INLAND NAVIGATION IN EUROPE

Marketobservation

2011
1

Market Observation No. 13

Supply and demand situation in 2010 and analysis of the economic situation as of mid-2011

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FOREWORD

After having focused in earlier reports on the upper reaches and the estuary of the Danube, the current edition of the market observation report on inland navigation in Europe presents, in the form of a topical focus, an overview of navigation and freight transport on the waterways in Serbia and Croatia. Future editions will provide regular updates based on the individual articles and the traffic flows described below.

Another focus is tanker shipping. This sub-market of inland navigation serves an important transport function within the European economy as the means of transport for liquid fuels and for supplies to and products from the chemical industry. This industry is currently facing major challenges, arising from the need to renew the fleet with double-hull vessels in accordance with technical regulations. In a second topical focus we first describe in detail and analyse the market for inland tanker shipping along with the fleet serving the market, subsequently pointing out the economic trends in this segment. It is important to note in this regard that this sector is nearing overcapacity, resulting from the coexistence of a new fleet of double-hull tankers alongside the fleet of single-hull vessels still in service, even though the latter are in fact becoming fewer. By way of a supplement to this article, a topical focus in the future will discuss the medium-term perspectives and the challenge of coordinating supply and demand.

As usual, the actual market observation presents the economic situation of the sector in the form of an overview of developments in 2010 and in early 2011. While 2010 came to a close without any major surprises, confirming the trends recognised earlier, the year 2011 would appear to be developing into a major challenge, previously not encountered by the inland shipping industry, the outcome of which will depend on how well this form of transport demonstrates its reliability. Following high water levels in the winter, only very small amounts of water are expected to drain in the spring and summer. In addition, there were major traffic blockages along the Rhine in January and February. When this edition went to press, no analyses had as yet been made to ascertain the potential effects on the ability of inland navigation to compete within the transport market. The second publication later this year will discuss the subject in greater detail.

Fact sheet 1:

Inland navigation on the middle Danube – Serbia and Croatia

► 1 - Waterway network

Situated in the middle Danube region, Serbia and Croatia lie between the upper Danube countries (Slovakia and Hungary) and the countries of the lower Danube (Romania and Bulgaria). Croatia borders on the Mediterranean and thus has access to world markets through seaports (Koper, Rijeka). The seaport of Koper in particular is becoming increasingly important for trade within the entire Danube region.

Serbia has a large network of waterways extending over a distance of 1,600 km. The Serbian section of the Danube extends over a distance of 588 km, and 207 km of the Sava and 164 km of the Tisa, both Danube tributaries, lie within Serbia. Another waterway is the Danube-Tisa-Danube canal, having a length of 600 km. Maintenance of Serbia's waterways requires approximately 6 million euros each year.

The Croatian inland waterway network extends over a total length of 804 km. This network is distributed among three waterways: the Croatian section of the Danube (188 km); the Sava (562 km); and the Drava (305 km), which forms the border with Hungary.

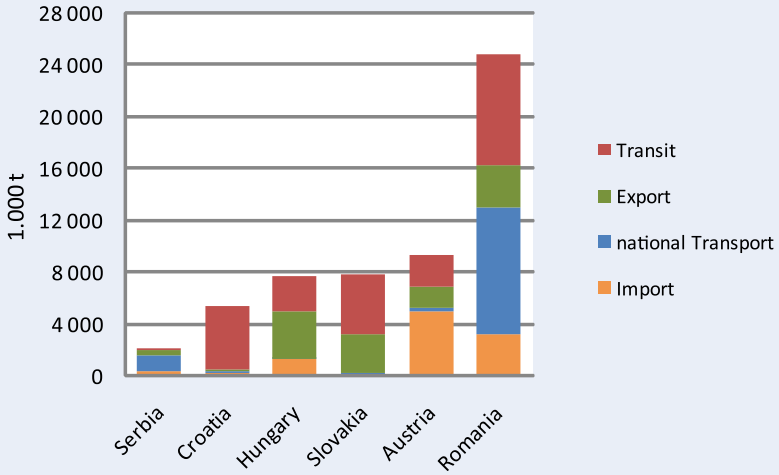
The network density (i.e. total length of waterways relative to the total area of the country) is 18 km/1,000 km^2 for Serbia and 11 km/1,000 km^2 in the case of Croatia. These figures are comparable to those for France (10 km/1,000 km^2), Hungary (10 km/1,000 km^2) and Slovakia (9 km/1,000 km^2), but lower than the network densities for Germany (21 km/1,000 km^2), Belgium (47 km/1,000 km^2) and the Netherlands (123 km/1,000 km^2).

► 2 - Transport volume and structure

The volume of transport on Serbia's waterways has decreased by 40 % since 1990 due to a number of factors, including the Yugoslav Wars, deindustrialisation during the 1990s and a lack of infrastructure maintenance.

The figure below shows the current situation. The small amount of transit traffic given for Serbia would suggest that the figure for this type of traffic has not been compiled completely. This may be assumed since Croatia, Serbia's neighbour, reports a very high transit traffic rate.

Figure 1: Volume transported by inland shipping within the Danube countries*



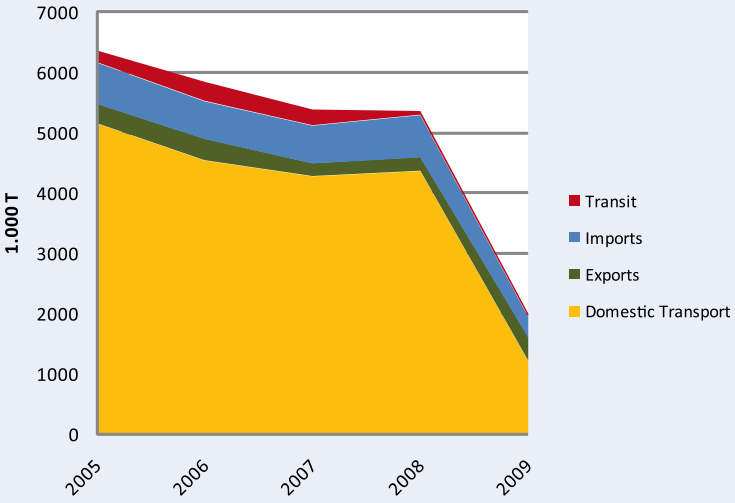
*Source: National statistical offices * 2009*

Imbalances among the types of traffic is a general problem in Danube shipping. The Danube countries import raw materials via the North Sea ports (ARA) and the ports on the Black Sea (Izmail and Constanţa). Yet, vessels returning to the seaports do not carry a volume of cargo comparable to the imports. The volume of export goods (in particular agricultural products and project cargo) does not achieve the same level as ore imports. This results in empty runs that pose a disadvantage in terms of cost-effectiveness.

The transport volume in Serbia has declined much more sharply in the wake of the economic crisis than in Croatia. In 2008 a volume of 5.4 million tonnes was transported in Serbia, almost as much as in Croatia during the same year (6.4 million tonnes). The drastic decline in 2009 is to be attributed both to structural factors as well as to the economic crisis. In Serbia, ores and scrap metals as well as steel products represent a larger portion of transport volume than in Croatia. The share of such goods in the total transport volume is about 60 % in Serbia, 55 % in Romania and approximately 30 % in Austria.

Meanwhile, the steel industry is reporting much more significant losses than other sectors. While the imbalance in transport volume was considerably reduced as a result of the decline in ore imports in 2009, with the recovery of the steel industry this circumstance will not continue very long.

Figure 2: Volume transported by inland shipping in Serbia



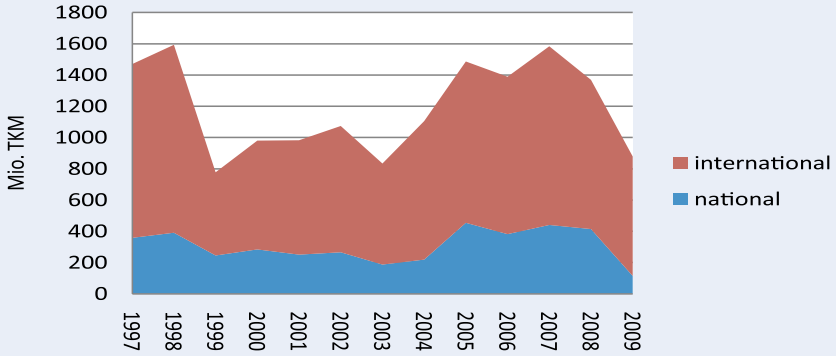
Source: Statistical Office of the Republic of Serbia

During the first six months of 2010, freight transport on Serbia's waterways increased by 40 % over the previous year. The increase was at a similarly high rate to that of rail freight transport (+36 %), whereas goods transport on roads remained at the same level.

If the 40 % increase were projected to include all of 2010, still only one quarter of the losses accrued in 2009 will have been compensated. Developments in the Serbian steel industry certainly played a role in this regard, since, according to the World Steel Association, production in 2010 was still 25 % below the level seen in 2008.

According to the International Transport Forum, transport performance in Serbia displayed vigorous growth from 2003 to 2007, in a manner similar to other Danube countries (Hungary, Slovakia and Romania).

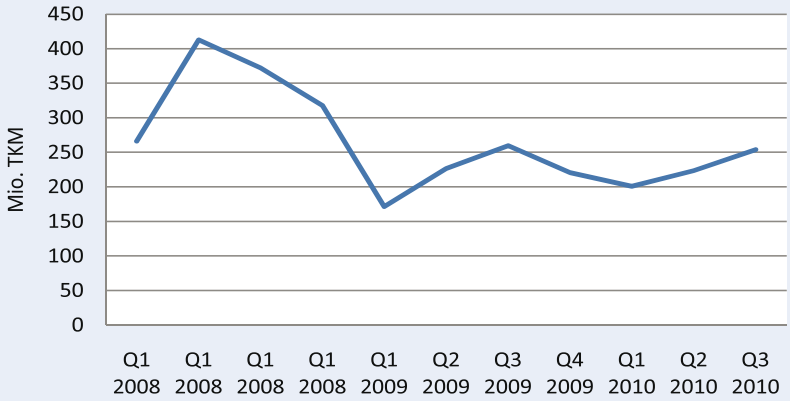
Figure 3: Transport performance of Serbian inland shipping (1997-2009)



Source: International Transport Forum

Transport performance increased only slightly during the first three quarters of 2010 compared with the same period in 2009.

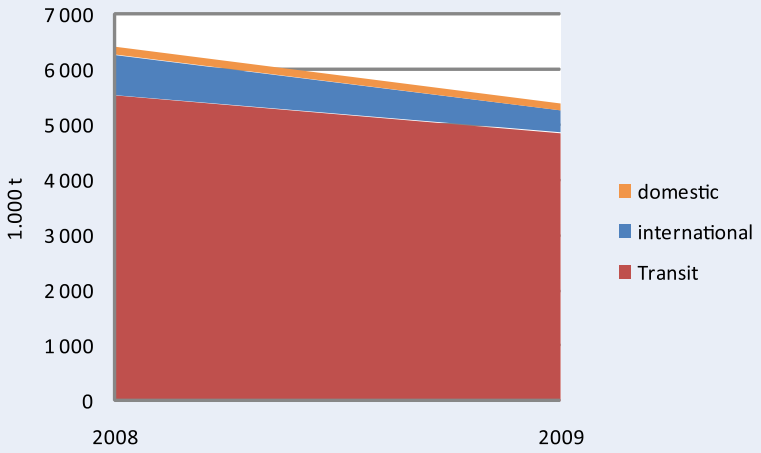
Figure 4: Transport performance of Serbian inland shipping (2008-2010)



Source: International Transport Forum

Transit traffic is a similarly important factor in Croatia as in other Danube countries.

