in Europe. It would simply be impossible to transport the annual volume of goods from the Rhine (300 million tonnes) as is the current situation via railways or the road, via one of the other ports within the Hamburg · Le Havre range. In China the incoming and outgoing flow of goods across water plays a comparable role to that of Northwest Europe.

The beneficial geographic situation at the coast and the combination with the transport via the Rhine provide Rotterdam, Amsterdam and Antwerp a great natural advantage to other seaports in this European region. On other matters (road and rail connections) many services and opportunities are equal in European seaports. In the future this means little or none physical obstacles to let the transport via European rivers grow even faster. As for the Rhine, according to research, we utilize less than a quarter of the available capacity. Therefore, many decades of sustainable growth of transport via Northwest Europe is possible, without having to invest in extra road building.

Via the Rhine and its adjacent rivers and canals the industrial areas of North and South Germany, North Switzerland and Northeast France are within reach to large vessels. Via the Maas and adjacent navigable waterways in Belgium, Luxembourg and North France are opened up to larger vessels. The other industrial areas in France can be reached with smaller vessels. The French government intends, with European support, to construct a new channel for large vessels between Paris and Antwerp, the Seine·North connection.

Ships can reach the Danube from the Rhine via the Main·Danube channel. This means that also the larger industrial areas in Austria, Czech Republic, Hungary, Croatia, Serbia, Romania and Bulgaria can be reached with larger vessels across water. Via the Elbe and the Oder the industrial areas in Austria, Germany, Poland and Czech Republic are within reach. The plan exists to connect the Elbe and Oder via a new channel with the Danube in order to create a new trans·European shipping line. Other countries in Europe which boast inland shipping are Italy, Finland, Sweden, Russia and Ukraine. However these pertain to isolated national waterways networks which (except maritime) have no connection with the European network. Outside Europe there are more than 30 countries in the world which have opportunities to utilize inland shipping at a much larger scale for the transhipment of cargo.

Principal European seaports, goods 2005 - 2007

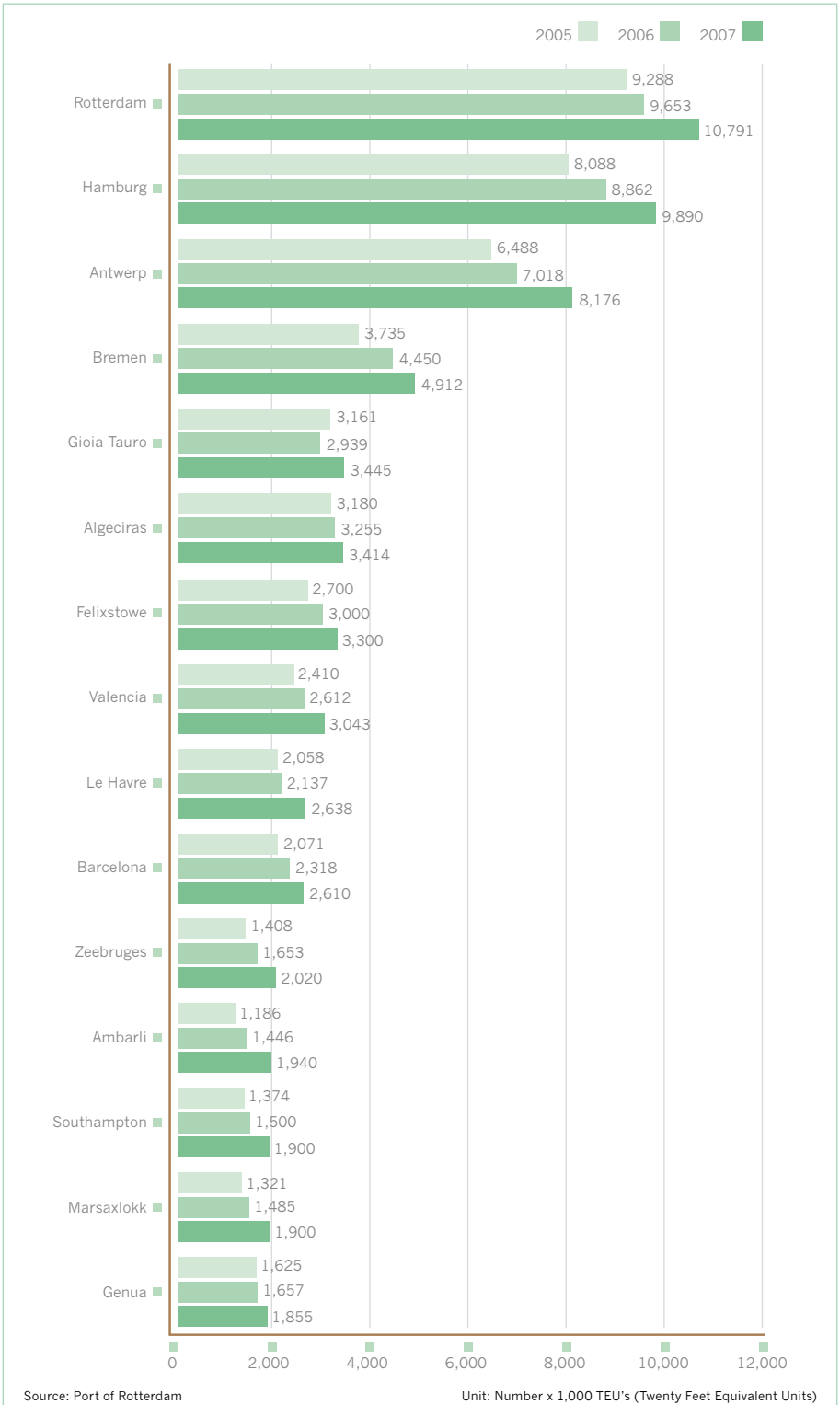


Source: Port of Rotterdam

Unit: Gross weight x 1 million metric tonnes

Rotterdam is Europe's largest transhipment port and will remain so in the future. The reason lies in the possibility to handle the deepest maritime vessels. The port can also carry out the hinterland transport, largely without any capacity restraints, across the Rhine and its connecting waterways, to deep into Europe, without encountering traffic jams.

Principal European container ports, 2005 - 2007



Source: Port of Rotterdam

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

Remarkably, the majority of maritime vessels opt for ports on the North Sea for distributing goods throughout Europe. Rotterdam, Hamburg, Antwerp and Amsterdam are capable of penetrating beyond their national borders deep into Europe. The other ports primarily fulfill national/regional functions.

All freight flows within Europe (road, rail, water and pipelines)

Nowhere else in the world are freight flows concentrated as massively as on the Rhine. This made it possible for the Netherlands to become the gateway to Europe. The Rhine's reserve capacity (700%) and that of the other waterways (100%) will ensure that a significant increase in transport volumes over the waterways network can be handled without difficulty for many years to come.

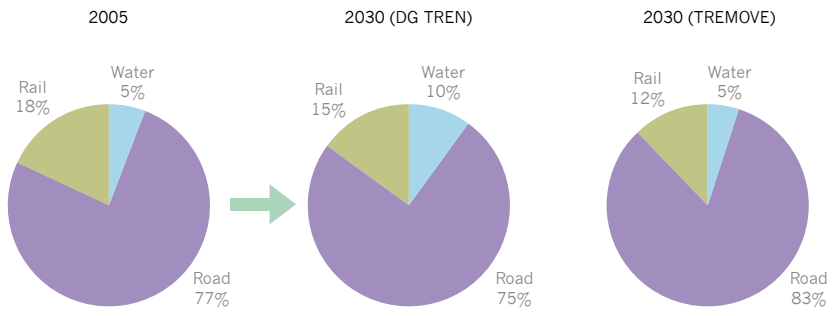
Tonnage shipped	Tonnes by water	Shares		
		Road	Water	Rail
EU 25 (2005)	467 million tonnes	89%	3%	8%

Transport performance	Cargo tonne-km by water			
EU 27 (2006)	138 billion tkm	76%	6%	18%

Projected European transport performance 2030				
	Expected total transport performance all modalities			
DG TREN model	3800 billion tkm (+52% vs 2005)	75%	10%	15%
TREMOVE model	3800 billion tkm (+52% vs 2005)	83%	5%	12%

Growth European inland shipping	
1995 - 2006	+ 14,5% (+ 17 billion tkm)
2005 - 2030 (DG TREN)	+ 175% (+ 242 billion tkm)
2005 - 2030 (TREMOVE)	+ 38% (+ 52 billion tkm)

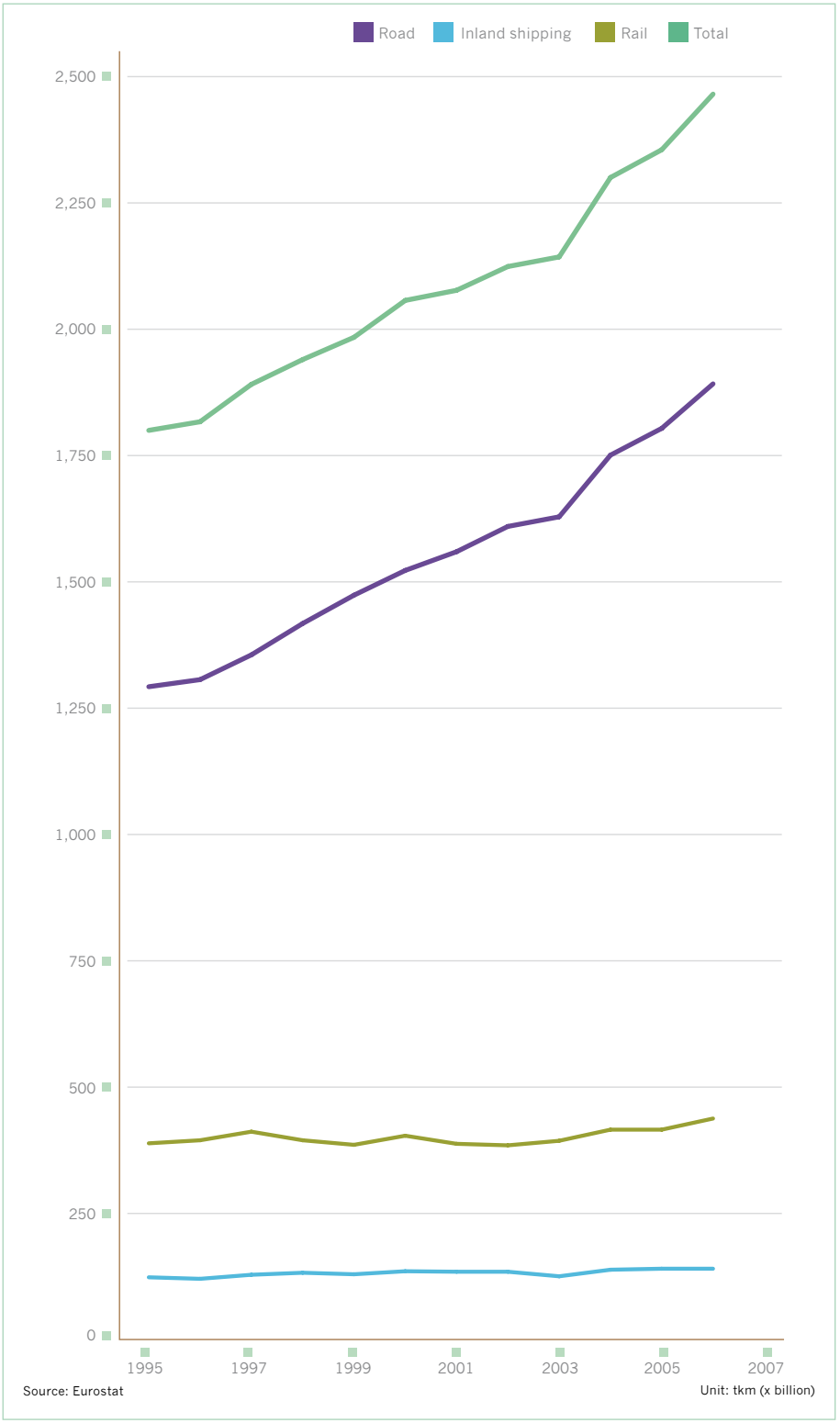
Modal split scenarios in European transport performance in 2030



Source: Eurostat, CE Delft, edited by BVB

Several models have come up with growth projections in European freight transport. Where they tend to differ is in how this growth will translate across the different modalities. Expectations are that European inland shipping will grow by at least 38% versus current transport performance until 2030.

EU27 transport performance by modality



Growth in freight transport is inextricably linked to economic growth. Based on this trend, predictions are that freight transport will double until 2020.