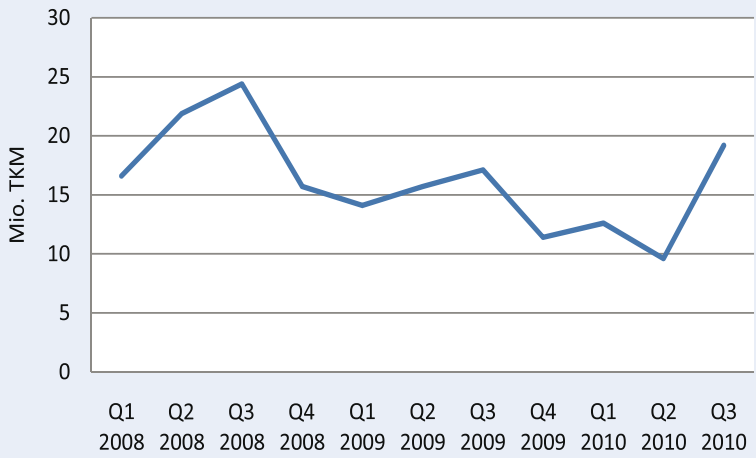
Figure 5: Volume transported by inland shipping in Croatia



Source: Croatian Bureau of Statistics

The transport performance on Croatian waterways increased for the first time again in the third quarter of 2010 after several quarters of decline.

Figure 6: Transport performance of Croatian inland shipping (2008-2010)



Source: International Transport Forum

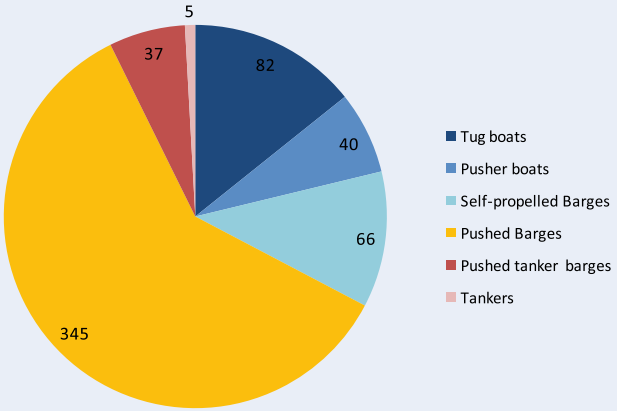
► 3 - Fleets

Tugboat and pushed barge traffic is very widespread in the Danube region. This fact is reflected in the statistics for fleets.

Serbia

According to the Statistical Office of Serbia, the country's inland fleet comprises a total of about 575 vessels. 60 % of these vessels are pushed barges, 14 % are tug boats and only 11.4 % motor cargo vessels. The proportion of tankers is smaller than in Western Europe. Serbia has only 2 passenger vessels, with a total of 100 passenger seats. The Serbian fleet has diminished in size in recent years. Of the fleet, 37 % of all vessels were built in the 1960s, 30 % in the 1970s and 14 % in the 1980s. Only 7 vessels (or 1 %) were built after 1990.

Figure 7: Serbian inland fleet



Source: Statistical Office of the Republic of Serbia. Situation at the end of 2008

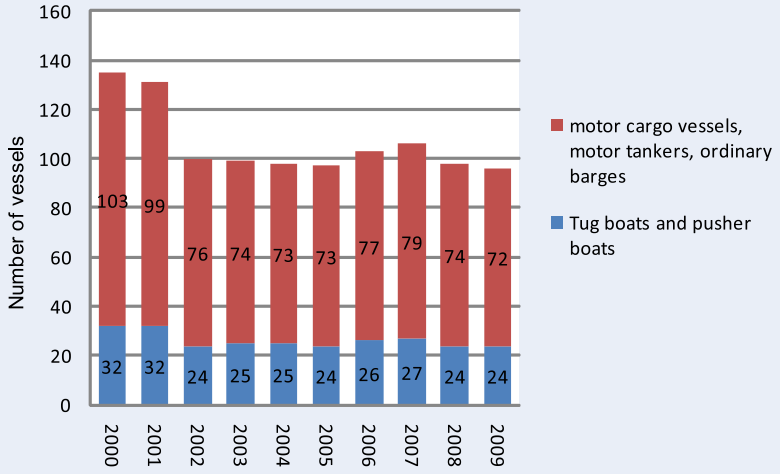
The average tonnage of the vessels is about 1,360 tonnes, which is comparable to the figures for Western European fleets.[1]

Croatia

The Croatian fleet, comprising some 100 vessels, is considerably smaller than Serbia's fleet. Foreign operators play a very major role in transport. Croatia has proportionally fewer tugboats and pushed barges than Serbia, so that the percentage of motor cargo vessels is greater. Unlike Serbia, Croatia's fleet has not diminished in size in recent years.

[1] Average based on the Belgian, Dutch, German, Luxembourg and Swiss fleets. The average for dry cargo shipping in Western Europe is currently about 1,285 tonnes, and about 1,643 tonnes for tanker shipping.

Figure 8: Croatian inland fleet



Source: Croatian Bureau of Statistics

► 4 - Inland ports and freight categories

Due to the lack of statistical information for individual freight categories, changes among the major inland ports will be considered in the following. This will allow conclusions to be inferred concerning the percentage of individual freight categories in total transport.

Serbia

Serbia has some ten inland ports, the most important of which are: Smederevo, Novi Sad, Prahovo, Bogojevo and Belgrade. Smederevo is currently the largest port by far. Belgrade, although the capital of Serbia, ranks only fifth. Following privatisation of the port of Belgrade, the volume of freight handled decreased by 30 % between 2006 and 2010.

Serbia established a port authority, the Port Governance Agency, in April 2011, with the purpose of supervising and managing port activities. It is to be hoped that this step will help to increase the volume of traffic at Serbia's ports and particularly at Belgrade.

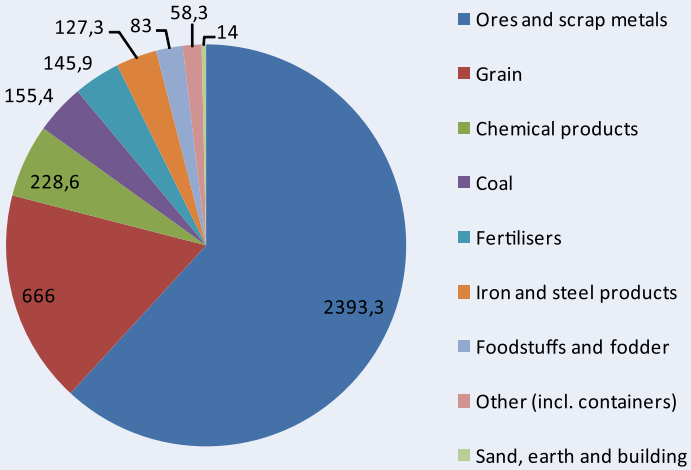
Table 1: Main freight categories handled at Serbian ports including transshipment volume

Port	Main freight	Inland waterways transport in 2010
Smederevo	Ores, scrap metals, steel products	2.51 million tonnes*
Novi Sad	Agricultural products, fertilisers	0.63 million tonnes*
Prahovo	Phosphates, chemical products, coal	0.27 million tonnes
Bogojevo	Grain	0.18 million tonnes
Belgrade	Salts	0.15 million tonnes

*Source: Serbian Ministry of Transport * Figures for 2009*

Port transshipments can be ranked according to freight category.

Figure 9: Inland waterways transport at Serbian ports according to freight groups 2009-2010 (1,000 t)



Source: Serbian Ministry of Transport

The chart reveals that, at 60 %, ores and scrap metals represent the largest percentage of freight transported on Serbia's waterways.

Transshipment totals about 3.9 million tonnes, which is in the vicinity of the average transport volume observed over several years.

Ores, scrap metals and steel products are transshipped almost exclusively at Smederevo, a centre of the Serbian steel industry. At this location the US Steel corporation operates two smelting furnaces with an annual capacity of 2.2 million tonnes. The firm uses the Danube as a means of transport for delivery of ores and scrap metals to the plant as well as for shipping the steel products to customers.

Grain, at about 17 %, ranks second among freight groups. This commodity is transshipped for the most part at Novi Sad and Bogojevo. These ports belong to the province of Vojvodina, Serbia's most important agricultural region, situated north of the Danube. Agricultural products and foodstuffs account for almost 30 % of the region's export revenues.

While maize is the major export commodity, soybean, sunflower, wheat and sugar are also exported. Export goods are transported by ship downstream on the Danube to Constanţa, from where they are shipped by sea-going vessel to Italy, Spain, Portugal, Greece and Cyprus. A small portion of exports are shipped to neighbouring countries such as Romania and Bosnia and Herzegovina.

Container traffic on the Danube is still very much in the developing stages. The Austrian-based Helologistics company established the first container line service on the Danube in 2010. Since then, container vessels travel once a week from Budapest to Constanţa and back via Belgrade. In an initial survey, the company reported transporting a total of 1,111 TEUs in 2010, with vessel capacity utilisation reaching a highly favourable level of over 70 %. The transport rates for 2011 were able to be lowered.

Among the potential factors in favour of continued growth of container transport on the Danube is the advantages in distance gained for sea routes and for trade with Asia and the Middle East. Specifically, container vessels from the Middle East and Turkey could transport goods at a shorter distance by setting course for Constanţa, resulting in lower fuel costs than for voyages to the more distant seaports in Western Europe. The same also applies to a certain extent to container transport from Asia, although the savings are significantly less due to the much greater total distance.

Figure 10: Inland waterways and ports in Serbia

Source: Plovput – Directorate for Inland Waterways

Croatia

Croatia has four inland ports, distributed along the Danube, Sava and Drava Rivers, as shown in the map below.

Figure 11: Network of inland waterways and inland ports in Croatia

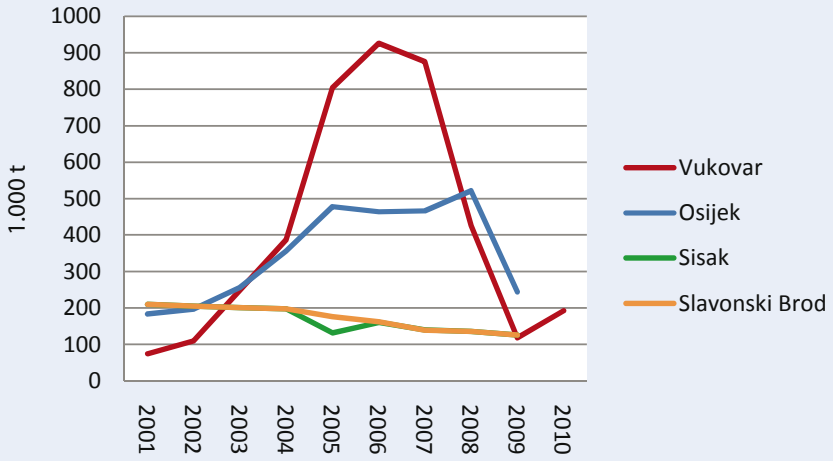
Source: Croatian Ministry of the Sea, Transport and Infrastructure

The chart below shows transshipment of waterborne freight. The port of Vukovar lost a very large volume of transshipped goods in recent years. This can be attributed to the fact that ore and coal transshipment at the port has virtually disappeared. The underlying reason is the change in transport supply routes for a steel plant in Bosnia and Herzegovina.

Following a decline lasting several years, an increase was seen once again in 2010 – amounting to 74,000 tonnes, which is equivalent to a 62 % rise over the previous year. This renewed increase is to be largely attributed to the opening of a new fertiliser plant in Vukovar. The port of Vukovar could experience additional recovery in the future through container transport. The container line service between Budapest and Constanţa, mentioned above, does not yet include any port destination in Croatia.

Helologistics is observing the market closely, and the company is currently not ruling out the possibility of including Vukovar in the container line service in the future.

Figure 12: Transshipment of waterborne freight at inland ports in Croatia



Source: Croatian Ministry of the Sea, Transport and Infrastructure

The main freight categories at the four ports are listed in the table below: [2]

Table 2: Main freight categories handled at Croatian inland ports including transshipment volume

Port	Main freight	Inland waterways transport in 2009
Osijek	Stone and gravel, coal, mineral oil products	0.24 million tonnes
Vukovar	Fertilisers, coal, iron ores	0.19 million tonnes*
Sisak	Crude oil	0.12 million tonnes
Slavonski Brod	Crude oil	0.12 million tonnes

*Source: Croatian Ministry of the Sea, Transport and Infrastructure * Figures for 2010*

The low transshipment volume at the four ports is no contradiction to the considerably larger amount of freight transport within the country as a whole. This is because transit traffic, a form of transport not included in the figures for port transshipment, is much more important for domestic transport.

[2] Based on information from the Croatian Ministry of the Sea, Transport and Infrastructure

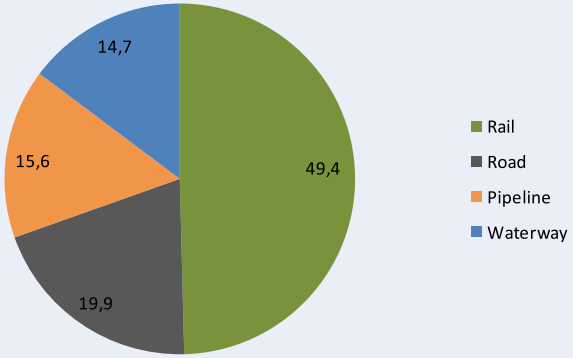
A detailed breakdown according to freight groups cannot be given, as only general information is available for Croatia. One important observation can be inferred nonetheless: the share of agricultural products is smaller than in Serbia, whereas mineral oil products play a greater role in transport activities.

The heart of the mineral oil industry is Sisak. One of Croatia's two refineries is located there (the second is situated at the seaport of Rijeka). Both domestic and imported crude oil is refined at the Sisak plant. Domestic crude oil, originating from Croatia's oil fields in Slavonia, is transported to the refinery by inland vessels. Such crude oil shipments currently account for most of the transshipment volume at the port of Sisak.[3]

► 5 - Modal split

Serbia and Croatia differ very strongly with regard to how market shares are distributed within the transport sector. Whereas rail is the most important mode of transport in Serbia, accounting for about one half of Tkm (tonne kilometre) performance, road freight transport is the most prominent mode in Croatia. Pipelines play a major role in both countries, a fact related to the mineral oil industry, which is relatively important for both countries.
With a share of almost 15 % of freight traffic, waterways in Serbia account for a very large market share compared with other countries. The equivalent market share in terms of transport volume is 9.2 % (first six months of 2010).

Figure 13: Modal Split in Serbia*

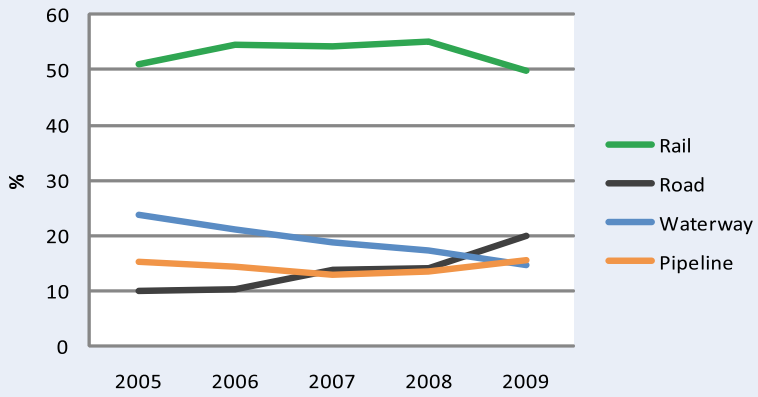


*Source: Statistical Office of the Republic of Serbia * Based on Tkm performance (2009)*

[3] Oil originating in other countries is supplied by pipeline from two directions (Russia and the Mediterranean).

In Serbia, the waterway market share has shrunk in recent years. Rail transport also lost some of its share during the crisis year. This was to the advantage of road freight transport, which gained an additional 10 % share between 2005 and 2009.

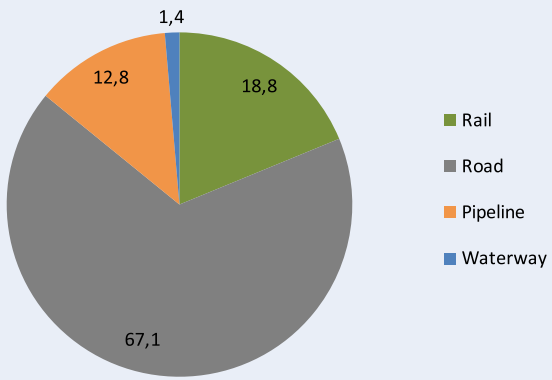
Figure 14: Changes in modal split in Serbia*



*Source: Statistical Office of the Republic of Serbia * Based on Tkm performance*

In Croatia, waterways currently account for a small share of the modal split, i.e. 4.5 % of traffic volume or 1.5 % of freight traffic. In recent years, there has been virtually no change in this distribution over time.

Figure 15: Modal Split in Croatia*



*Source: Croatian Bureau of Statistics. * Based on Tkm performance. 2009*

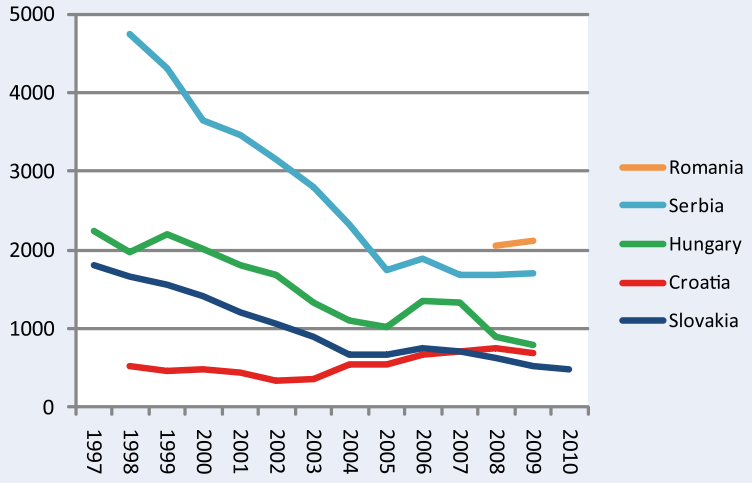
► 6 - Companies and employment

A total of 45 companies in Serbia provide waterway transport services for goods or passengers. Of these, 40 companies have no more than nine employees. Thus, a substantial share of the industry workforce, a total of about 1,700 workers, is employed by a very few large companies.

Following a decline lasting many years, the number of employees has been relatively stable since 2005. This development contrasts, incidentally, with the general decline within Serbia's transport sector. Salaries and wages in inland shipping are comparable to the level for the transport sector as a whole, with the exception of air transport.

At 1,700, more individuals are employed in the Serbian inland shipping industry than in the sector in Croatia (700), Hungary (800) or Slovakia (480), but fewer than in Romania (2,100). Croatia is showing an upward trend, however.

Figure 16: Employment in inland shipping in specific Danube countries



Source: National offices of statistics

Based on the available statistics, a migration of Serbian and Croatian skippers to Western Europe (to the Netherlands or Germany) can be observed only to a very limited extent.

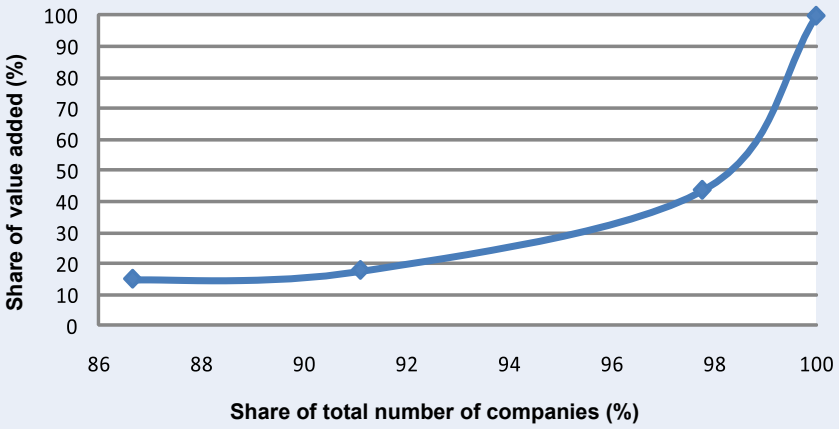
The chart below shows the share of companies in the total value added and in total employment. The companies are broken down according to size. Only one company, the Jugoslavian River Shipping Company, falls in the category of “250 employees and over”. This publicly owned company, which is currently in the process of being privatised, has a more than 50 % share in the value added and the employment.

Figure 17: Serbian inland shipping companies by size and share of value added and employment

Source: Statistical Office of the Republic of Serbia: CCNR calculations

The accompanying market concentration curve below indicates the percentage of companies having a certain market share (as expressed by value added). The companies are plotted by size on the X-axis of the chart, from the smallest (left) to the largest (right).

Figure 18: Market concentration curve for the Serbian inland shipping industry



Source: Calculations by CCNR based on data provided by the Statistical Office of the Republic of Serbia

The curve clearly reveals that 95 % of Serbia's inland shipping companies account for only a 30 % share of total value added in the industry. Expressed in other terms, 5 % of the largest companies generate approximately 70 % of value added in the sector. [4]

In the Serbian industry, freight rates are determined mostly by changes in costs, in addition to the ratio of supply to demand on the market. The cost structure, in turn, depends on the size of the company. For large companies, fuel costs account for 49 % or almost half of total costs, followed by wage costs (16 %), maintenance costs (5.5 %) and insurance costs (3 %).

In the case of small companies, fuel costs, maintenance costs and wage costs each make up one fifth or 20 % of overall costs. At 10 %, insurance costs are a weightier factor than for large companies. Remuneration for the entrepreneur, which amounts to about 10 %, must also be taken into account for small companies. [5]

[4] The following applies in general for the market concentration curve: 1) The more buckled the curve, the more unevenly market volume is distributed within the sector. 2) The more similar the curve is to a diagonal line, the more even the distribution of market volume.
[5] Source: Serbian Chamber of Commerce

Only two shipping companies and about 20 to 25 self-employed inland waterway carriers currently exist in Croatia. The largest shipping company is Dunavski Lloyd, based at Sisak on the Sava. The firm has a fleet encompassing 57 vessels. The other company is Dunavska Plovidba, which was only recently established in 2007 and has its headquarters at Vukovar.

The volume transported by Dunavski Lloyd increased by 300 % between the years 2000 and 2007, from 200,000 tonnes to almost 600,000 tonnes per year. The volume diminished in 2008 and 2009 as a result of the crisis, with only 400,000 tonnes being transported in 2009.

Neither the capacities nor the technical standard of the Croatian fleet are adequate to meet total transport demand. Foreign shipping companies consequently provide a four times greater share of transport services than Croatian companies.