Modal split per EU country, 2006 (all enterprises)

	Road	Inland shipping	Rail
Belgium	43.02	8.91	8.57
Bulgaria	13.77	0.79	5.40
Czech Repulic	50.38	0.04	15.75
Denmark	21.25	-	1.89
Germany	330.02	63.98	107.01
Estonia	5.55	-	10.42
Ireland	17.45	-	0.21
Greece	34.00	-	0.66
Spain	241.79	-	11.63
France	211.45	9.01	40.92
Italy	220.40	0.10	24.17
Cyprus	1.17	-	-
Latvia	10.75	-	16.83
Lithuania	18.13	-	12.90
Luxembourg	8.81	0.38	0.44
Hungary	30.48	1.91	10.17
Malta	0.25	-	-
The Netherlands	83.19	42.31	5.32
Austria	39.19	1.84	20.98
Poland	128.32	0.29	53.62
Portugal	44.84	-	2.43
Romania	57.29	8.16	15.79
Slovenia	12.11	-	3.37
Slovakia	22.21	0.11	9.99
Finland	29.72	0.07	11.06
Sweden	39.92	-	21.96
United Kingdom	172.18	0.16	23.12

Source: Eurostat

Unit: million tkm

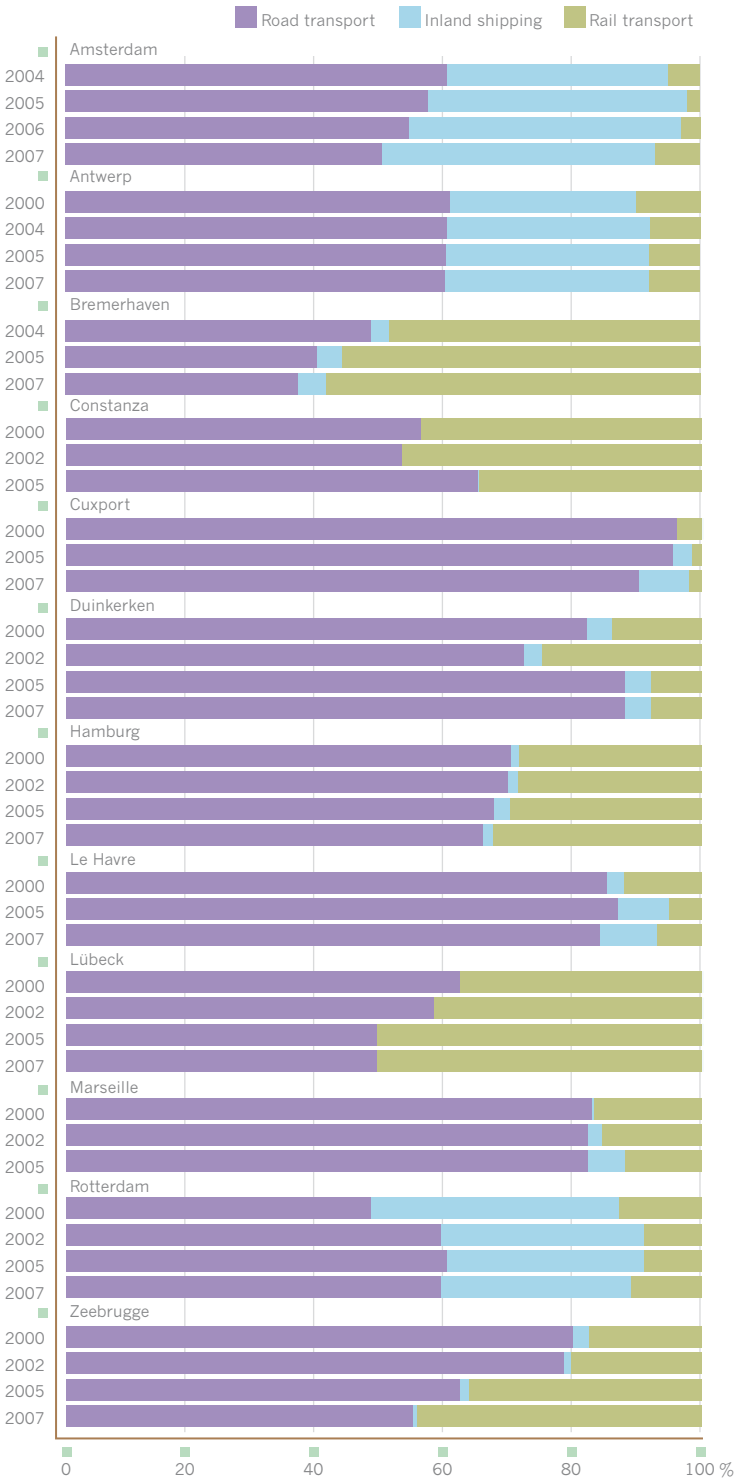
Road transport takes the biggest share of transport performance in all European countries. In Germany, the Netherlands, Belgium, France and Romania however, inland shipping accounts for a considerable share of transport performance.

Map of EU navigable waterways

The largest navigable waterways in Europe are the Rhine and Danube. The network of channels and rivers enables the inland shipping sector to cover a large part of Europe. Historically, principal industrial sectors have located near navigable waterways.

Industrial focal points will be situated here well into the future. Excepting Munich and Zurich, all main industrial regions are within reach using inland shipping.

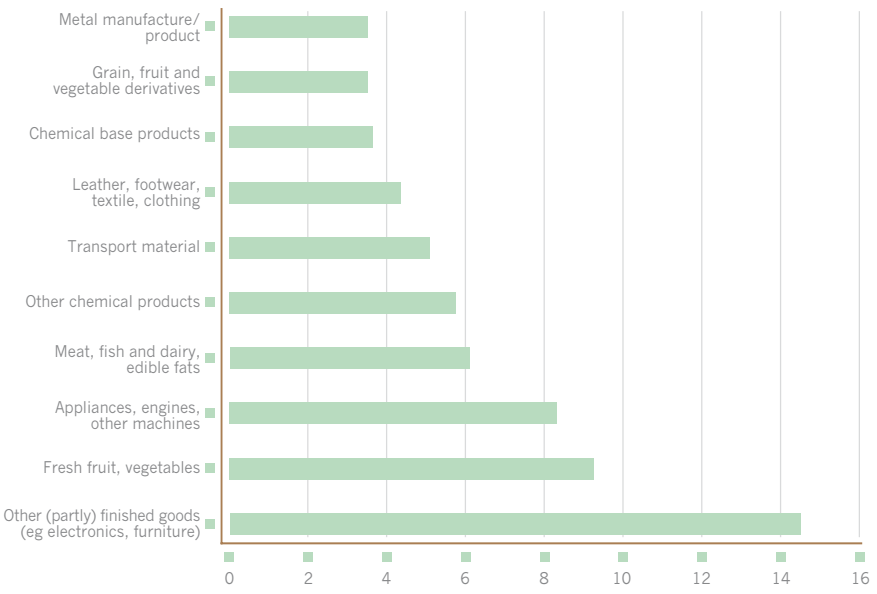
Modal split hinterland container transport of EU-ports



Source: Schiffahrt Hafen Bahn und Technik

At every seaport, 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, Antwerp and Amsterdam the emphasis lies on inland shipping instead.

Top ten groups of cargo in maritime container transport, 2007

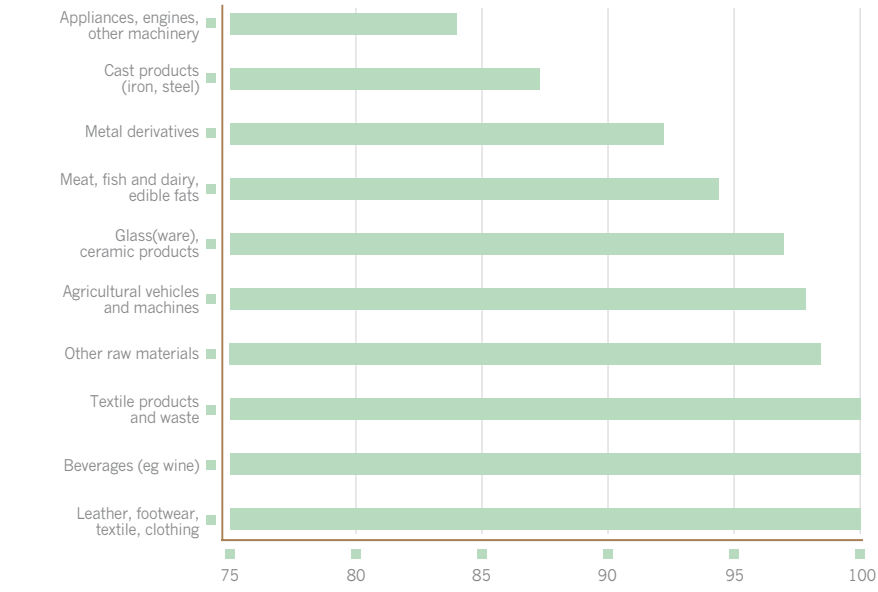


Source: CBS

Percentage of total

More than half of the container goods consist of products destined for daily usage. In April 2007 more than 200 thousand containers deposited on Dutch quays were assessed on their exact contents. Over 14 percent of the containers were filled with consumer electronics, furniture and other home products. In addition, containers were mostly filled with food stuffs like fruit, vegetables, meat, fish, dairy and grains. Another large part of container goods consisted of clothing, footwear and small utility goods.

Top ten groups of cargo most often transported in maritime containers, 2007



Source: CBS

Percentage transported in containers

In 2007, products like shoes and clothing generally entered the Netherlands in containers. This is also the case with beverages such as wine. Nearly 95 percent of meat, fish and dairy products were packed in containers.

Container transhipment terminals for inland shipping in Europe

Source: Schiffahrt Hafen Bahn und Technik 2006, edited by BVB

In the hinterlands of North Sea ports, container transhipment terminals are concentrated along waterways. This insures cheap incoming and outgoing flows and 'just-in-time' transport. Vessels are best equipped to be on time.

	Road		Inland shipping		Rail		Total
	TEU	percentage	TEU	percentage	TEU	percentage	
Germany							
Andernach*	19,048	38.1%	30,830	61.7%	57	0.1%	49,935
Aschaffenburg	0	0.0%	8,791	100.0%	0	0.0%	8,791
Berlin	18,826	26.4%	0	0.0%	52,531	73.6%	71,357
Bonn	No data	No data	No data	No data	No data	No data	195,281
Braunschweig	1,653	2.8%	41,461	69.6%	16,442	27.6%	59,556
Brunsbüttel	5,426	31.5%	11,793	68.5%	0	0.0%	17,219
Cologne	No data	No data	No data	No data	No data	No data	573,475
Deggendorf	5,950	72.7%	0	0.0%	2,234	27.3%	8,184
Dörpen	0	0.0%	23,221	38.6%	36,999	61.4%	60,220
Dresden/Decin	1,377	4.1%	6,829	20.5%	25,053	75.3%	33,259
Duisburg	893,000	49.8%	370,000	20.6%	531,000	29.6%	1,794,000
Frankfurt	0	0.0%	35,964	90.4%	3,800	9.6%	39,764
Gelsenkirchen	0	0.0%	822	100.0%	0	0.0%	822
Germersheim	No data	No data	No data	No data	No data	No data	226,256
Gernsheim **	0	0.0%	46,038	100.0%	0	0.0%	46,038
Glückstadt	3	0.7%	425	99.3%	0	0.0%	428
Halle/Saale	12,317	34.1%	0	0.0%	23,824	65.9%	36,141
Hannover	1,622	3.6%	20,362	44.9%	23,366	51.5%	45,350
Herne	0	0.0%	0	0.0%	40,610	100.0%	40,610
Karlsruhe	55,179	58.9%	38,464	41.1%	0	0.0%	93,643
Kehl	3,040	18.7%	10,302	63.2%	2,953	18.1%	16,295
Kehlheim/Donau	0	0.0%	2,470	58.7%	1,739	41.3%	4,209
Koblenz	33,993	39.8%	51,009	59.7%	503	0.6%	85,505
Krefeld	0	0.0%	0	0.0%	204	100.0%	204
Ludwigshafen	0	0.0%	60,292	76.3%	18,709	23.7%	79,001
Magdeburg	No data	No data	No data	No data	No data	No data	9,840
Mainz	No data	No data	No data	No data	No data	No data	112,793
Manheim	0	0.0%	108,066	70.9%	44,247	29.1%	152,313
Minden	13,490	46.5%	9,736	33.6%	5,780	19.9%	29,006
Switzerland							
Basel	0	0.0%	104,366	100.0%	0	0.0%	104,366
Belgium							
Brussels	0	0.0%	17,000	100.0%	0	0.0%	17,000
Liège	201	0.9%	17,138	79.8%	4,145	19.3%	21,484
France							
Lille	39,273	47.2%	43,898	52.8%	0	0.0%	83,171
Lyon	68,687	47.5%	57,567	39.8%	18,391	12.7%	144,645
Mulhouse Ottmarsheim	50,597	42.3%	53,893	45.1%	15,028	12.6%	119,518
Austria							
Enns	93,793	52.3%	996	0.6%	84,425	47.1%	179,214
Krems***	41,622	49.5%	872	1.0%	41,622	49.5%	84,116
Linz	102,199	46.9%	2,879	1.3%	112,646	51.7%	217,724

* 2005 instead of 2007
** no data on road and rail transport
*** combined data road and rail transport

Source: Schiffahrt Hafen Bahn und Technik

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

New waterways

The Alps form a natural barrier to inland shipping. Constructing two new North-South connections will enable the completion of the Trans-European waterways network. Recently the decision has been made to construct the Seine North connection, which enables larger ships to sail from the Netherlands and Belgium to Paris.

HOOFDSTUK 3

Europe chooses the sustainability of inland shipping

3. Europe chooses the sustainability of inland shipping.

Inland shipping will take up a special position in Europe in the near and distant future. Being the most sustainable method of transport, the inland vessel can increasingly pose an alternative to road transport, without the ill effects of traffic jams, environmental taxation, traffic risks or noise pollution. There are no traffic jams on water ways and a ship expels three to six times less CO_2 per transported unit compared to road transport. Whoever chooses energy efficient transport could not wish for a better partner than the inland vessel. On the short and long term therefore, the choice for inland shipping is a good choice.