In recent years, inland shipping companies operating within the country have had to shoulder a special charge for diesel fuel. Thus, unlike most other countries with an inland shipping industry, Croatia has no fuel tax exemption. Consequently, shipping companies operating exclusively on inland waterways are confronted with higher fuel costs than operators of international transport services, who are able to purchase diesel fuel in other countries. [6]

Specifically, companies purchasing marine diesel in Croatia are charged a fuel duty of 1.2 kuna (about 0.13€) per litre; the official designation is “Highway and Road Duty” (Naknada za autoceste.) As the name suggests, the revenues from this duty are used for road and highway construction. This amounts in effect to cross-subsidy of road freight transport by the inland shipping industry. [7]

However, after the shipping industry had protested for a number of years, the government introduced the “State Aid Scheme for Inland Navigation Shippers in National Traffic” in late November 2010, a subsidy programme which provides for a refund of the diesel duty at the end of each year. The programme has been approved for a three-year period (2010-2012) with the option of extension.

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[6] Source: CRUP – Croatian Inland Navigation Development Centre

[7] Stated precisely, the charge is not a fuel tax but rather a kind of fuel duty, since the generated revenues are earmarked (i.e. for road construction).

► 7 - Infrastructure

Next to the challenge of developing the industries related to the waterways, the most serious problem facing inland shipping in the Danube countries is the poor condition of the waterway infrastructure. Waterways, locks and ports were neglected for an extended period. No maintenance work was done between 1990 and 2000 on waterways in Croatia, for example. [8] Between now and 2025, Serbia will require an estimated 500 million euros in investments in order to bring its infrastructure of waterways, locks and ports up to standards.

Infrastructure bottlenecks can be found in Serbia and Croatia on the Danube, Sava and Drava Rivers. Bottlenecks most commonly take the form of water levels that are too low for an extended period during the year. The risks associated with the navigable depth make it extremely difficult for cargo shippers to estimate the costs of transport on the Danube.

The river is also too narrow at some points, posing a danger for navigation. There are even wrecks, remaining from World War II, on the bed of the river near Prahovo, constituting an obstacle particularly for river cruise ships. The funds required for salvaging, up to 30 million euros, have not yet been raised.

One of the EU's major objectives for the coming years is to ensure navigability of the Danube on at least 300 days each year for vessels with a maximum draught of 2.5 metres. Another central concern related to infrastructure is to equip ports with modern freight transshipment facilities. Croatia's plans for building a canal to link the Sava and Danube Rivers represents an opportunity to develop the Croatian network of waterways into an integrated system.

Within the context of the national economy, the extent to which investments in the waterway infrastructure can be amortised soundly and swiftly depends on the potential transport volume able to be achieved under "good" navigation conditions. This potential transport volume results, in turn, from the regional economic potential, in conjunction with the degree to which individual industries are inclined to make use of waterways for inbound and outbound logistics.

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[8] Cf.: Croatian Ministry of the Sea, Transport and Infrastructure (2008): Medium Term Development Plan of Inland Waterways

In this respect, it is advantageous for waterways to be developed concurrently with the expansion of the industrial economy and particularly of those domestic industries that favour shipping. This having been said, an estimate will be made in the following of the modal shift potentials that can be achieved by improving the waterway infrastructure. The specific example concerns the Croatian steel industry. The two ports of Slavonski Brod and Sisak are situated on the Sava; both ports are currently used largely for the transshipment of relatively small volumes of oil.

However, one of Croatia's two steel mills is located at Sisak (the other mill is at Split, on the Mediterranean). The steel mill at Sisak was recently modernised by the new owner, the US-based steel corporation CMC, and was equipped with a new electric-arc furnace that offers twice the original capacity. A better developed Sava would allow inland shipping to benefit from the company's growing transport demand, while the cost burden incurred by transport would be lower for the company.

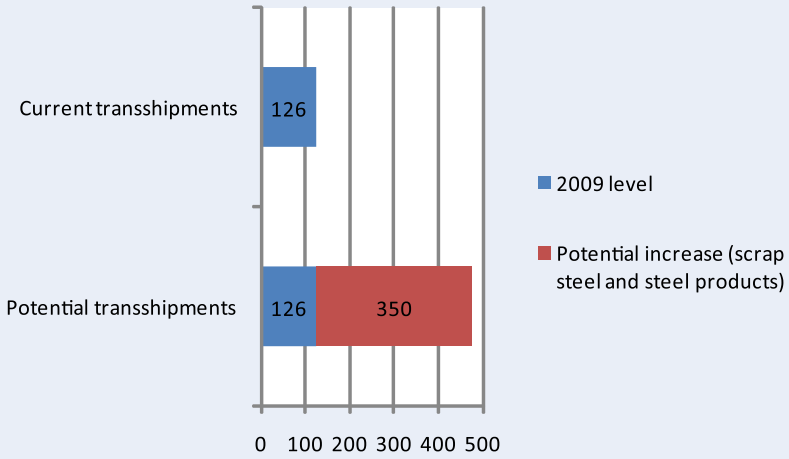
1) **Raw material supply:** According to CMC Sisak estimates, improved navigability of the Sava would allow at least 200,000 tonnes of scrap steel to be supplied to the steel mill each year by inland cargo vessels. [9] Steel is currently being delivered mostly by rail and to a small degree by lorry.

2) **Sales market:** The company sells its products mainly to Germany, Austria, Hungary and Romania. Once reliability of the Sava is improved, CMC Sisak estimates that 150,000 tonnes of steel could be transported to these countries each year via the waterway (Sava-Danube).

As a result of the steel mill modifying its logistics, transshipment of waterborne freight at the port of Sisak would increase by a total of at least 350,000 tonnes annually, amounting to four times the current level.

[9] Information provided by CMC Sisak

Figure 19: Modal shift potentials from the steel industry in Sisak (1,000 t)



Source: CCNR Secretariat based on information from port authorities and CMC Sisak

► 8 - Summary

The level of inland freight transport on the middle Danube is still currently lower than on the upper and lower Danube. This is largely due to developments originating in the past, such as the Yugoslav Wars in the 1990s. During the 1990s, the waterway infrastructure was not maintained or was partially destroyed as a result of the Wars.

In addition to developing the physical infrastructure, a non-physical infrastructure complying with high standards (e.g. efficient port authorities) also needs to be in place. This sharp decline in freight traffic at the port of Belgrade clearly illustrates this fact.

With regard to Croatia, it can be recognised that the size and technical standard of the country's inland fleet are not capable of meeting current transport volume demands. Thus, it will be necessary to modernise the fleet, in addition to improving the infrastructure and introducing port authority reforms.

The future potential for freight transport in Serbia and Croatia is centred largely on the steel industry, on container transport and on the agricultural sector. The latter is very prominent, particularly in Serbia, and is dependent to a large degree on inland shipping for exporting the large volumes of agricultural goods and transporting them over long distances.

The port of Sisak is an example that demonstrates how improving navigability of the Sava would be of tremendous advantage in integrating Croatia's steel industry with inland shipping. Were the steel industry located at Sisak to resort to waterway transport, freight transshipment at the port of Sisak could be increased to four times the current level. Beyond this, one half of Croatia's mineral oil industry is located at Sisak (the site of one of the country's two refineries).

In Serbia, a significant portion of the net product and of the employment generated by the inland shipping industry is accounted for by a very few large companies. The same observation applies correspondingly to Croatia.

Employment as well as an adequate supply of skilled workers will also play an important role in the future. Employment in Serbia declined up to 2005 and has since stagnated at a level of about 1,700 persons. In Croatia, 700 workers are currently employed in the industry and the rate is increasing moderately.

Fact sheet 2:

Tanker shipping market and market development

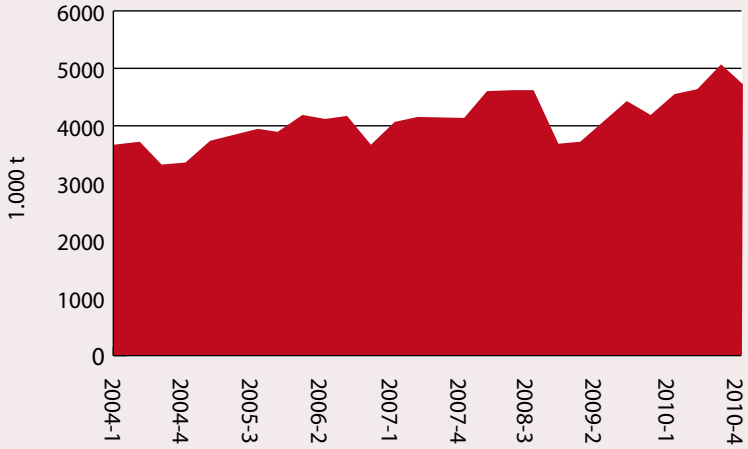
Inland shipping is an important means of transport for the distribution of mineral oil and chemical products within Europe. With the requirement for the conversion of the fleet of single-hulls into double-hull ships, the tanker shipping industry is facing a tremendous challenge. It would therefore appear helpful to view the development of this industry and its future prospects from various perspectives.

► 1 - General development and sub-segments

With regard to the transport of liquid goods, a distinction needs to be made between chemical products and chemical gases, on the one hand, and mineral oil products, on the other hand. The two segments display varying trends when viewed over a number of years.

The transport of chemical products has developed in step with production levels in the chemical industry in Germany, Belgium and the Netherlands. The transport of such goods has been increasing for several years with growing production output within the chemical industry in Western Europe. The volume of chemical products transported on the Rhine increased considerably between 2004 and 2010, at a rate of 29 %.

Figure 20: Transport of chemical products on the Rhine

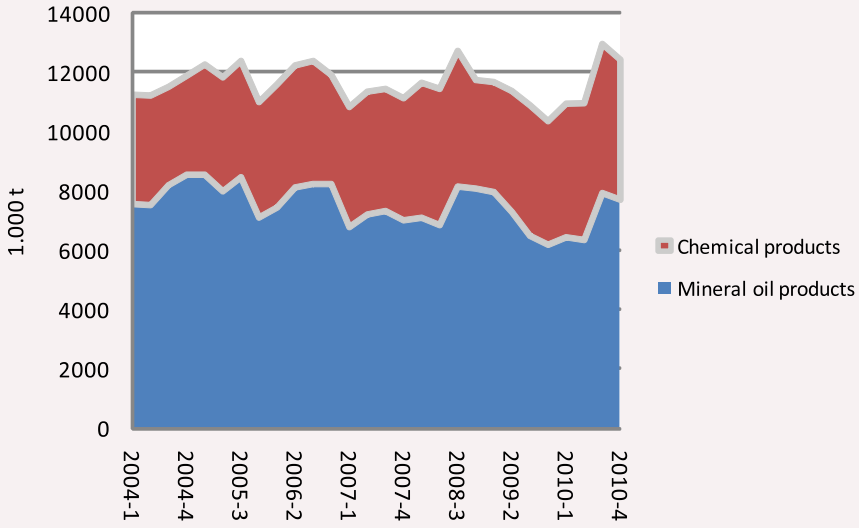


Source: destatis

In contrast, transport of mineral oil products is declining with the downward trend in consumption of these commodities (tendency towards more efficient vehicle engines, more efficient use of heating oils

among consumers). Increased transport demand for chemical products has compensated the reduced demand for mineral oil products, with the result that the overall balance for the tanker shipping industry in fact increased by almost 5 % from 2004 to 2010.

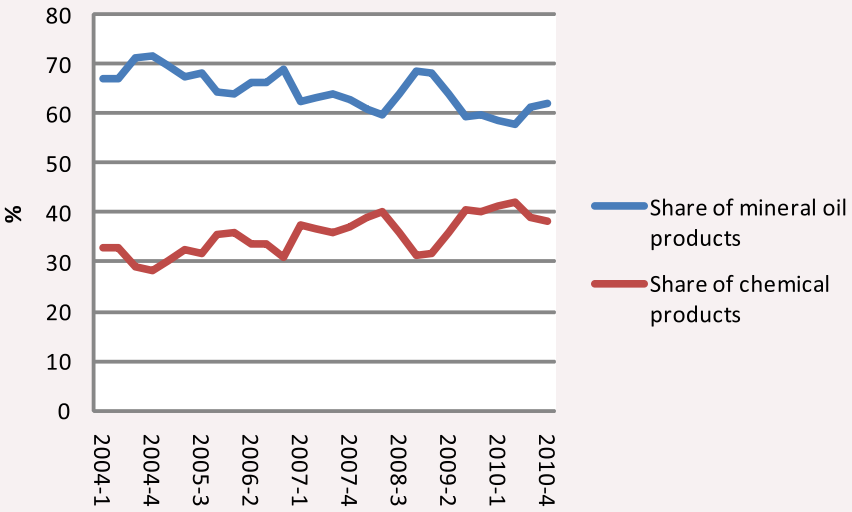
Figure 21: Volume transported by tanker shipping on the Rhine



Source: destatis

As a result of the various developments, there has been a structural shift in transport volumes. While the share of mineral oil products in total transport volume dropped from 67 % in 2004 to 60 % in 2010, the share of chemical products simultaneously increased from 33 % to 40 %.

Figure 22 : Share of segments in the volume transported by tanker shipping on the Rhine



Source: destatis; calculations by the CCNR Secretariat: share of transport volume

► 2 - Transport demand

2.1 Factors affecting demand

In order to be able to assess the development of transport demand in tanker shipping, it is useful to make a distinction between a short-term and a long-term perspective. An additional distinction can be made between economic factors and factors that are exogenous to the market (i.e. natural factors).

Table 3: Factors affecting transport demand in tanker shipping

Short-term factors		Long-term factors	
Economic	Exogenous to the market	Economic	Exogenous to the market
Oil price, oil futures markets and stock Business cycle of the chemical industry	Weather conditions (winter temperatures)	Demand for mineral oil products Location of refineries and chemical plants refineries' choice of transport carrier	Technological progress in the energy sector Energy policy

Source: CCNR Secretariat

The oil price plays a major role in the short and medium term. Evaluations carried out for the period from 2000 to 2008 have revealed that a high oil price tends to curb transport demand. The amount of oil stocked also has a significant effect. To mitigate the price risk posed by futures markets, oil products are transported to tank storage facilities and stocked whenever trends at the London futures market indicate rising gas oil prices in the future. [10] Tank storage facilities are located in the ARA region and on the Rhine.

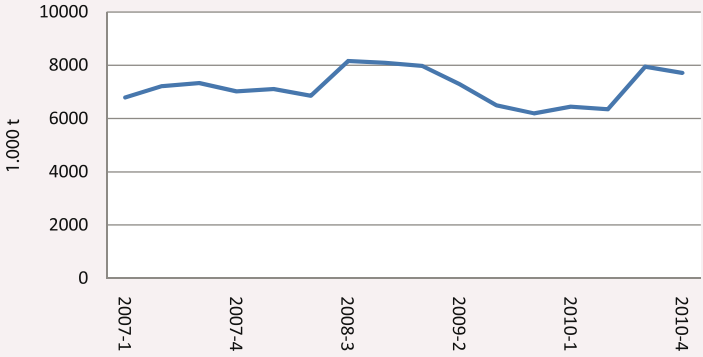
When, as in late 2008, there is a very strong incentive to stockpile oil, inland and sea-going vessels are employed as floating storage facilities. Weather conditions have an effect depending on the season, influencing the heating oil segment in the autumn and the market for fuels in the summer months. The factors affecting demand in the long term will be discussed in detail farther below. First, a description of current trends in supply and demand will be given.

[10] This kind of price swing results in a changeover from a backwardation to a contango situation, i.e. futures market trading reflects the expectation of rising instead of falling oil prices.

2.2 Current demand trend

The transport of mineral oil products during the last four years has been characterised by fluctuating demand. Initially, demand increased considerably in late 2008 in response to sharply falling oil prices. Demand subsequently became somewhat sluggish, remaining at this level for all of 2009. A recovery can be observed since early 2010.

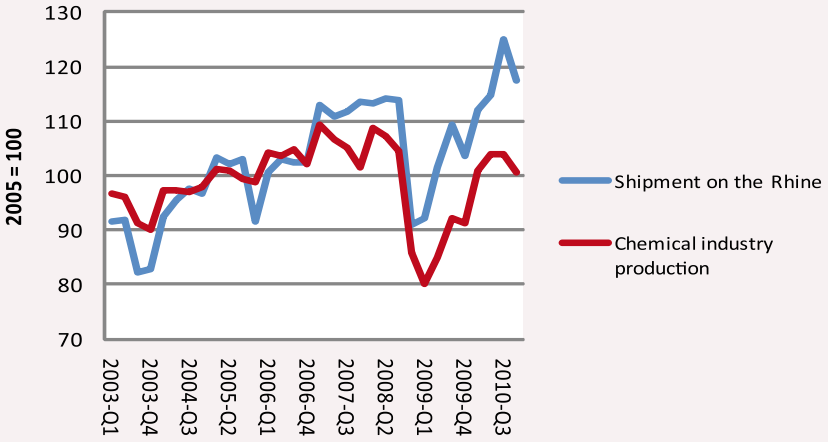
Figure 23: Transport of mineral oil products on the Rhine



Source: destatis

The crisis had negative repercussions on the chemical industry at a much earlier point in time, whereas the recovery also set in earlier.

Figure 24: Transport of chemical products on the Rhine *



*Source: destatis; calculations by the CCNR Secretariat. * Production index for Germany*

On the Rhine, the pre-crisis level of 4.6 million tonnes (value for third quarter 2008) was already reached in the first quarter of 2010. About 5.2 million tonnes were transported in the third quarter of 2010. The volume transported rose by 20 % from 2005 to 2010 and by 29 % during the 2004-2010 period. This would indicate a trend toward increased transport of chemical products.

► 3 - Fleet development

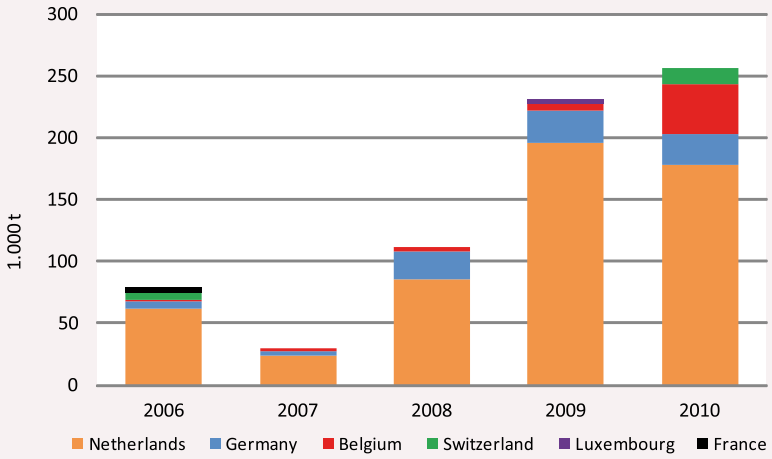
The fleet capacity of a country or a river system can change because of the following factors:

- New ships
- Converted ships (if the ships' capacity is changed as a result)
- Scrapping
- Purchase and sale

3.1 New and converted ships

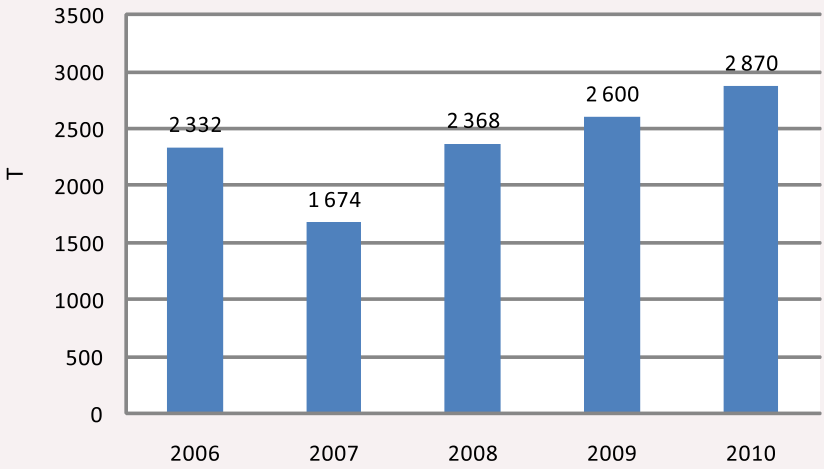
From 2006 to 2010 inclusive, around 280 new tankers were added to the fleets of the Western European countries (Netherlands, Belgium, Germany, Luxembourg, Switzerland). For several years new building has been focused to double-hulled motor tankers. By far the greatest number of new ships have a Dutch flag, followed by Germany and Belgium (see chart).

Figure 25 : Construction of new tankers in Western Europe (tonnage)



Source: IVR

Figure 26 : Average capacity of new tankers in Western Europe (tonnes)



Source: Calculations CCNR; IVR

In the tanker shipping industry, the fleet is currently being converted from single-hull to double-hull ships. The conversion is being carried out in accordance with the transitional provisions of the ADN [11], which permit the industry to continue transporting certain substances in single-hull ships during the transition period (which lasts until 2018).

The transition deadlines vary according to the substance being transported. For instance, for many chemical products a transition period until 31.12.2012 applies. Petrol fuel may be transported in single-hull ships until the end of 2015. In respect of diesel fuel, gas oil, light heating oil and kerosene, this is still possible until the end of 2018. [12]

[11] ADN = Annex to the European agreement from 26 May concerning the international carriage of dangerous goods by inland waterways
[12] Source: ADN (2011)

Table 4: Schematic representation of the transition deadlines for tanker shipping

End of the transition deadline		
31.12.2012	31.12.2015	31.12.2018
Various chemical substances	Petrol, various other petroleum distillates, hydrocarbons	Diesel, gas oil, light heating oil, kerosene, jet fuel, turpentine oil substitute

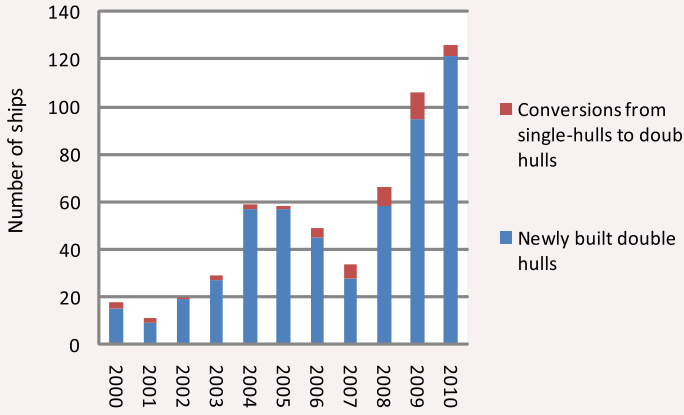
Source: ADN (2011)

The ADN regulations mean that different conditions will prevail in sub-segments of the tanker shipping industry in the coming years. It may be observed that the quantitatively largest area of the mineral oil segment (i.e. diesel, light heating oil, gas oil, kerosene) is affected relatively late by the transitional provisions. By contrast, the changeover comes relatively early for chemical products.