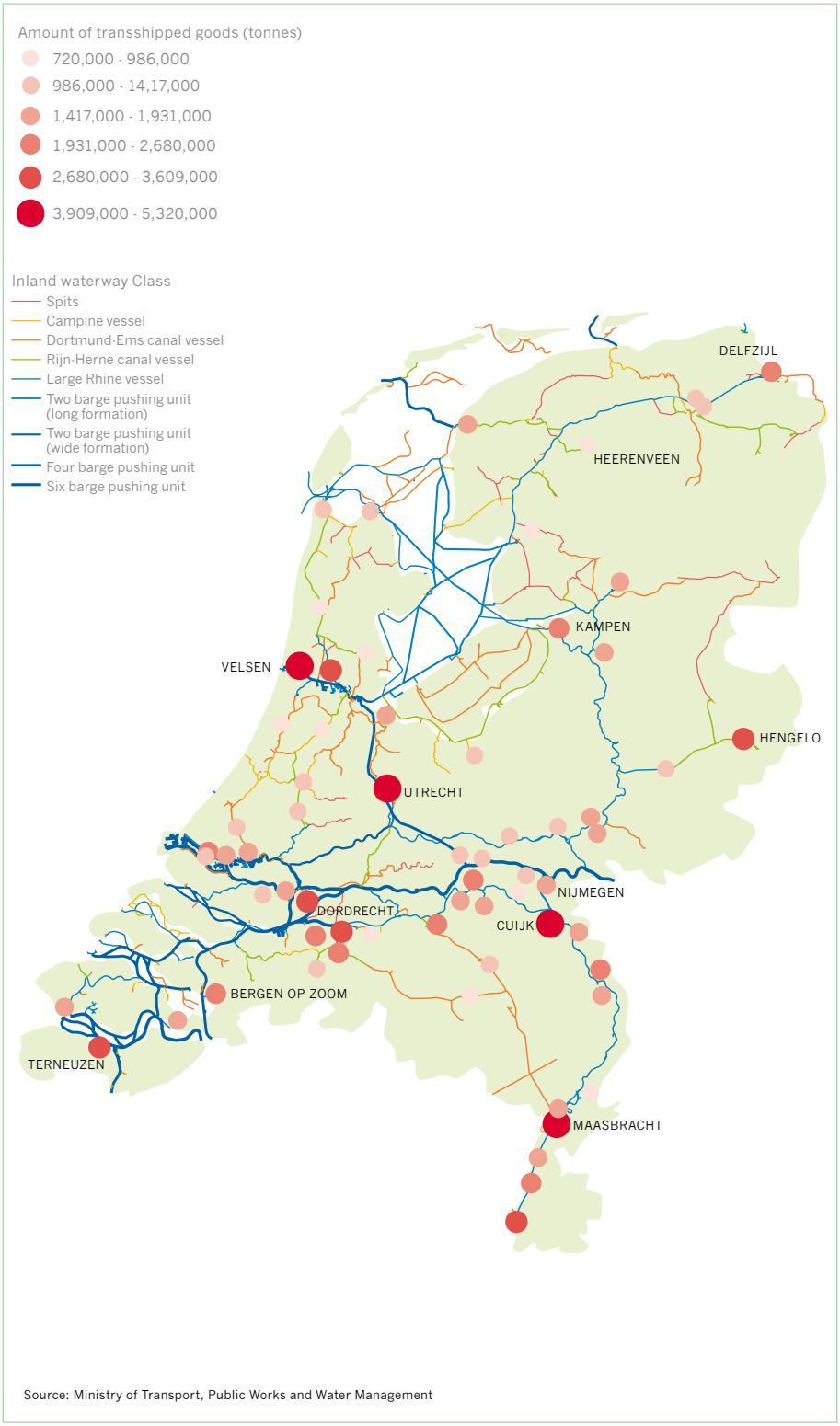
Three quarters of European inland shipping takes place on the river Rhine, from its source in Switzerland, running to the sea via France, Germany and the Netherlands. As such, the Rhine is the main artery and gateway to Europe in terms of goods transport. The Netherlands and Belgium are countries containing tight mazes of navigable waterway networks, unlocking all industrial regions. The same holds true for the north of Germany and the north of France. All greater industrial areas of Germany and France are unlocked by navigable waterways, excepting the surrounding areas of Munich. Where ever navigable waterways are lacking, it follows logically that industry in those areas does not exist.

The biggest European waterway project is currently being carried out in the north of France. A new major channel between the Seine and the "Schelde" (North-Seine) will in 2014 connect Paris to Belgium, the Netherlands and Germany across water. A second project is being prepared to also connect the Rhone-basin via the river "Saone" and the Moselle with the Rhine. In Mid-Europe, there are plans on the drawing board to connect the Elbe or Oder (or both) with the Danube. Vienna will in that case in future become the most important inland shipping centre in Mid-Europe.

East and West Europe meet at the Danube. From the West, via the Main-Danube channel, all industrial areas along the Danube (South Germany, Austria, Check, Slovakia, Hungary, Croatia, Serbia, Bulgaria and Romania) are within reach of inland vessels. Budapest in Hungary is a regular destination for Western Europe. All destinations along the Danube are reached from Eastern Europe, Vienna and Linz being regular destinations. Expectations in coming years are that the navigability of the Danube will be further improved. Along the northern route (Mittelland channel and Elbe) the northern industrial areas of Check are also within reach of vessels. Via the Oder and the Weichsel the Polish navigable waterway network is also unlocked.

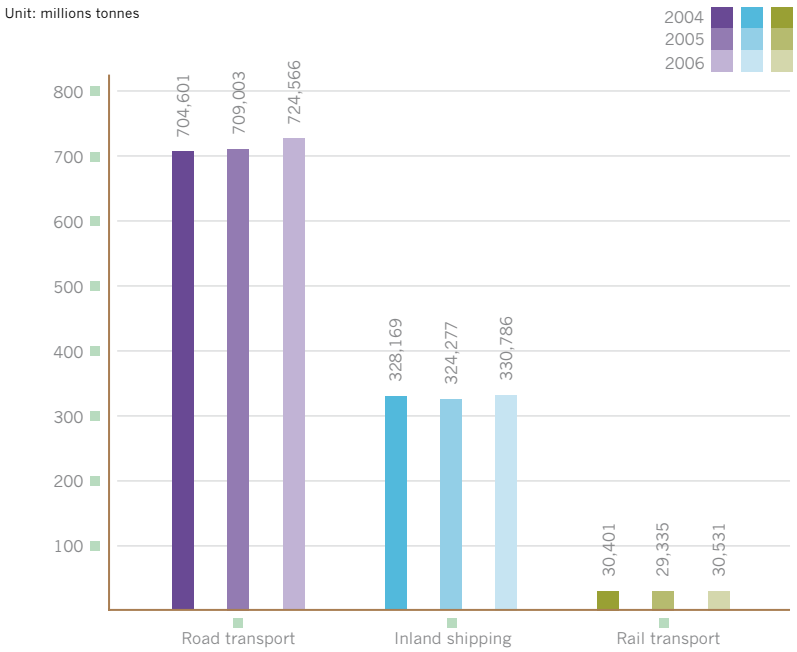
Further east, inland vessels cannot sail, because they cannot sail the Black Sea. In Russia therefore vessels who can sail both rivers and the sea are active (inland/outside vessels). Via Poland there is another waterway connection with limited tonnage class, with the White Russian Dnjepr, but this is not being used actively. Italy is admittedly isolated from the rest of Europe, but with the river Po and its adjacent ports it boasts an active inland shipping sector counting about 1000 vessels. By connecting the Danube and the Po, these waterways will also become part of the European navigable waterway network. Croatia and Serbia are also developing plans to improve the navigability of the river Sava which runs through both countries. Long-term, there are major opportunities for sustainable inland shipping in Europe.

Navigable waterways and main inland ports in the Netherlands



Source: Ministry of Transport, Public Works and Water Management

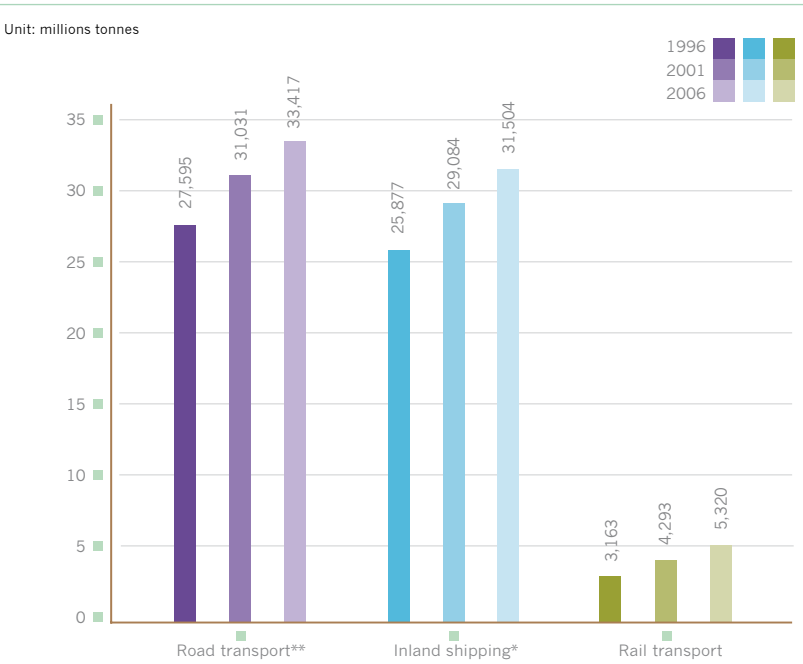
Transported weight in the Netherlands (x million tonnes)



Source: CBS

The modalities road transport, inland shipping and rail transport are usually compared based on transported weight (million tonnes). Road transport then appears to be taking the largest share. Over 60% of road transport takes place at distances below 50 km.

Performance per tkm for freight transport by Dutch enterprises and vehicles in the Netherlands



Source: CBS

* transport across Dutch territory under Dutch flag, excluding bilateral transport
** inland transport by Dutch enterprises only

A more realistic comparison of modalities would be based on the freight performance per tonne-kilometre. Based on that, the importance of inland shipping increases, while the contribution of rail transport remains limited. The strong percentage growth of rail (40%) is remarkable, but its share remains limited (6%).

Facts and figures inland shipping, 2007/2008

The Netherlands	Northwest Europe
6,500 vessels (Dutch flag)	13,500 vessels
7.4 million tonnes load capacity	13.8 million tonnes load capacity
30.5% transport share in tonnage vs road and rail	3% transport share in tonnage vs. road and rail
331 million tonnes annually	467 million tonnes annually (EU 25)

Inland shipping transports 3.2 million TEU
Jobs inland shipping: 15,500
Net turnover inland shipping: 1.87 billion euro
Number of enterprises: 3,650

Source: CBS / IVR

Facts and figures Dutch inland ports, 2006

Key figures
· 389 inland ports in the Netherlands
· 150 larger inland ports
· 384 million tonnes goods are annually on transhipped in Dutch inland ports
· Dutch inland ports offer 66,400 direct jobs

Added value in the Netherlands
Seaport + inland shipping transport + inland ports = 0.3 bln + 1.4 bln + 5.7 bln = 7.4 billion euro

Top 10 main ports	
1) Utrecht	6) Dordrecht
2) Cuijk	7) Geertruidenberg
3) Maasbracht	8) Terneuzen buiten
4) Velsen-Zuid	9) 's-Hertogenbosch
5) Zaanstad-Noord	10) Roermond

Main inland ports distinguished by typology
· Main inland port: Drechtsteden
· Multifunctional inland ports: Moerdijk, Utrecht and Nijmegen
· Industrial port: Stein
· Agroport: Zaanstad
· Container port: Born
· Sand and gravel port: Cuijk

Source: CBS, NVB, BVB

Virtually every (industrial) region in the Netherlands has been opened up using navigable waterways. Over 150 cities and villages have an inland port. A lot of inland ports offer opportunities for expanding their wet industrial areas.

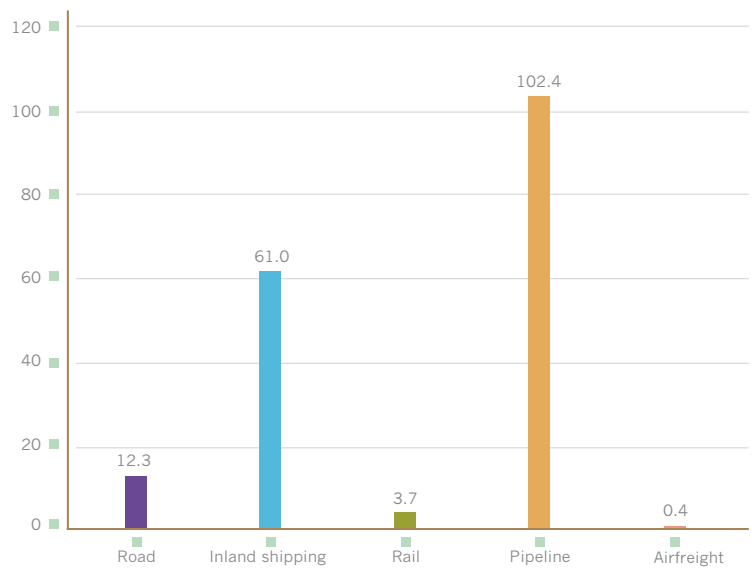
Types of goods transported via inland shipping, 2006

Types of cargo	tonnes
fresh (frozen) fruit and vegetables	27,494
beet, live stock	245,478
glass, glassware, ceramic products	399,659
Metal ware	403,666
Textiles and basic materials	536,886
wood and cork	915,078
Crude oil	1,009,734
Leather, textiles, clothing, other manufactured goods	1,898,857
Cellulose and paper	2,973,735
Charcoal and petrochemicals, tar	3,120,929
Transport materials, machines (assembled and unassembled)	4,196,222
cement, chalk, other manufactured building materials	7,531,317
Natural and chemical fertilizers	10,176,544
Iron ore, iron and steel waste products and blast furnace dust	11,343,536
Oil containing seeds, fruits and fats	11,386,344
Food and cattle feed	13,812,151
Grains	17,750,589
Metal products	19,191,544
Other chemical materials	31,094,707
non-ferrous-ores and waste	31,292,346
Solid mineral fuels	43,538,210
Various articles	45,819,815
Petrochemicals	84,952,137
Raw minerals and manufactured materials	131,586,526

Source: Eurostat

Inland shipping is suitable for the transport of various cargo. Inland shipping is often used for transporting crude oil, petrochemicals, ores, raw minerals and containers.

Transporting hazardous materials by modality, 2005

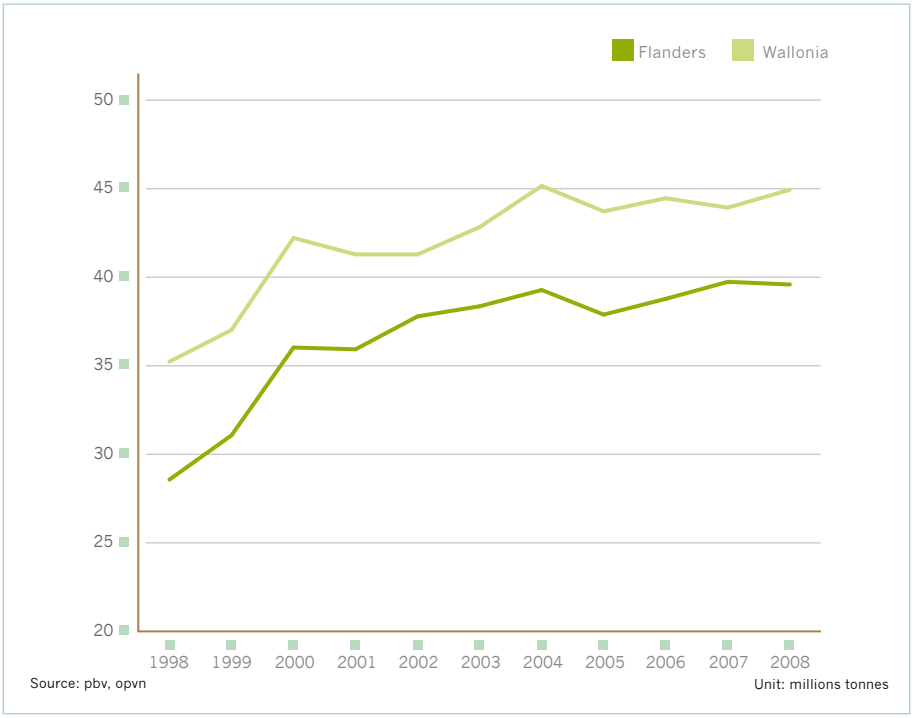


Source : Communication transport de substances dangereuses 2005

Unit: millions tonnes

Most hazardous materials are transported by pipeline. In addition, inland shipping is setting the trends in the safe transport of hazardous materials. A large proportion of the transport of hazardous materials takes place across waterways.

Transport development Belgian waterways



Source: pbv, opvn

Unit: millions tonnes

Approximately 15% of the Total Belgian transport capacity is taken up by inland shipping. In a 10-year-period, the capacity of Walloon's inland shipping grew by 28% and Flemish inland shipping by 39%. In the end, Wallonia transports more via inland shipping than Flanders.

Waterways in Belgium

Source: pbv

Belgium boasts a good network of rivers and canals, also compared to the rest of Europe. The waterways are connected to Dutch, French and German waterways. Flanders only contains 1076 kilometres navigable waterways.

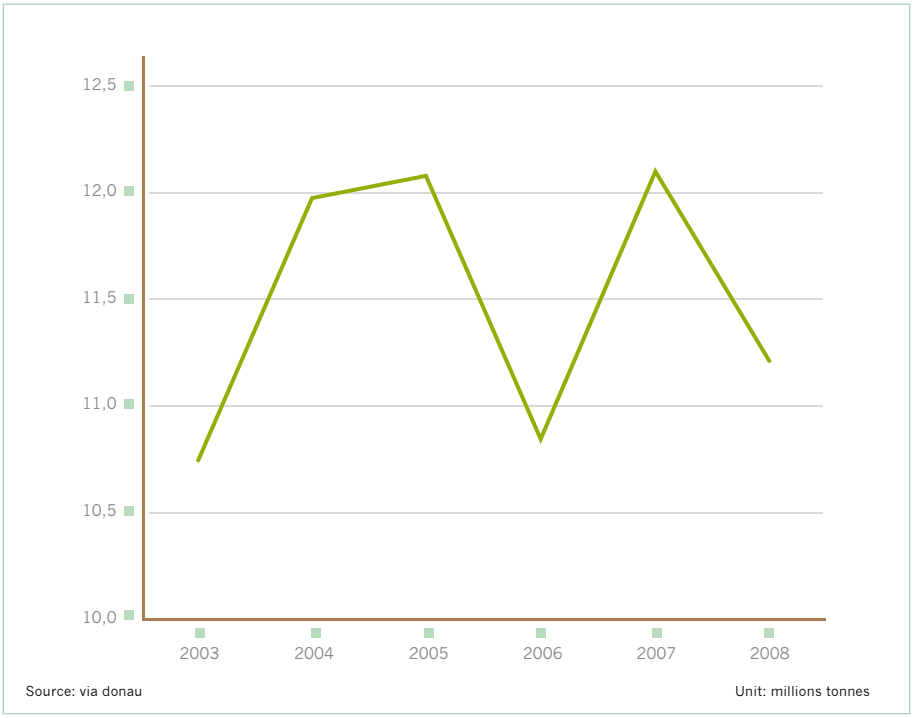
Developments French waterways

Area	Development	
	2006	2008
Rhine	-1.7%	-12.1%
Seine-Oise	5.3%	-4.9%
Moselle	16.2%	4.5%
Rhône - Saône	7.6%	1.6%
North/ Pas de Calais	-3.9%	11.2%

Source: vnf

The capacity of inland shipping in France tends to fluctuate. The most important canals and rivers are situated in the north of France. These areas also show the greatest increases in transport capacity. The largest connection from the south is the Rhône area.

Transport of goods via the Austrian Danube

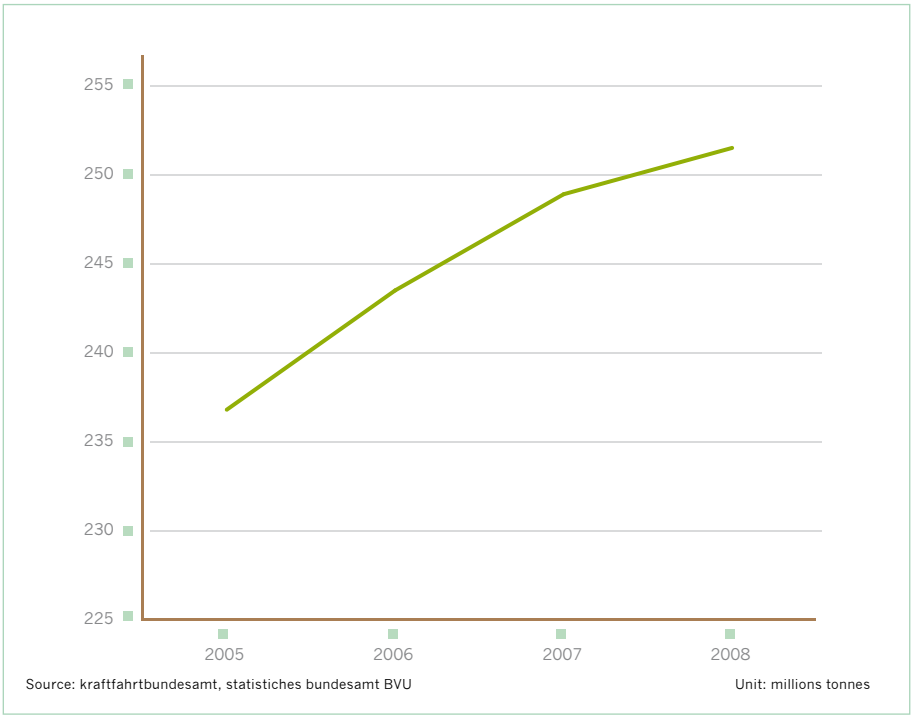


Source: via donau

Unit: millions tonnes

Just like the French transport capacity the transport capacity of inland shipping in Austria tends to fluctuate. In a period of 5 years, on average, an increasing trend is seen, in the transport of goods along the Austrian Danube. Expectations are that container transport along the Danube will be responsible on the long term for a further increase of transport.

Developments goods transport German inland shipping



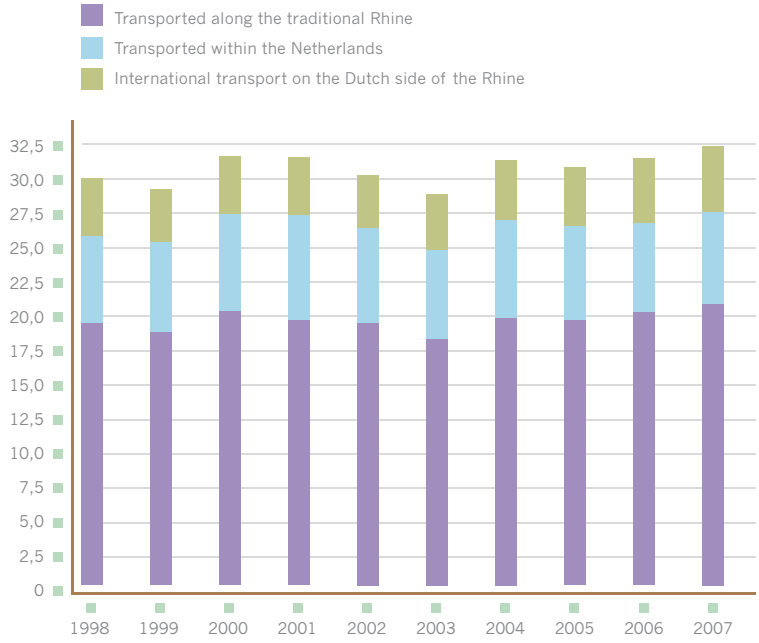
Source: kraftfahrtbundesamt, statistiches bundesamt BVU

Unit: millions tonnes

Since 2005 the transport by inland shipping is showing steady growth. In 2008 this growth flattened.

Developments on the Rhine

Traditionally, the Rhine is the busiest navigable waterway in Germany. Transport along this axis has increased by 2.6% in 2007. Expectations are that the figures for 2008 and 2009 will be considerably less.



Source: via donau

Unit: millions tonnes

Developments on the Moselle

The source of the Moselle lies in northern France and runs via Luxemburg to Germany, pouring into the Rhine at Koblenz. Inland shipping via the Moselle supplies several power stations and steel industry. The steel industry in particular is sensitive to market tendencies, which largely explains the fluctuations.

Source: kraftfahrtbundesamt, statistiches bundesamt BVU

Unit: millions tonnes

CHAPTER 4

The European inland shipping fleet and innovations.

4. The European inland shipping fleet and innovations.

Over one thousand new inland vessels were added to the European fleet from 2000 to 2010. This translates into an investment in vessels by private enterprises of more than four billion euro. In the past few years, Northwest Europe tended to invest more in inland vessels rather than maritime vessels. As a result, the West European inland shipping fleet is the most modern fleet worldwide and we are very proud of this.

Inland vessels in Germany, the Netherlands and Belgium are currently responsible for an average 25% of inland cargo transport and more than half of international cargo transport. Forty percent of container transport currently takes place on inland vessels. Striving for cleaner air, seaports Rotterdam and Amsterdam have agreed to increase the role of inland shipping (and rail) in their new container terminals by five to ten percent, thus reducing the use of road transport. These and other developments in this part of Europe are expected to cause an increase of more than fifty percent in container inland shipping in the future.

Scaling up has been the principal trend in the inland shipping building sector over the past few years. As a result, the total capacity of the inland shipping fleet has kept increasing (by over five million tonnes), while the number of units transported decreased.

A standard inland shipping vessel for large waterways measures 110 metres long and 11.40 metres wide. At 3.5 metres load draught, the vessel can carry 3,000 tonnes or 200 TEU's. The largest vessels currently measure 135 metres long and 14, 20, 17 or 22 metres wide. At 3.5 metres load draught, these vessels can carry 5,000, 7,000 or 9,000 tonnes (300, 500 or 800 TEU's).

The largest inland shipping (tank) vessel will be built in 2009 and measures 150 metres long, 22.8 metres wide, with a draught of 6.3 metres. The reality of what is possible in lock sizes and vessel building technology will probably not allow for larger measurements then this.

Increasingly lightweight materials are used in the construction of vessels (hatches, wheel-house house, accommodation, etc). Especially promising is the development of synthetic-steel composite connections and an experiment with a vessel completely made of synthetics (composite). Also, much progress has been made in developing the most efficient hull shape and size.

Expectations are that the first inland shipping vessels with diesel/electric propulsion will be released around 2010. Soon after that we can expect a vessel that sails on hydrogen. From 2011, European inland shipping will be using low-sulphur fuels, so that the emission of particles, sulphur dioxide and nitrogen oxide can be reduced even further. When applying all these new technologies, the emission from new vessels can be reduced by another 80%.

The inland shipping sector offers many opportunities for technological innovation in vessels and new logistical concepts, whereby the vessel becomes part of new or existing supply chains. The government support business innovation by offering grants. Think of inland vessels for specific kinds of cargo, with or without crane fitted (containers, pallets, municipal waste, recyclables, perishables, town distribution, etc).

The Dutch inland shipping sector has access to its own innovation agency, which can support enterprises with research and development: the Expertise and Innovation Centre Inland Shipping (EICB), +31 (0)10 798 98 30 (T). EICB's experts are happy to assist and will be able to point your business to relevant government grants pertaining to inland shipping.

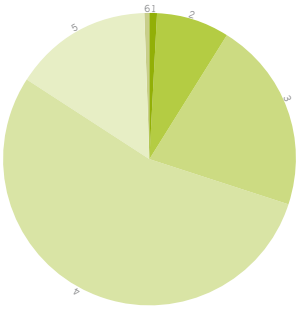
The inland shipping sector will do its utmost to maintain the diversity of the fleet in order to enable shippers located at smaller waterways to continue using the possibilities of transport across waterways. Besides keeping existing, well maintained, smaller vessels afloat, the sector also wants to start building smaller tonnage vessels as soon as possible.