The following chart shows the growth of double-hull ships in each year from 2000 to 2010. This growth is based on information from the EBIS organisation, which monitors the operational safety of tankers on inland waterways. [13]

[13] The total number of tankers inspected by the EBIS is roughly comparable to the size of the Western European fleet of tankers, as stated here by the CCNR.

Figure 27: Annual growth of double-hull ships



Source: EBIS

The above chart shows that the conversion of single-hulls to double-hulls is not very frequent. Consequently, hardly any limitation of the fleet stock due to the conversion of existing ships can be discerned.

3.2 Scrapping of ships

The scrapping of ships is of negligible importance in Western Europe at present. Calculations for the Netherlands and Germany reveal the following:

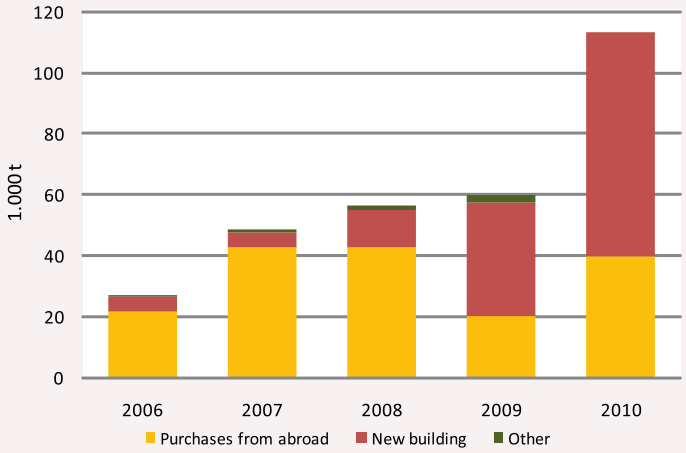
- Netherlands: 546,300 tonnes, in other words more than half a million tonnes, were added as newly built ships from 2006 to 2010, while only 5,700 tonnes were scrapped in the same period. The scrapped tonnage corresponds to a share of only 1 % of the newly built tonnage. [14]
- Germany: 81,600 tonnes were added to the market as newly built ships in the period from 2006 to 2010. 5,000 tonnes were scrapped. This corresponds to a share of 6 % of the newly built tonnage.

3.3 Purchase and sale of ships

This form of inventory change is quantitatively important. This is shown by the following charts which take Germany as an example. Here, the purchase and sale of ships from 2006 to 2008 was quantitatively more important than new building. However, the proportion of the inventory change accounted for by newly built ships has grown year after year.

[14] These are approximate figures

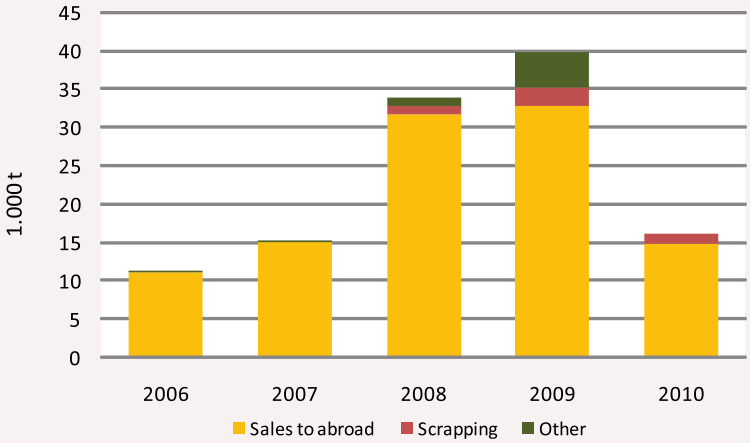
Figure 28: Additions to tanker tonnage in Germany differentiated by type of addition



Source: WSV Südwest; ELWIS. Note: Apart from tankers the additions also included a (tiny and diminishing) number of tank barges for push tows.

It may also be observed that in 2010 these ships originated exclusively from the Netherlands and Luxembourg.

Figure 29: Subtractions from tanker tonnage in Germany differentiated by type of subtraction



Source: WSV Südwest; ELWIS. Note: Apart from tankers the subtractions also included a (tiny and diminishing) number of tank barges for push tows.

Around 64 % of the countries to which the ships were sold were countries on the Rhine river system (Netherlands, Belgium, Switzerland, Luxembourg). The remaining 35 % went primarily to Eastern Europe (Romania, Serbia, Ukraine). In 2010, ten motor tankers (16.200 t) were sold from Germany to abroad. The main countries to which the ships were sold are the Netherlands and Belgium. On balance, there was an increase of stock for Germany, because the tonnage added outweighed the subtractions.

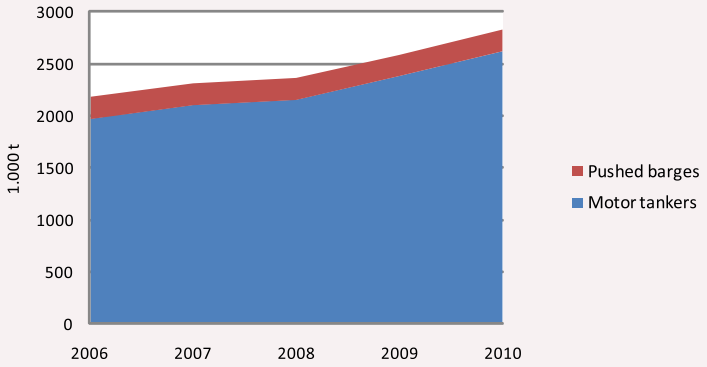
It may be observed that most of the countries to which the tankers were exported from Germany were Western European countries. This indicates – at least in the case of Germany – that the fleet operating in Western Europe is barely reduced by the export of ships.

► 4 - Available shipping tonnage

As mentioned above in relation to newly built ships, pushed tanker barges are no longer being built, only motor tankers. However, the pushed tanker barges still have a certain share of the existing fleet.

The total capacity of the Western European tanker fleet (Netherlands, Germany, Belgium, France, Switzerland, Luxembourg) is approximately 2.8 million tonnes, 2.6 million tonnes of which is accounted for by motor tankers, leaving a tiny remainder of 0.2 million tonnes to be accounted for by pushed barges. Expressed in numbers of ships, there are 1,177 motor tankers and 142 pushed tanker barges, including some barges for push tows.

Figure 30 : Tanker fleet in Western Europe *



*Source: CCNR. * Western Europe = Netherlands, Germany, Belgium, France, Switzerland, Luxembourg*

In terms of proportional share of the fleet among individual countries, the Netherlands rank first, having a 49 % share (based on tonnage). Germany ranks second at 28 %, followed by Belgium with 13 % and the remaining countries (Switzerland, France and Luxembourg) which each hold a share of 5 % or less.

Table 5: Distribution of the Western European tanker fleet by country

Country	Tonnage (1.000 T)	Share of capacity in %
Netherlands	1.396,5	49
Germany	765,5	28
Belgium	377,2	13
Switzerland	114,8	4
France	131,9	4
Luxembourg	36,2	1
Total	2.825,6	100

Source: CCNR calculation based on national statistics. As of 31.12.2010

The proportional share of double-hulls in relation to the entire fleet may also be estimated. When all double-hull ships newly built since 2000 (as well as the converted vessels) are taken into account, the current double-hull share of the Western European fleet can be assumed to be about 60 %.

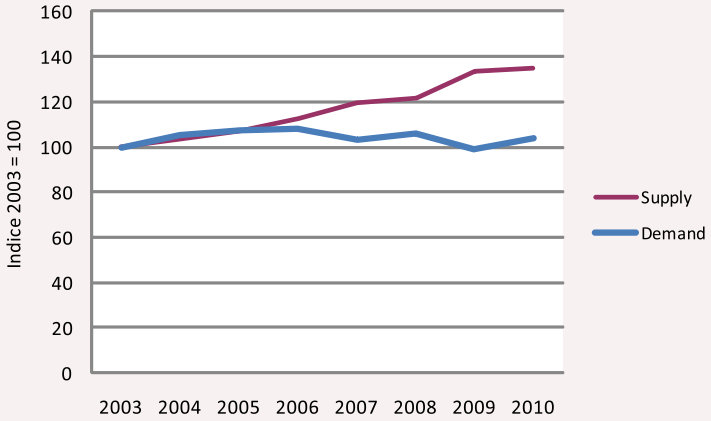
► 5 - Comparison of changes in supply and demand

If the volume to be transported does not increase at a rate commensurate with fleet expansion, utilisation of vessel capacities will decrease, affecting utilisation both at the level of individual shipping companies and the industry as a whole. An additional consequence is downward pressure on freight rates.

The chart below shows the changes in supply and demand over time. The curves specifically indicate the changes in the capacities of the Western European tanker fleet relative to 2003 as well as fluctuations in the corresponding demand for capacities.

Demand in this case entails transport services for chemical goods and mineral oil products on the Rhine. Supply includes the tanker fleet capacities of Belgium, Germany, France, Luxembourg, the Netherlands and Switzerland.

Figure 31: Comparison of changes in supply and demand in the tanker shipping industry



Source: CCNR calculations

The chart shows that supply and demand developed at a similar rate until 2006. The percent increases in total volume roughly corresponded to the percent increases in capacity. A more or less balanced development may thus be observed until 2006.

Beginning in 2007, supply and demand can be seen to increasingly drift apart. While demand remained more or less constant, the capacity increased at a linear rate. The fleet transport capacity grew by about 35 % between 2003 and 2010. Demand, meanwhile, increased by a mere 4 %.

It must be assumed that this gap will continue to widen in the coming years. This follows from the fact that the conversion of the Western European fleet from single-hulls to double-hulls is far from completion, since the estimated share of double-hulls in Western Europe is 60 %.

Another fact needing to be considered is that the increased productivity of new ships will have the effect of increasing the capacity supply. A higher level of personnel (i.e. with several shifts operating 24/7) is one of several factors that enhance the productivity of newer tankers in comparison to more dated vessels. This aspect additionally contributes to the effective supply of vessel capacity.

► 6 - Freight rates and turnover

When examining freight rates in the tanker shipping industry, a distinction needs to be made between gas oil and petrol fuels. In a manner similar to demand, the factors affecting freight rates can generally be broken into economic causes and factors exogenous to the market (i.e. natural effects). In both categories it is useful to further distinguish between supply-side and demand-side factors.

It is also necessary to distinguish among freight rates according to region. Tanker shipping on the Rhine needs to be distinguished from tanker shipping in the ARA region. Freight rate changes in each of the sub-markets can parallel each other at times but also follow differing curves at other times. A shipping company always has the option of shifting the focus of activities either to the Rhine market or on the ARA market, depending on which offers higher freight rates.

The water level is the most important factor exogenous to the market and at the same time the most important determinant of freight rates in general. As the water level falls, the maximum draught of each vessel is reduced, so that less vessel capacity is available for a given total fleet capacity and level of demand. This results in rising freight prices.