The principal navigable waterways in Northwest Europe are still able to cope with a significant increase in transport, without having to make substantial investments. Some locations however require building extra locks however.

The inland shipping sector is keeping a close eye on the possible consequences of climate change for inland shipping. Research has found that the least favorable scenario in 2050 still allows for all destinations within Northwest Europe to be reached by inland vessels.

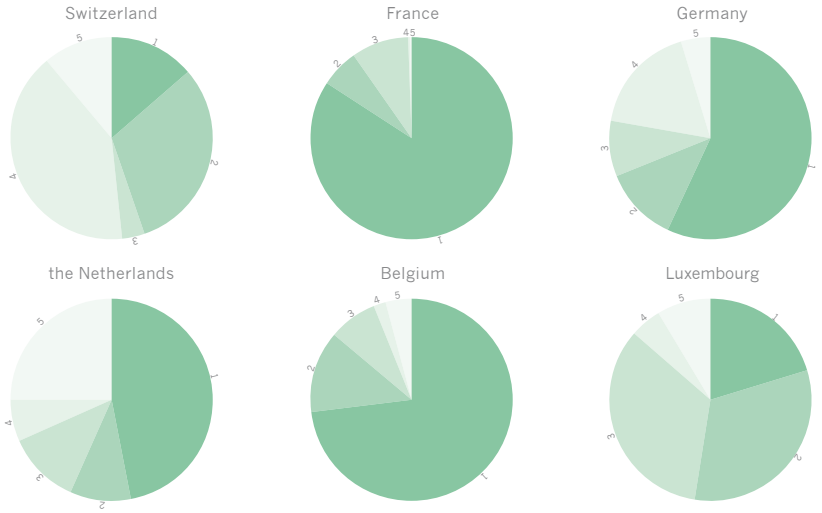
Flag share in West European inland shipping in percentages

	Landen	Tonnage	Percentage
1	Switzerland	132,156	1.0%
2	France	1,123,686	8.1%
3	Germany	2,920,143	21.1%
4	the Netherlands	7,441,804	53.9%
5	Belgium	2,129,254	15.4%
6	Luxembourg	61,324	0.4%
	Total	13,808,367	100%



Bron: IVR

Flag distribution of the West European fleet



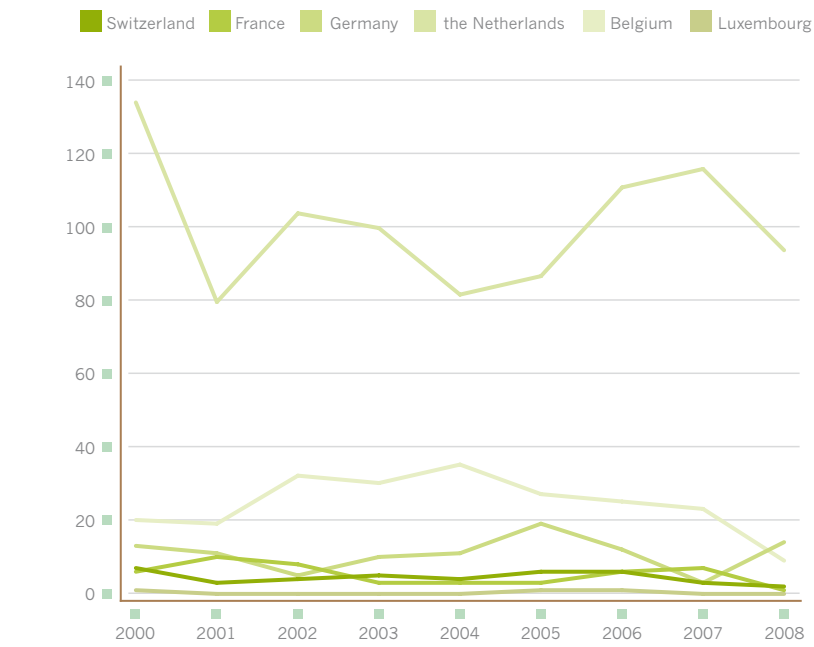
	Lading	Switzerland	France	Germany	the Netherlands	Belgium	Luxembourg
1	Dry cargo fleet	19	1,436	2,422	4,448	1,528	12
2	Tank fleet	43	105	504	923	277	19
3	Push & tug vessels	5	158	382	1,094	163	20
4	Passenger vessels	56	4	748	617	37	3
5	Others	15	2	190	2,356	86	5
	Total	138	1,705	4,246	9,438	2,091	59

Source: IVR

* pontoon, deck barges and professional sailing vessels among other things

Over half of the European fleet sails under the Dutch flag. The Dutch inland fleet (capacity 7.4 million tonnes) is larger than its maritime fleet (capacity 4.2 million tonnes).

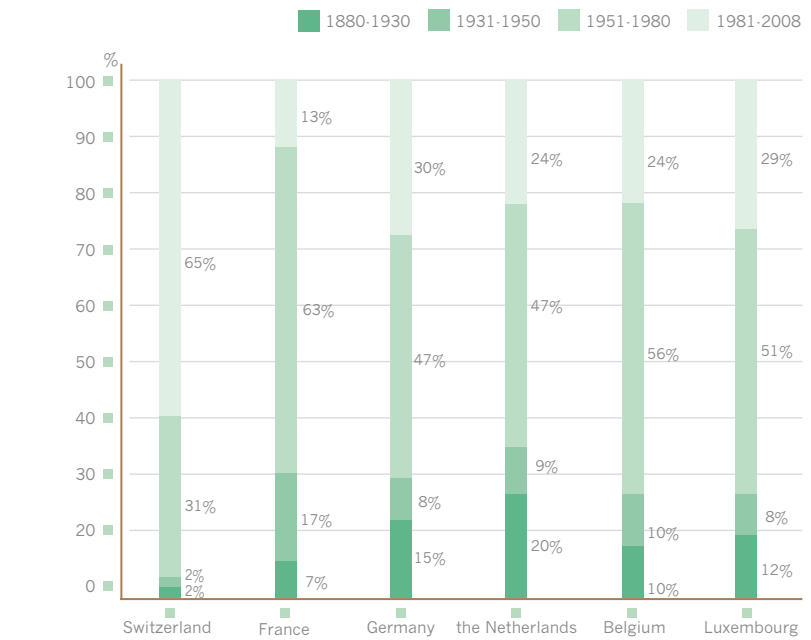
Number of new vessels in West European inland shipping



Source: IVR

Between 2000 and 2008 over 1,300 new vessels were added to the West European inland shipping fleet. This overview clearly indicates that the Netherlands leads in the construction of new vessels: almost 900 new vessels were added to the Dutch fleet.

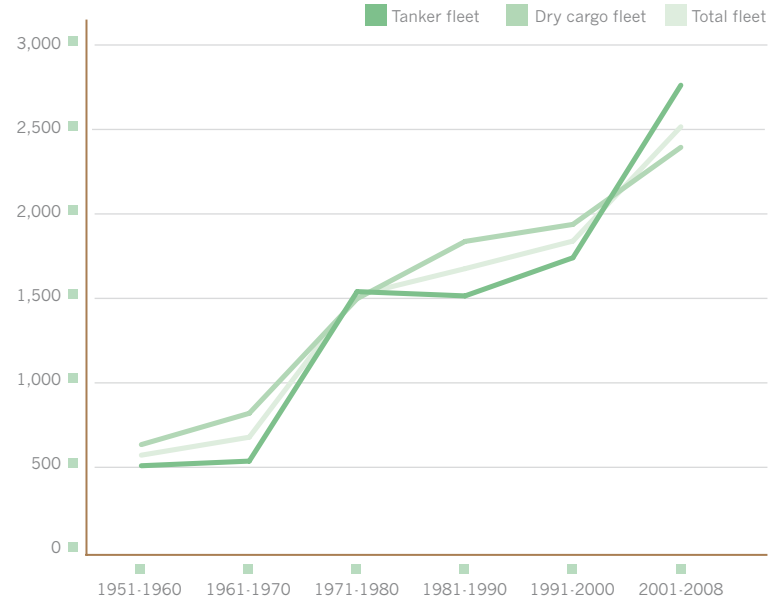
Dates of construction of the inland shipping fleet



Source: IVR

Vessels are highly durable. Provided they are well-maintained and regularly invested in, vessels tend to have a lifespan of over 50 years. About a quarter of the Northwest European fleet consists of new vessels up to 20 years old.

Average increase in tonnage in the West European fleet



Source: IVR

Unit: metric tones

Scaling up is the main trend in the inland shipping sector over the past 50 years. Increases in scale firstly occur in the tanker segment, as it is easier to adapt loading and unloading facilities for these vessels.

Size of enterprises in inland shipping

	Enterprises		Number of vessels	
	Actual	Percentage	Actual	Percentage
1 vessel	2,930	87%	2,930	61%
2 vessels	230	7%	460	10%
3 vessels	73	2%	219	5%
4 vessels	35	1%	140	3%
5 vessels	21	1%	105	2%
6 to 10 vessels	39	1%	301	6%
10 to 20 vessels	28	1%	371	8%
20 and more vessels	9	0%	245	5%
Total	3,365	100%	4,771	100%

Source: Nederland en de Scheepvaart op de binnenwateren CBS, 2002

Small and medium businesses dominate the inland shipping sector. Nearly 90% of all enterprises consist of one-vessel-companies. This makes inland shipping flexible and reliable, but at the same time its weakness is an inability to realize a common marketing concept.

Total European inland shipping fleet, 2008

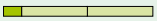
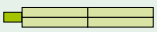
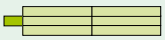
	Motorized freight vessels	Motorized tankers	Push boats	Tugs	Towing barges	Passenger vessels	Freight push barges	Tanker push barges	Towing vessels	Total
West European inland shipping fleet										
Belgium	1,252	269	72	27	64	37	272	7	5	2,005
Germany	1,074	460	181	116	85	748	995	36	3	3,698
France	960	35	147	11	0	4	475	70	0	1,702
Luxembourg	12	17	13	1	6	3	0	2	0	54
the Netherlands	3,301	862	170	533	391	617	1,038	43	1	6,956
Austria*	28	4	13	6	0	0	96	0	43	190
Switzerland	17	42	0	1	4	56	2	1	0	123
East European inland shipping fleet										
Bulgaria*	22	0	22	28	9	0	99	0	1	181
Croatia*	2	2	10	36	0	0	44	0	1	95
Hungary*	10	5	16	14	1	0	0	0	1	47
Moldavia*	3	0	0	0	1	0	0	0	0	4
Poland*	10	0	236	9	0	76	384	0	5	720
Romania*	32	5	124	365	54	0	735	0	8	1,323
Serbia*	65	4	45	66	0	5	144	48	1	378
Slovakia*	12	0	34	2	0	0	0	0	2	50
Czech Republic*	67	0	20	85	0	67	0	0	2	241
Ukraine*	44	0	21	9	46	0	369	0	1	490

Source: www.informatie.binnenvaart.nl / IVR

* data from 2005

The entire East and West European inland shipping fleet consists of almost 19,000 vessels and units. The East European fleet revolves around the Danube, while the West European fleet is focused on the Rhine. A larger share of the East European fleet is taken up by push & tug vessels, more so than the West European fleet.

Categories of European waterways (ECMT)*

Class	Type of motorized vessel	Tonnage (ton)	Formation push convoy	Tonnage (ton)	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)	-		3,200 - 6,000	95 - 110	22.8	2.5 - 4.5	7.1 - 9.1
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

Standard dimensions

Push barge: 76.5 m x 11.40 m

The official dimensions of the European waterways network is based on the ECMT-standards, as drawn up by the European Conference of Ministers of Transport in Paris.

Source: CEMT

* European Conference of Ministers of Transport

Total costs per phase of travel in motorized freight vessels

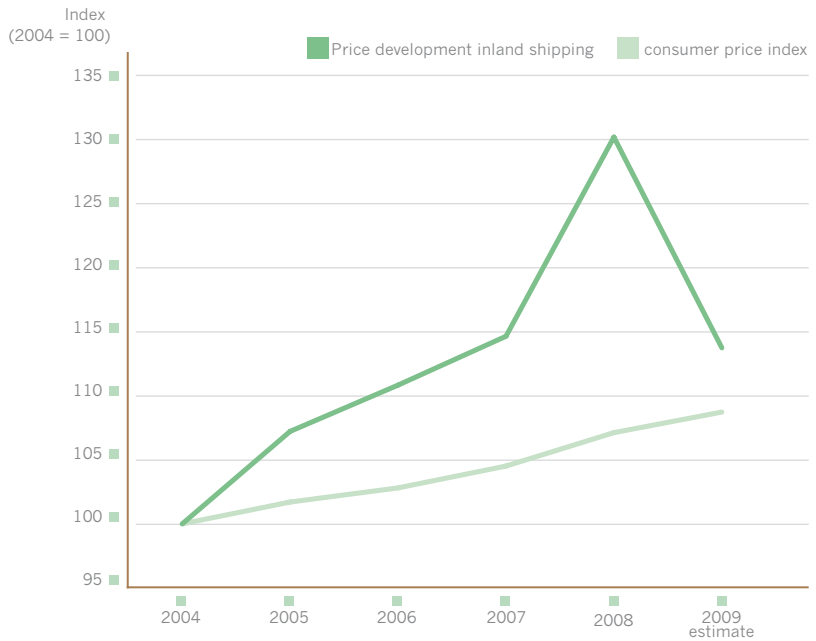
Cargo capacity	Sailing hours loaded travel	Sailing hours unloaded travel	Waiting general lay hour	Waiting for chartering lay hour
250 tonnes	42.20	40.50	31.34	26.07
500 nesnes	55.90	52.08	38.34	32.67
750 tonnes	71.20	65.25	46.96	40.89
1,000 tonnes	88.59	80.52	57.72	51.08
1,250 tonnes	108.50	98.30	71.01	63.44
1,500 tonnes	126.95	114.63	82.88	74.36
1,750 tonnes	145.91	131.47	95.28	85.95
2,000 tonnes	165.20	148.63	108.03	97.89
2,250 tonnes	184.55	165.86	120.86	109.92
2,500 tonnes	202.89	182.07	132.70	120.96
2,750 tonnes	217.93	194.99	141.25	129.09
3,000 tonnes	231.33	206.26	148.18	135.60
3,250 tonnes	242.82	215.63	153.21	140.20
3,500 tonnes	252.15	222.83	156.10	142.66

Source: NEA

Unit: Euro's

The official cost estimates from research institute NEA provide an indication of the costs of an inland shipping vessel per hour.

Price development index inland shipping



Source: NEA

The costs of inland shipping is expected to decrease significantly after 2008, while the consumer price index keeps rising. The decrease in cost price is mainly due to an expected decrease in oil prices in 2009.

Types of vessels

Spits
length 38.5. m · width 5.00 m ·
draught 2.20 m · cargo capacity 350 t

14x

Campine vessel
length 59.85 m · width 6.60 m ·
draught 2.59 m · cargo capacity 655 t

22x

Europ vessel
length 85 m · width 9.50 m ·
draught 2.50 m · cargo capacity 1,350 t

54x

4-barge push convoy
length 193 m · width 22.80 m ·
draught 4 m · cargo capacity 11,000 t

440x

Standard tanker
length 110 m · width 11.40 m ·
draught 3.50 m · cargo capacity 3,000 t

120x

Tanker
length 135 m · width 21.80 m ·
draught 4.40 m · cargo capacity 9,500 t

380x

60x

Car vessel
length 110 m · width 11.40 m ·
draught 2 m · cargo capacity 530 cars

16x

Container vessel, campine class
length 63 m · width 7 m ·
draught 2.50 m · cargo capacity 32 TEU

100x

Standard container vessel
length 110 m · width 11.40 m ·
draught 3 m · cargo capacity 200 TEU

250x

Container vessel, Jowi class
length 135 m · width 17 m ·
draught 3 m · cargo capacity 500 TEU

72x

Ro-ro vessel
length 110 m · width 11.40 m ·
draught 2.50 m

Example cost calculation

Dry load vessel in continuous deployment

General:

Length	110 meter
Width	10.50 meter
Load capacity	2,583 tonnes
Speed at full load	18.7 km/h
Capacity	1,242 HP

Example journey:

2,500 tonnes of gravel Breisach (D) > Utrecht (NL) (loaded downstream)

Costs:

Annual costs:		Costs example journey:	
Labour	€ 572,718.–	Labour	€ 5,911.–
Capital	€ 291,857.–	Capital	€ 3,012.–
Other	€ 127,961.–	Other	€ 1,321.–
Fuel	€ 761,789.–	Fuel	€ 7,863.–

Total per tonne:

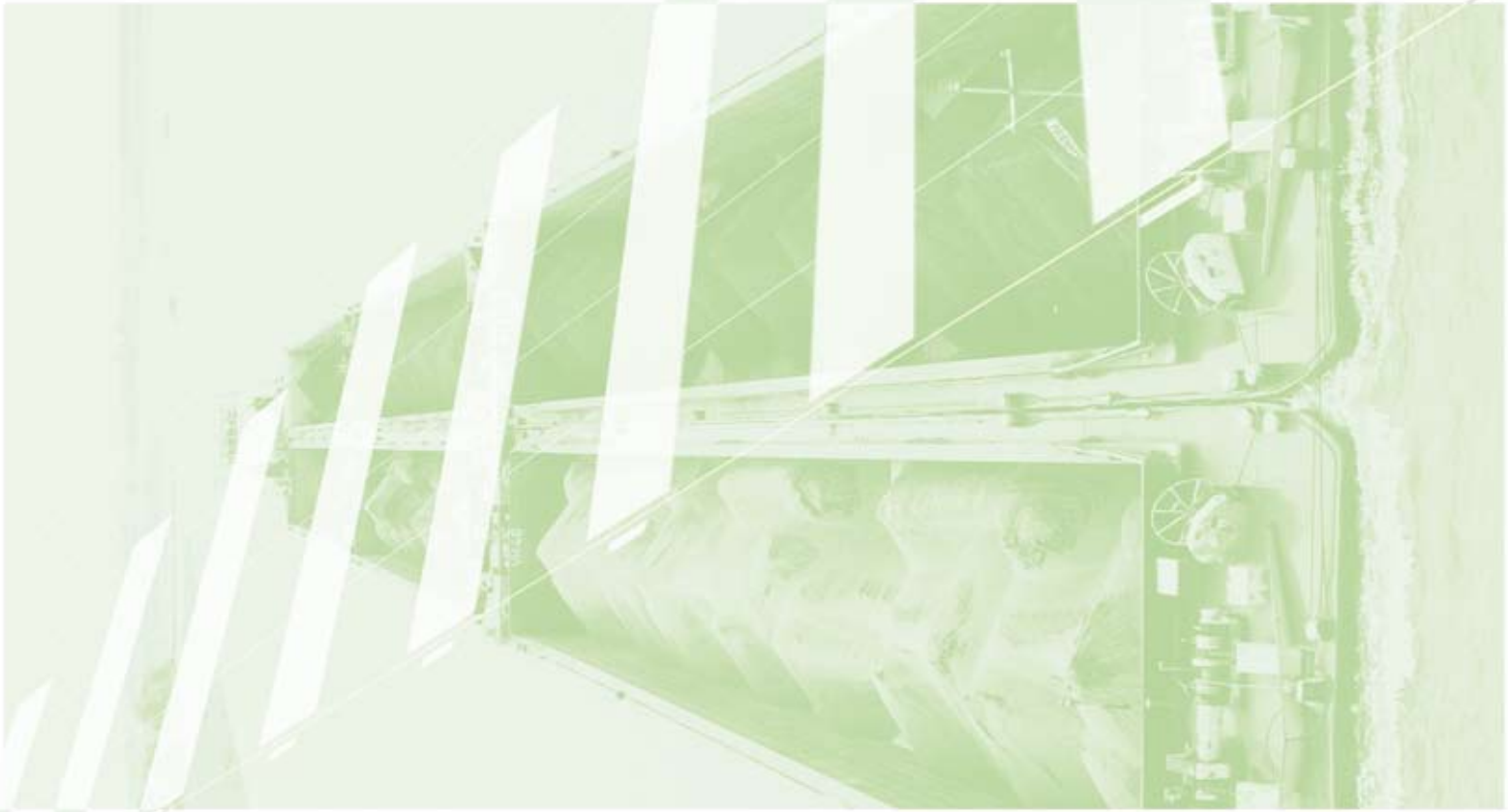
Labour	€ 2.36
Capital	€ 1.20
Other	€ 0.53
Fuel	€ 3.15
Costs per tonne	€ 7.24

The cost calculations from NEA provide an indication of the costs involved in deploying an inland shipping vessel. The actual transport costs are always influenced by the actual supply and demand.

Source: NEA / CBRB

CHAPTER 5

Is a conscious choice for inland shipping also a sustainable choice?



5. Is a conscious choice for inland shipping also a sustainable choice?

If we do not significantly change the way we utilize our infrastructure, it is impossible to continue handling the increasing streams of cargo flows. Shock scenario is the traffic in New York, Paris, Peking, Bangkok or Djakarta, of which a significant part just stands still during the day. Keep in mind that in our part of the world a doubling of cargo transport in the short term is necessary in order to be able to guarantee the continuance of all services. Without additional solutions, our primary supply of goods and mobility are in danger. Not to mention the air pollution which would take on giant proportions.

One disadvantage of the transport and distribution of goods is that the different modes of transport all put pressure on physical space, energy consumption and emission levels. Despite the fact that much remains uncertain as to the source and consequences of climate change for our living environment, there exists consensus about the fact that the emission of pollutants must be reduced, and the influence of mankind on the environment as much as possible limited. Making conscious choices to bring in alternative sources of energy, introducing clean engines or fuels and saving energy are the most important challenges for the future of the transport sector.

Fortunately we already have access to many sustainable solutions. Transport by road will be characterized, because of sharpened requirements, by even cleaner and quieter engines. In the future, transport by road will remain the most important modality for transporting cargo over short distances. Already seventy percent of current road transport takes place at short distances (up to 50 km). For this method of supplying retail few alternatives are available, excepting standalone initiatives with a freight tram in Amsterdam or a freight boat in Utrecht. In order to maintain sufficient product supply in the shops, road transport is simply indispensable.

The transport of goods via rail, inland shipping and short sea is on average more sustainable per unit compared to road transport, because generally large quantities are being transported. But the actual emission depents on the transported quantity, the distance and the age of the engine in the vehicle or vessel. Vessels and trains are generally more economical in terms of energy use then trucks. Because of that, vessels emit three times less CO_2 per tonne·kilometre than trucks (per tonne it works out even six times less). Hence, also on the long term, these sustainable transport modes hold a considerable advantage to road transport.

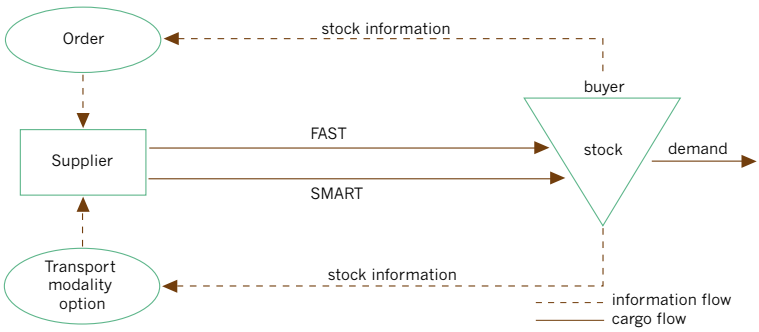
Transport via rail is generally only profitable at longer distances (above 300 km). Inland shipping can be attractive at short as well as long distances, more so than road transport, also depending on the transport volume. Despite this, already thirty percent of current inland shipping is done at transport distances under 50 km. In Europe, shortsea offers an alternative to road transport which is interesting at long distances (above 1,000 km). Often, a combination of two or more transport modalities is necessary or more efficient, in order to serve the entire supply chain.

For most enterprises with an annual cargo transport from 10,000 tonnes, there is an efficient method to make an informed choice about which modality or combination of modalities to use. In their case, the 80/20 ratio can be generally applied to the use of inland shipping and road transport. Other enterprises might benefit from an 90/10 ratio or an 70/30 ratio. Either way, enterprises who are smart in combining inland shipping, rail or shortsea next to road transport in their transport strategy generally realize significant transport cost reductions. This has been the case in companies like Heineken, Neckermann, Cehave, Akzo, DSM and Corus. These enterprises significantly increased the use of vessels for their transport needs, in combination with trucks and trains.

The application of the 80/20 principle as a method in multimodal transport optimalization has been developed by professors Fransoo and Kiesmüller of the Technical University in Eindhoven. Their research indicates that chasing after even faster processes of distribution has a counterproductive effect. They suggest a re-evaluation of storage in enterprises, taking the view that reliable delivery times are in danger of disappearing due to increasing road congestions. According to these logistical insights, most non-perishables benefit from storage as an efficiënt method for saving costs.

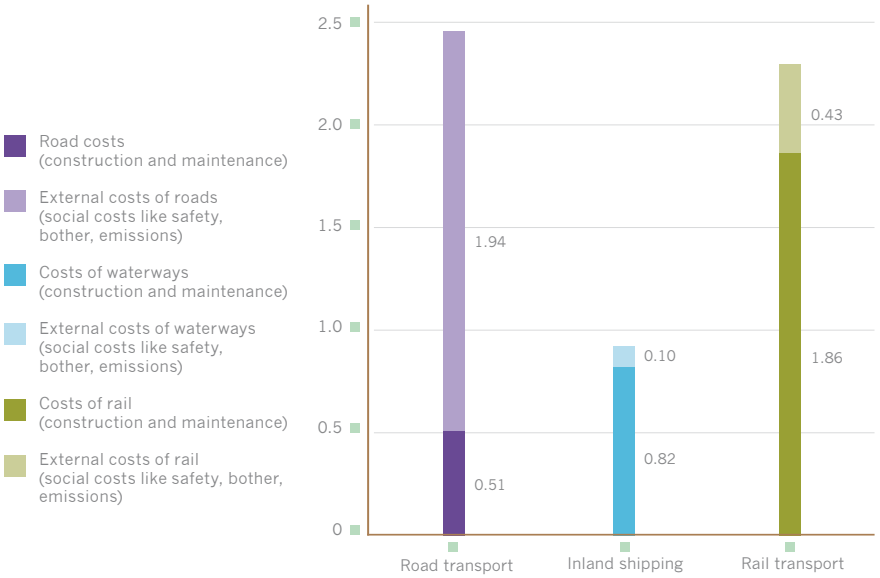
The professors distinguish between fast and smart modalities. Road transport (fast and flexible) ought to be used as a fast delivery guarantee and to prevent that the supply and transport of products would be interrupted. Inland shipping, rail and shortsea on the other hand are considered “smart” modalities, most suited to regularly supply 70-90% of a core package. This often results in significant cost savings, as well as a reduction in road congestions and environmental advantages. Would you like to find out how the 80/20 method may be applied in your company and what benefits you might be able to realize? Please contact one of our advisors (contact details on page 2).

We base our assessment of the various transport modalities on the following charasteristics, illustrated in the flowchart below:



External costs of freight transport

Although the building and maintenance of roads is relatively cheap, the social costs tend to be high. The most expensive modality to construct and maintain is rail, but its social costs are low. Waterways score well in both respects. As such, when it comes to freight transport, countries with many waterways are more attractive than those that rely on road and rail.