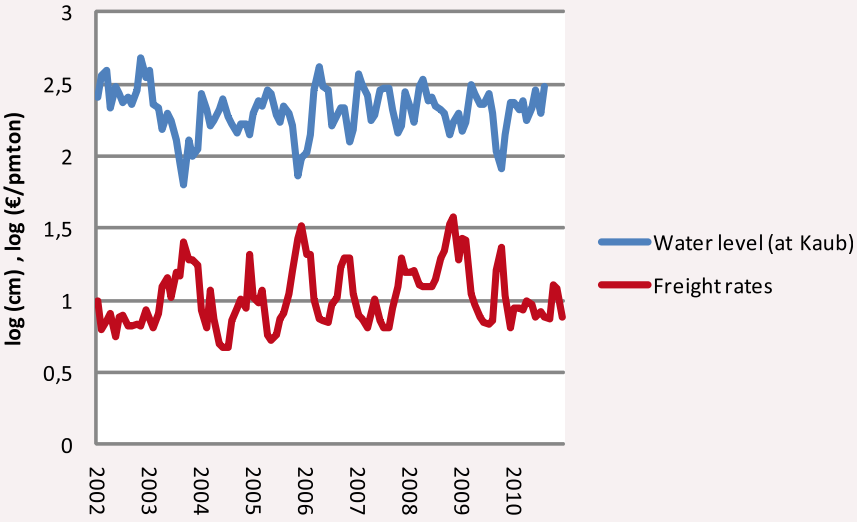
Table 6: Factors affecting freight rates in tanker shipping

Economic factors		Factors exogenous to the market	
Demand side	Supply side	Demand side	Supply side
Transport demand Oil futures markets Stockpiles	Fleet capacity Changes in tanker shipping costs	Winter temperatures (for the heating oil market) Summer (for the fuel market)	Water level

Source: CCNR Secretariat

One look at the figure below is sufficient to recognise that the water level is generally the most important determinant for the level of freight rates.[15] The chart shows the water level at Kaub on the Rhine and the average freight rates for gas oil (average for six destinations from Rotterdam) for the period of 2002 to the end of 2010.[16] The price for transport increases regularly during periods when the water level drops below 'normal'. Thus, a clearly recognisable inverse relationship exists between the water level and the freight rate.

Figure 32 : Water level and gas oil freight rates in Rhine shipping *



Source: Data from PJK International; Federal Institute for Hydrology; calculations by CCNR.
Note: Values have been logarithmised to allow plotting of the two datasets on one and the same chart.

[15] The visual impression is additionally confirmed by calculations. For example, in the period 2002 to 2008 an average increase of one percent in the water level at Kaub on the Rhine resulted in a 0.8 % reduction in Rhine freight rates. Refer to "Freight rates in the tanker sector", CCNR Market Observation Report 2010-1.

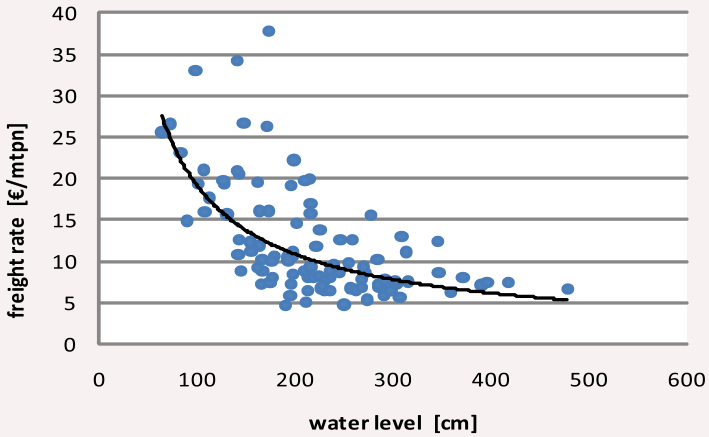
[16] Monthly averages of the gas oil freight rates for transport from Rotterdam to six destinations (Duisburg, Dortmund, Cologne, Frankfurt, Karlsruhe, Basel)

Other factors affecting rates, such as transport demand, while difficult to recognise from the chart, can be readily identified mathematically.[17] From the chart it can be recognised at least that the second half of 2008 was a period during which the freight rate trend was clearly determined by the demand side. During this period, the drastic price drop in the oil market swiftly drove transport demand upward, and with it the freight rates. The water level at this time could be considered more or less normal.

In a manner similar to demand, freight rates returned to a relatively low level in the course of 2009, increasing only briefly during the second half of the year due to a low water level phase. Very low freight rates were typical for all of 2010, which can be attributed to the high rate at which new ships were being built, but also to the relatively high water level.

The relation between water level and transport price for the period cited above (2002-2010) can also be recognised from the chart below. It reveals that the relationship between water level and transport price, viewed overall, is not a linear one. Specifically, the freight rate increases at a disproportionately high rate once the water level drops below a certain threshold. The regression curve, which was drawn in on the basis of the data, illustrates the cited non-linear relationship.

Figure 33: Water level and gas oil freight rates in Rhine shipping



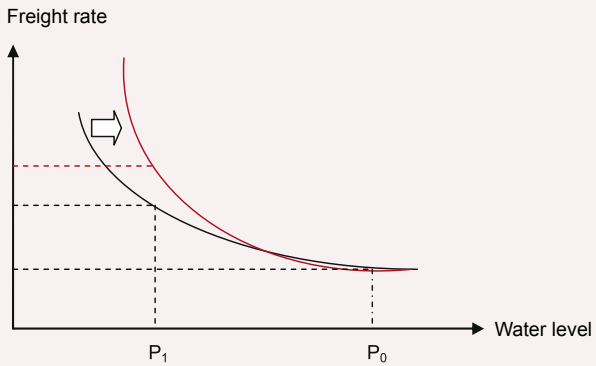
Source: Chart prepared by CCNR Secretariat based on data from PJK International; Federal Institute for Hydrology. Including non-linear regression function

[17] Refer to the fact sheet "Freight rates in the tanker sector", CCNR Market Observation Report 2010-1.

Effect of ship size on the water level-freight rate relation

The relationship between water level and freight price is additionally affected by the cargo capacity of the ships themselves. Vessels having a larger cargo capacity reach the maximum permissible draught sooner than smaller ships.
Scientific research has established that lowering the water level reduces the maximum permissible cargo volume for small vessels to a proportionally lesser extent than for large vessels, with the result that the freight price for large vessels increases more quickly than for small vessels when the water level falls.

Figure 34: Effect of increasing cargo capacity on the water level-freight rate relation



Source: Chart by CCNR Secretariat

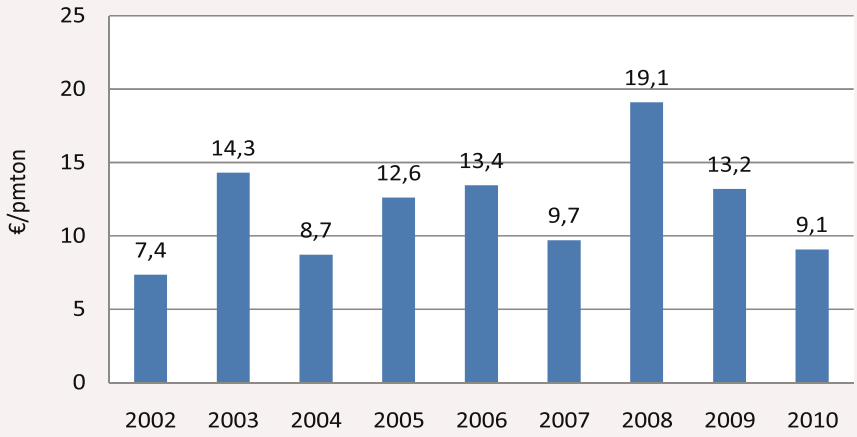
This effect is revealed by the chart above. The black line represents the water level-freight rate relation for a fleet of small vessels. The average cargo capacity of the fleet subsequently increases as large vessels are added. The result is that the curve representing the water level-freight rate relation shifts to the right. The red line represents the new relation.

A decrease in water level from P_0 to P_1 results in a defined increase in freight rate for a fleet of small vessels. The increase in freight rate is greater, however, for a fleet of large vessels than for a small-vessel fleet. Estimates indicate that the negative effects of a freight rate increase caused by a low water level are relatively minor due to a low price elasticity of demand.

*Refer here to the doctoral thesis by O. Jonkeren (2009): Adaptation to Climate Change in Inland Waterway Transport; p.30: "…Given a decrease in water level, for small ships, the increase in price per ton is less than for large ships […].

A comparison of the average freight rates for individual years reveals that 2008 was a record year – at least within the period of 2002 to 2010.

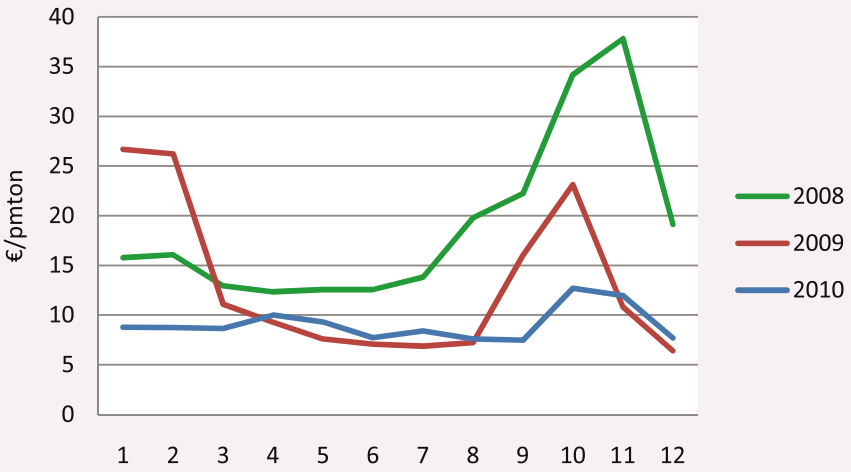
Figure 35: Average annual gas oil freight rates in Rhine shipping



Source: Data from PJK International; calculations by CCNR.

The changes in freight rates from month to month during the years 2008, 2009 and 2010 allow two observations to be made:
There was an overall 'phase shift' in 2008, relative to the other two years. A seasonal effect can be seen in the autumn of each year; this is probably related to the time when heating oil was delivered to tank storage facilities.

Figure 36: Average freight rate level for gas oil in 2008, 2009 and 2010 in Rhine shipping



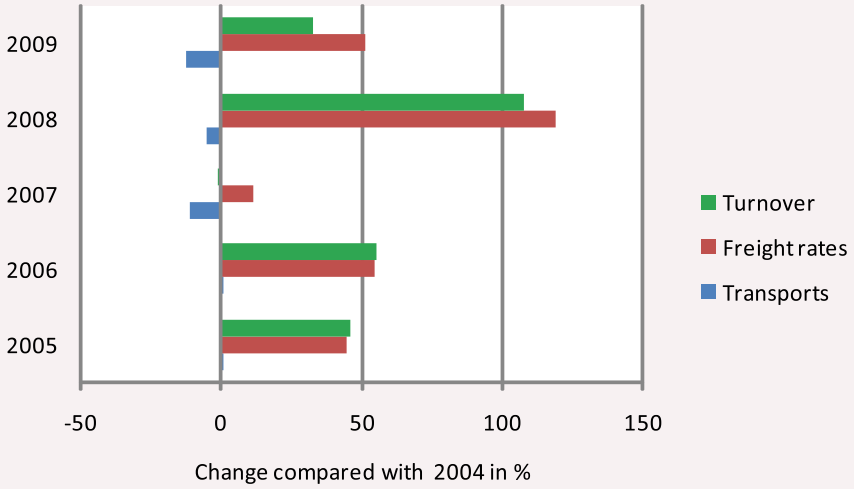
Source: Data from PJK International; calculations by CCNR. Numbers 1 to 12 = months

Turnover is a function of freight rates in relation to the total volume transported. An indicator for the "industry turnover" in the tanker shipping sector can be derived by multiplying the average freight rate level for one year by the total volume transported by tankers in that year.

Industry turnover can be increased, either through a large transport volume, higher transport prices, or through a combination of these two factors. It is thus of interest to note the changes in freight rates, in total volume transported and in industry turnover, which is derived from the two foregoing figures, for the tanker shipping industry on the Rhine. It is additionally of interest to note the specific contributions of freight prices and total volume to turnover.