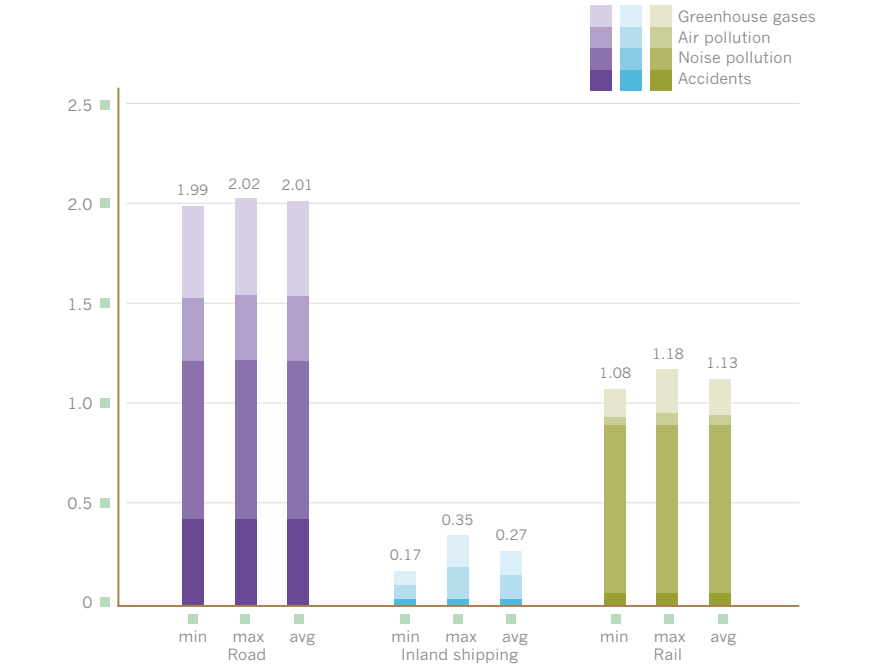


Source: Prognos

Unit: euro per 100 tkm

External costs of modalities

When taking into account external costs (excluding building costs), it becomes apparent that inland shipping has low costs when compared to other modalities. Inland shipping is an especially favourable option in terms its low score on accidents and noise pollution.



Source: Planco 2007

Unit: eurocent per tkm

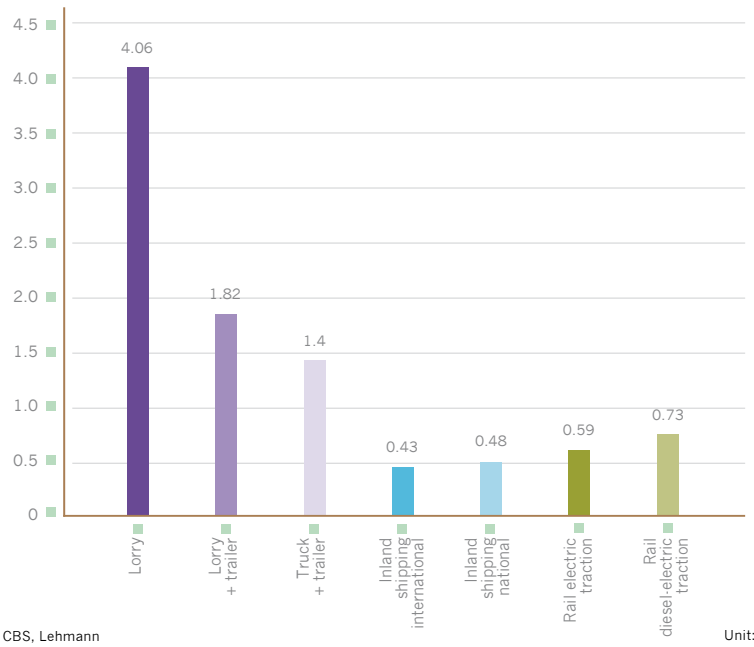
Energy factors for various modalities in MJ/tkm

Type of transport	average cargo capacity (tonnes)	primary energy consumption (MJ/tkm)
Road transport		
Lorry	7.3	4.06
Lorry + trailer	19.3	1.82
Truck + trailer	25	1.40
Inland shipping		
International*	1,250	0.43
National*	700	0.48
Rail		
Electric traction*	1,000	0.59
Diesel-electric traction*	650	0.73

Source: CBS, Lehmann

*) value is calculated as the total energy consumption for loaded and unloaded kilometers, divided by the tonne-kilometre performance

Energy consumption modalities in MJ/tkm

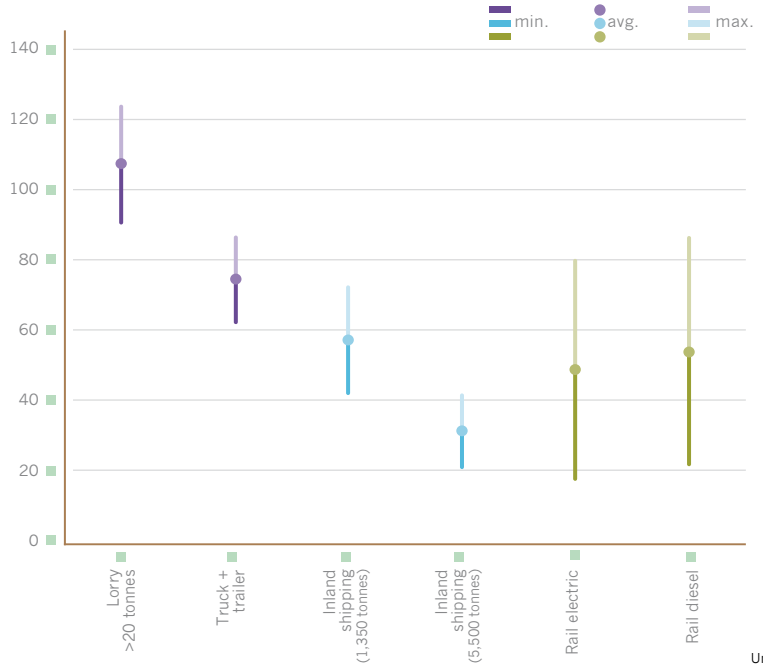


Source: CBS, Lehmann

Unit: MJ/tkm

When it comes to energy consumption, inland shipping is by far the most economical modality. Per tonne-kilometre, its energy consumption tends to be up to 3.5 times lower than in road transport.

CO_2-emissions cargo transport in 2010 at long distances*



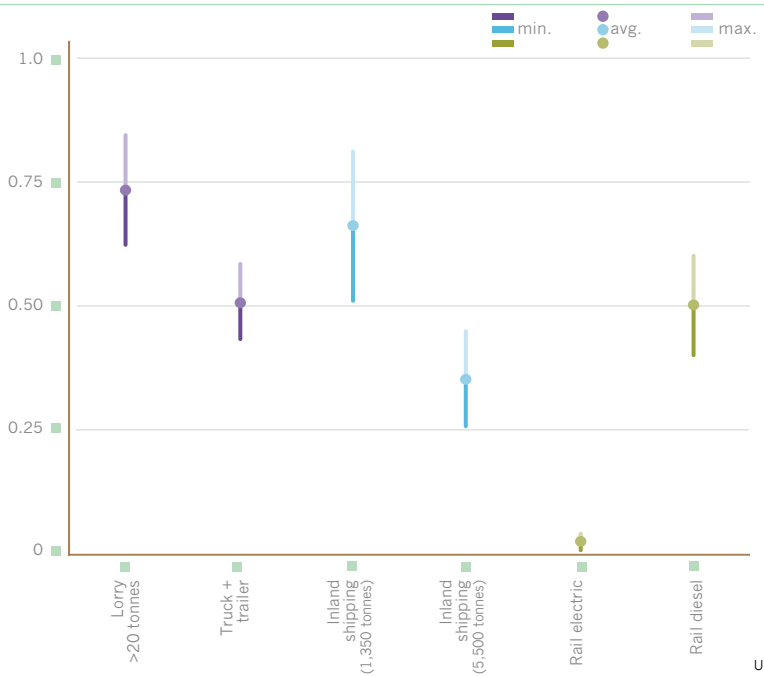
Unit: g/tkm

Source: Stream (2008), CE Delft

* Long distance: more than 150 km

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

NO_x-emissions cargo transport in 2010 at long distances*



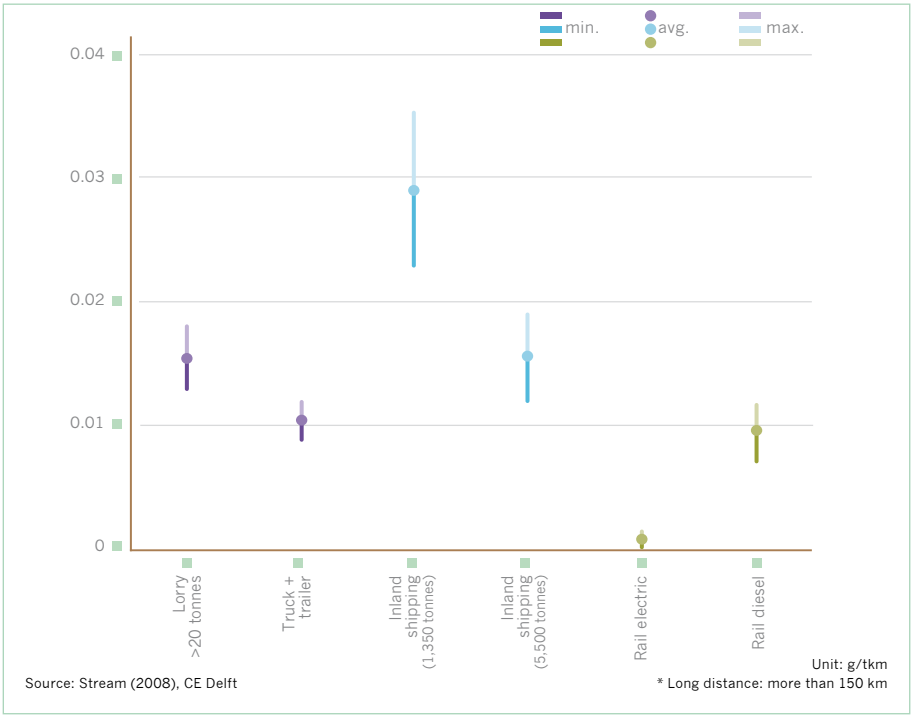
Unit: g/tkm

Source: Stream (2008), CE Delft

* Long distance: more than 150 km

NO_x (nitrogen oxides) cause acid rain and smog. In future, inland shipping vessels will be equipped with SCR-catalyser which can reduce NOx emissions by 85%.

PM_{10}-emissions cargo transport in 2010 at long distances*



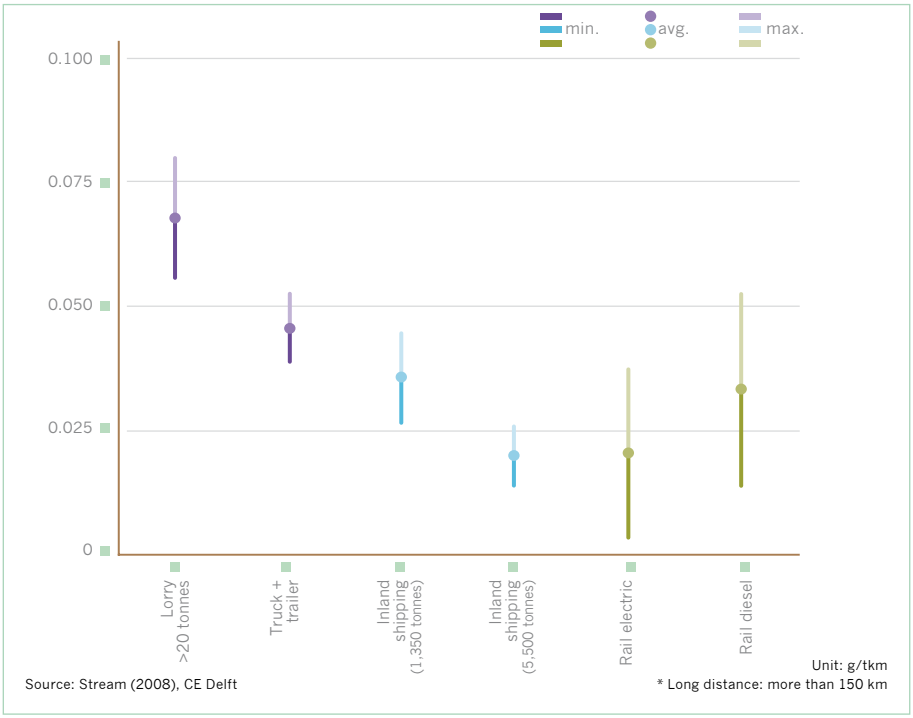
Unit: g/tkm

Source: Stream (2008), CE Delft

* Long distance: more than 150 km

PM_{10} stands for particulate matter. The level of emissions of particulate matter is codependent on the sulphur levels contained in fuel. From 2011, the inland shipping sector will be utilizing fuels which contain less sulphur. As a result, the emissions of particulate matter will be reduced by 17%.

SO_2-emissions cargo transport in 2010 at long distances*



Unit: g/tkm

Source: Stream (2008), CE Delft

* Long distance: more than 150 km

The level of emissions of SO_2 (sulphur dioxide) depends on the amount of sulphur in fuel. Sulphur levels in fuel used by the inland shipping sector are higher than in the road transport sector. From 2011, both inland shipping and road transport will be delivered the same fuel, low in sulphur.

Here sails the largest inland shipping tanker in the world!

Length:	135 meter
Width:	21.80 meter
Draught:	4.4 meter
Engine capacity:	7,500 pk
Sailing speed:	max. 27 km/h
Tonnage:	9,500 tonnes
Cargo:	fuel for sailing ships and distribution centres
Unloading system	height of boom maximum 34m, angle of inclination 82 degrees
Loading-unloading speed:	2000 tonnes/h
Number of tanker vehicles:	380x

Advantages of "Vlissingen"

- Efficient supply system for distribution centres and sea ships: approx. 9,500 tonnes in 4.5 hours.
- Active in ARA-zone seaports.
- Environmentally friendly and low-noise.
- Optimum protection of cargo zone because of double walls.
- High-tech systems, e.g. molecular magnetic transmission from main engine to pump system.
- Possibility of remote radiographic control to ensure optimum operational safety.

Here go 500 containers with everything that the modern consumer could wish for!

Length:	135 metres
Width:	17.40 metres
Draught:	3.60 metres
Engine capacity:	4,300 hp
Sailing speed:	Loaded, upstream: 12.5 km/h
	Loaded, downstream: 20 km/h
Tonnage:	5,407 tonnes or 500 TEUs
Cargo:	containers
Number of lorries:	500x

Advantages of the container vessel

- Each container can hold a different type of cargo, from clothes to high-tech equipment.
- Conditioned transport (cold-storage containers) is possible, as is transport of chemical products.
- Goods from around the whole world are placed on board and collected to be transported in one go.
- The vessel provides efficient and environmentally friendly just-in-time transport.
- It works 24 hours per day, 7 days a week, 365 days a year.
- Goods reach their destinations safely and without damage.
- Tracking & tracing the goods is possible, service levels are high and planning is good.
- Container shipping is a reliable link in the logistic chain.
- Increases of scale are linked to flexibility.
- The pilot house can be adjusted in height, with a variance of 10 metres, and can be raised up to 20 metres above the water line to provide safe visibility.

Here goes the safest transporter of chemical products!

Length:	135 metres
Width:	11.45 metres
Draught:	3.82 metres
Engine capacity:	2,028 hp
Sailing speed:	20 km/h on calm waters
Tonnage:	4,038 tonnes / 5175 m^3
Cargo:	Liquid chemical products
Cargo area:	14 separate coated cargo tanks
Unloading speed:	Up to 1,700 m^3/h
Number of tanker lorries:	160x

Advantages of chemical tankers

- The vessel is suitable for German canals, based on its cargo efficiency and ballast options.
- The loading system is sealed and fully automatic.
- The tanker is double-walled and coated, and is equipped with the latest gadgets to ensure the safest and most environmentally friendly transport of chemical substances.
- The vessel is equipped with a gas-proof computer screen on the roof of loading zone, to ensure efficiency and safety during loading and unloading.
- It has a certified quality system (DNV).
- The cargo is optimally protected by the double walls.
- The vessel can transport a wide range of different types of chemical cargos, thanks to the coating on the tanks.
- Different products can be loaded and unloaded separately.

Here go 655,000 kilos of grain, to serve as the basic ingredient for our daily bread!

Length:	59.85 metres
Width:	6.60 metres
Draught:	2.59 metres
Engine capacity:	450 hp
Sailing speed:	Loaded, upstream: 11 km/h
	Loaded, downstream: 19 km/h
Tonnage:	655 tonnes
Cargo:	Bulk cargo
Number of lorries:	26x

Advantages of the "Kempenaar"

- The dimensions of this type of vessel (Kempenaar) allow it a tremendous navigable area; loading and unloading destinations situated along both major and minor waterways can be accessed, both at home and abroad.
- This vessel ensures a high level of service, efficient planning and punctual arrival at its destination.
- Clients can receive relatively small shipments of cargo at a time.
- Agricultural products intended for human consumption and animal fodder are transported and handled in accordance with strict hygiene-code standards.
- Living and working on board means that the vessel is manned at almost all times, and that the vessel and its cargo are rarely left unsupervised.
- The vessel offers the flexibility of a privately-owned family business, in terms of working hours and finance.
- Sliding hatches allow the cargo to be protected in an instant if the weather conditions make it necessary.
- The vessel is environmentally friendly, safe and quiet.
- The vessel is suitable for a wide range of cargoes, from sand, gravel, rolls of steel, cellulose (the raw material for paper), packed salt and fertiliser to raw materials for human foodstuffs and animal feed.
- The vessel allows for smooth shipping traffic: there are no traffic jams on the waterways.

Here go 300,000 kg of corn for bread, popcorn and animal feed!

Length:	39 metres
Width:	5.09 metres
Draught:	2.42 metres
Engine capacity:	230 hp
Sailing speed:	Loaded, upstream: 7 km/h
	Loaded, downstream: 15 km/h
Tonnage:	362 tonnes
Cargo:	Bulk cargo
Number of lorries:	14x

Advantages of the "Spits"

- It allows for efficient and environmentally friendly transport of both bulk freight and general cargo to deep into the heart of the European hinterland, from Hamburg to Marseille and from Dunkirk to Vienna.
- This vessel ensures a high level of service, efficient planning and punctual arrival at its destination.
- Clients can receive relatively small shipments of cargo at a time.
- Clients utilise the time that the vessel is en route as 'free storage time'.
- The vessel offers the flexibility of a privately-owned family business, in terms of working hours and finance.
- It offers the lifestyle of a high level of involvement and a varied life.

Length:	Tow with 4 barges: 193 metres
	Tow with 6 barges: 269.5 metres
Width:	22.8 or 34.2 metres
Draught:	4 metres
Engine capacity:	5,400 hp (3x 1,800 hp)
Sailing speed:	Loaded approx. 10 km/h, empty approx. 20 km/h
Tonnage:	11-16,000 tonnes
Cargo:	Coal and ore
Loading speed:	1,500 tonnes per hour
Unloading speed:	800 tonnes per hour
No. of lorries:	440-660x

Advantages of the Four-Barge Tow

- It provides large-scale transport of 11,000 to 16,000 tonnes of bulk cargo at a time.
- It works around the clock, 7 days a week.
- The separate barges can hold various types of ore and/or coal.
- The vessel is environmentally friendly and safe.
- It never encounters traffic jams or delays.
- It offers the just-in-time system for the German steel industry.
- It transports indispensable raw materials for European car manufacturers and ther industries.

Here goes a full-automatic self suction sand ship!

Length:	66,94 metres
Width:	8,58 metres
Draught:	2,81 metres
Engine capacity:	1.780 HP
Sailing speed:	max. 20 km/h
Tonnage:	936 tonnes
Cargo:	Both wet and dry cargo
No. of lorries:	38x

Advantages of the "Giessenmond"

- With the (self) suction- and riddle installation it is possible to deliver every size of sand and gravel.
- Possibility to unload itself with a speed of 520 m^3 in half an hour by using it's own pressure line connected to a quay.
- Deliver certified raw materials directly from the location of extraction to the customer.
- High service-level; thanks to advanced positioning equipment, harbours and channels can be yield accurate.
- Multifunctional equipped; from extraction to riddle, from transport to delivery on the quay.

Length:	110 metres
Width:	11.40 metres
Draught:	2.00 metres
Engine capacity:	1,800 hp
Sailing speed:	Loaded, upstream 11 km/h
	Loaded, downstream 20 km/h
Tonnage:	645 tonnes
Cargo:	530 cars
No. of lorries:	60x

Advantages of the car vessel

- It provides damage-free transport of rolling stock.
- Cars arrive at their destinations day and night and just in time.
- The vessel is environmentally friendly, efficient, and in addition does not cause noise pollution.
- Inland shipping contributes to a higher level of mobility and accessibility.
- Clients can realise great benefits of scale.
- Inland shipping is a cross-border transport modus that offers certainty of transport.
- It provides a reliable link in the logistics chain.
- The vessel offers the best possible protection to the cargo.
- The vessel allows for smooth shipping traffic: there are no traffic jams on the waterways.

Glossary

Inland shipping vessel
An inland shipping vessel is a non-seaworthy vessel for the transport of cargo on inland waters (like rivers, lakes and canals)

Classification ECMT
To align the dimensions of the West European waterways network the inland and river shipping in Europa is devided in ECMT-categories. Each categorie captures the maximum dimensions of the ships. The classification is determined by the European Conference of Ministers of Transport.

CO_2: Carbon dioxide
Carbon dioxide (CO_2) is the principal greenhouse gas. CO_2 is part of a natural cycle. The CO_2 surplus arises after combustion of fossil fuels like oil, gas and stone coal.

Emission
Emission means 'substances discharged into the air'. Polluted parts can get into the soil, water or air. Emission is about 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 are bundled and subsequently be transported 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 to move goods. Modes of transportation are trucks, trains or inland vessels.

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

Modal split
Modal split is the devision of the shifts of goods onto the modes of transportation (modalities).

NO_x: nitrogen oxide
Nitrogen oxides are part of the substances who add to the acidification of the environment. Nitrogen oxides arises during any kind of combustion at a high temperature.

PM_{10}: particulate matter
Particulate matter is a form of pollution and has an unfavorable effect on our health. Particulate matter includes floating parts in the atmosphere smaller than 10 micrometer.

SO_2: sulphur dioxide
Sulphur dioxide is a combinatietoon of oxigen and sulphur. Fossil fuels contain a lot of sulphur. Combustion causes sulphur dioxide. It is harmful for man, animal and nature.

TEU
TEU is the indicator for the dimensions of containers. The abbreviation stands for Twenty feet Equivalent Unit. 1 TEU is a container of 20 feet long, 8 feet wide and a draught of 8 feet.

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

Shipper
Company or person who let the cargo be transported by a carrier.

European Organizations

European Barge Union
T: 0031 (0)10 411 60 70
W: www.ebu.uenf.org

European Skippers Organisation
T: 0032 (0)25 217 22 08
W: www.eso-oeb.org

Inland Navigation Europe
T: 0032 (0)25 53 62 70
W: www.inlandnavigation.org

IVR
T: 0031 (0)10 411 60 70
W: www.ivr.nl

National Organizations

Belgian organizations

Algemeen Actiecomité der Belgische Binnenvaart-organisaties V.Z.W. [2]
T 0032 (0)36 51 71 12

Association de Maîtres ateliers des regio's de Liège, Limbourg, Namur et Charleroi [2]
T: 0032 (0)42 27 17 10

Promotion Office for Inland Navigation in Flanders [4]
T: 0032 (0)11 23 06 06
W: www.binnenvaart.be

UCV, Union of Continental Navigation [3]
T: 0032 (0)92 51 12 01

Walloon Office de Promotion des Voies Navigable [4]
T: 0032 (0)42 20 87 50
W: www.opvn.be

British Organizations

British Waterways [4]
T: 0044 (0)84 56 71 55 30
W: www.britishwaterways.co.uk

Dutch Organizations

Central Agency for Rhine and Inland Shipping[3]
T: 0031 (0)10 798 98 00
W: www.cbrb.nl

Dutch Association of Insurers, Transport Division [1]
T: 0031 (0)70 333 85 00
W: www.verzekeraars.nl

Dutch Inland Shipping Information Agency [4]
T: 0031 (0)10 412 91 51
W: www.bureauvoorlichtingbinnenvaart.nl

FOV, Federation of Mutual Insurance Companies in the Netherlands [1]
T: 0031 (0)30 656 71 60
W: www.fov.nl

NBKB, Dutch Association for Inland Shipping Inspection [1]
T: 0031 (0)10 411 60 70
W: www.nbkb.nl

NPRC, Commercial Partnership for IWT [1]
T: 0031 (0)78 789 09 00
W: www.nprc.nl

Royal Barge Owners Association Schuttevae [4]
T: 0031 (0)10 412 91 36
W: www.koninklijkeschuttevaer.nl

The Inland Shipping Office, Co-operative Inland Shipping Organisations
T: 0031 (0)10 206 06 00
W: www.kantoorbinnenvaart.org

German/Austrian/Swiss Organizations

Bundesverband der Deutschen Binnenschiffahrt e.V. [3]
T: 0049 (0)20 38 00 06 50
W: www.binnenschiff.de

Bundesverband der Selbständigen, Abteilung Binnenschiffahrt
T: 0049 (0)22 87 46 377
W: www.bds-dgv.de

"Die Schiffahrt", Wirtschaftskammer Österreich [2]
T: 0043 (0)59 090 03 252
W: www.schiffahrt.at

Gesamtverband der Deutschen Versicherungswirtschaft [1]
T: 0049 (0)30 20 20 50 00
W: www.gdv.de

Verein für Europäische Binnenschiffahrt und Wasserstraßen e.V.
T: 0049 (0)20 380 06 27
W: www.vbw.ev.de

Via Donau Wasserstraßen Gesellschaft [4]
T: 0043 (0)50 432 11 000
W: www.via-donau.org

Schweizerische Vereinigung für Schiffahrt und Hafenwirtschaft [3]
T: 0041 (0)61 631 29 19
W: www.svs-online.ch

French organizations

Bureau Veritas [1]
T: 0033 (0)14 291 52 91
W: www.bureauveritas.fr

CAF, Comité des armateurs Fluviaux [3]
T: 0033 (0)14 260 36 18
W: www.caf.asso.fr

Féderation Française de Sociétes d'Assurances, [1]
T: 0033 (0)14 247 90 00
W: www.ffsa.fr

Voies Navigable de France [4]
T: 0033 (0)32 163 24 30
W: www.vnf.fr

Organizations in Central and Eastern Europe

AVP CZ [2]
T: 0042 (0)48 512 24 605
W: www.avp.cz

Dunaj Petrol Trade [1]
T 0412 (0)35 770 19 56
W www.dunajpetrol.edb.sk

Inland Navigation Development Centre, CRUP [4]
T 00385 1 631 4446
W www.crup.hr

Opm:
[1] Member of IVR
[2] Member of European Barge Union, EBU
[3] Member of IVR and EBU
[4] Member of Inland Navigation Europe, INE

Main sponsors BVB

Ministry of Transport, Public Works and Water Management

Port of Rotterdam

Port of Amsterdam

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