The chart below shows the changes, from year to year, in freight rates, in the volume transported and in the resulting level of industry turnover, whereas each of the variables is represented relative to the year 2004. Substantially greater variability can be recognised for rates than for total volume. Freight rates consequently also have a greater effect on changes in industry turnover.

Figure 37: Percent changes in turnover, transport volume and freight rates in the tanker shipping industry on the Rhine – 2005 to 2009

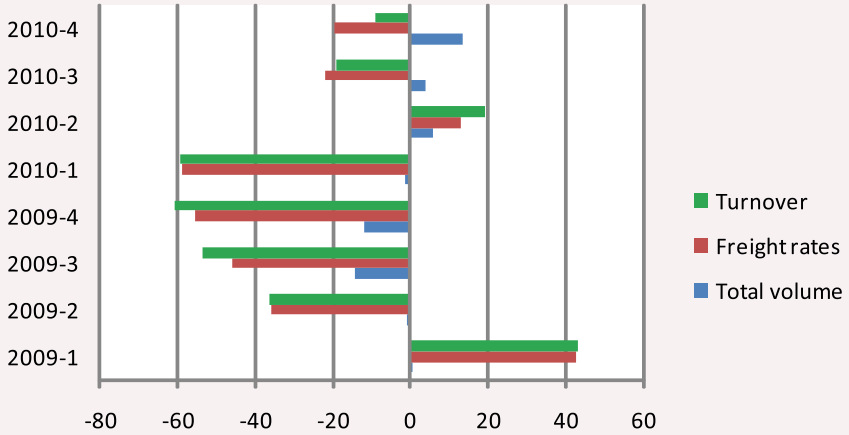


Source: Calculations by the CCNR Secretariat based on information from PJK International, destatis

One example for this relationship is 2008, when the total volume transported during the year as a whole was slightly below the 2004 level (despite very strong increases toward the end of the year). Freight rates, in contrast, rose sharply as the year came to a close. As a result, there was very strong growth in turnover during 2008, while this trend was dampened only somewhat by the slight transport volume losses.

Rates in 2009 were about 50 % higher than in 2004, whereas the total volume was slightly below the 2004 level. Industry turnover nonetheless increased relative to 2004, because the positive effects generated by higher freight rates more than compensated the negative impact of volume. The chart below shows the changes in turnover, rates and total volume for each of the quarters of 2009 and 2010.

Figure 38: Percent changes in turnover, transport volume and freight rates in the tanker shipping industry on the Rhine – 2009 and 2010 by quarter



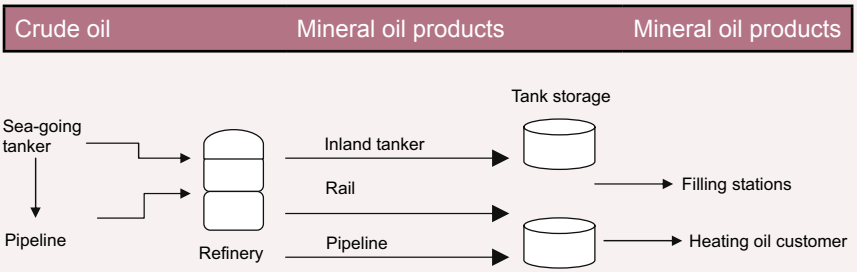
Source: Calculations by the CCNR Secretariat based on information from PJK International, destatis

A closer examination of the chart above reveals the after-effects of high freight rates in 2008. Specifically, freight rates during the second to fourth quarters 2009 were well below the level recorded for the previous year, which consequently resulted in less turnover. While demand in 2010 picked up compared to 2009, freight rates did not follow the trend, principally due to the relatively high water level.

► 7 - Market shares of inland shipping in the mineral oil segment

In areas where waterways and rail links are simultaneously available, inland shipping must compete with rail for the transport of chemical and mineral oil products, as well as with pipelines. In the mineral oil sector, transport on inland waterways is used almost exclusively for shipping oil products from refineries to tank storage facilities, since crude oil is supplied to refinery locations by way of pipelines or by sea-going tanker (depending on the geographical location of the refinery).

Figure 39: Schematic diagram of material flows in the mineral oil logistics chain



Source: Chart by CCNR Secretariat

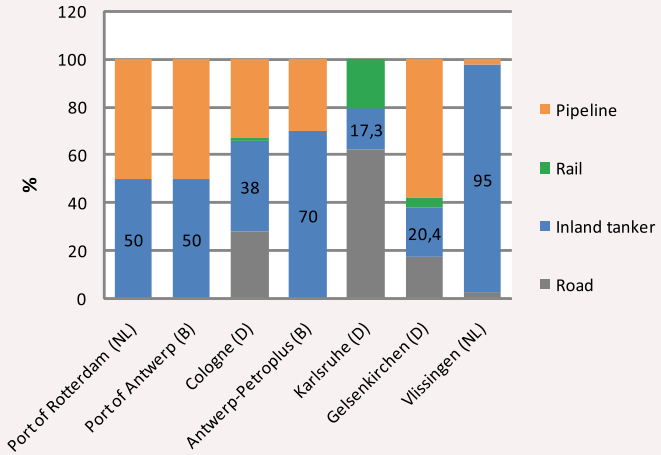
The next two charts present the results of a survey among all refineries currently in operation in Belgium, the Netherlands and Germany to determine the market shares of the modes of transport used. The locations are indicated in the order of size (i.e. beginning with the largest refineries on the left and on to the smallest ones at the right end of the chart).

The plants at the ports of Rotterdam and Antwerp (there are four refineries in each of the port areas) have been grouped together, with the modal split share in each case estimated on the basis of the port of Rotterdam.

In view of available capacities, inland shipping could achieve an even greater share of the market at the ARA ports. However, the logistic rhythms of sea-going tankers, tank storage facilities and inland shipping are frequently not very well coordinated. This often results in waiting times and thus in lost time.

In this context, inland vessels often function as logistic buffers and floating storage facilities for mineral oil products. In 2008, there were very often waits at loading and unloading points. This also meant that shipping companies had to pay a large amount in demurrage charges.

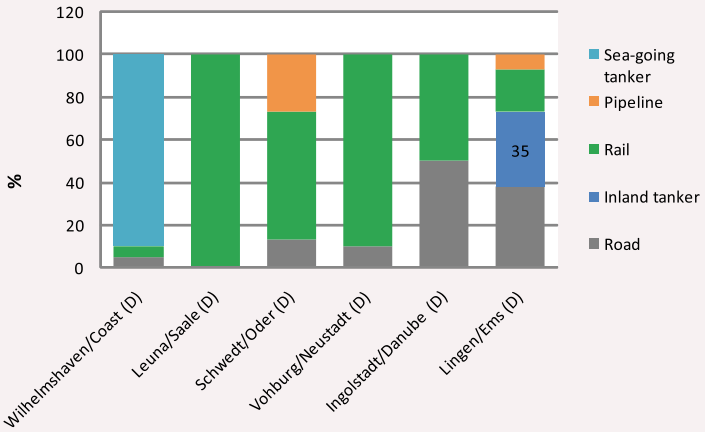
Figure 40: Modal split shares for deliveries of mineral oil products from refineries in the Rhine region



Source: Corporate information from Shell, BP Germany, Total, Petroplus, Mineral Oil Refinery Oberrhein, Haven Rotterdam. Refineries in the port areas of Rotterdam and Antwerp: Estimate based on port information

The corresponding chart for the other refineries located in Germany shows very clearly that inland shipping is in a disadvantaged position in much of Germany, particularly when compared to rail transport.

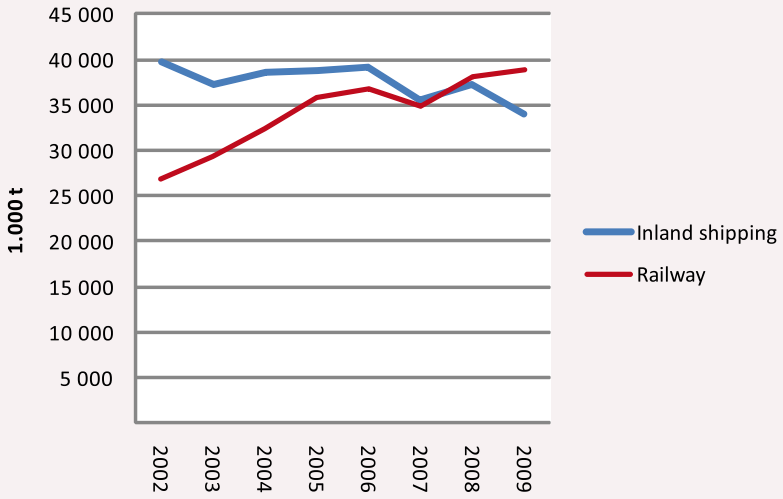
Figure 41: Modal split shares for deliveries of mineral oil products from refineries in Germany outside the Rhine region



Source: Corporate information from ConocoPhilips, Total, PCK GmbH, Petroplus, BP Germany. Vohburg/Neustadt: Estimate

It thus becomes clear that, in Germany as a whole, about an equal volume of mineral oil products are transported by inland shipping and by rail. Finally, inland shipping and rail will probably not be natural competitors for refinery business – at least not everywhere. That is because transport on inland waterways, due to a lack of infrastructure, is simply not feasible in a number of regions.

Figure 42: Total volume of mineral oil products, petroleum and gases transported by rail and by inland tanker in Germany



Source: destatis

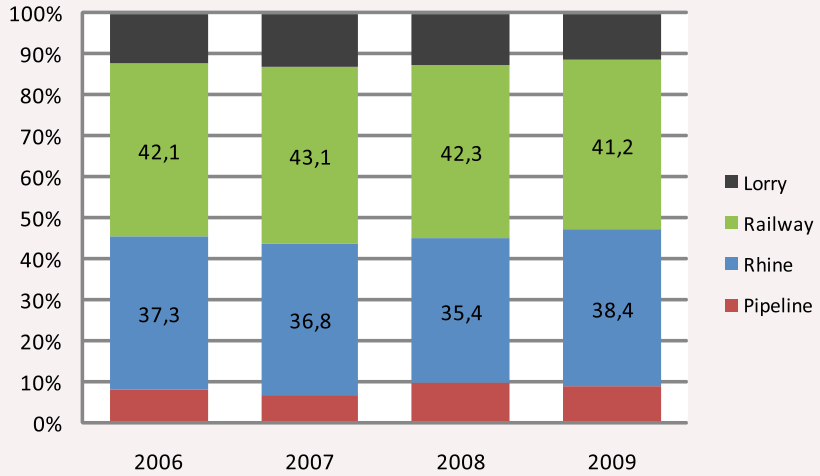
When discussing the transport of mineral oil products in Western Europe, the role of Rhine shipping for Switzerland also needs to be mentioned. It is true that the Switzerland's two refineries are not situated on waterways: the Cressier refinery is near Neuchâtel, while the Colombey refinery is situated near Lake Geneva.

Nonetheless, the Rhine plays a central role in imports of mineral oil products. A total of about 80 % of such imports arrive in Switzerland by rail and by waterway (i.e. the Rhine). As a means of transport, the Rhine is responsible for about 38 % of such imports. [18]

[18] Source: CCNR calculations based on information from the Swiss Oil Association (EV)

The mineral oil imports transported on the Rhine originate in the Netherlands, Belgium and Germany. A total of 3.2 million tonnes of mineral oil products reached Switzerland via the Rhine in 2009. Of these shipments, 1.6 million tonnes were from Germany, 1.3 million tonnes from the Netherlands and 0.3 million tonnes from Belgium.

Figure 43: Market shares of individual modes of transport in imports of mineral oil products to Switzerland



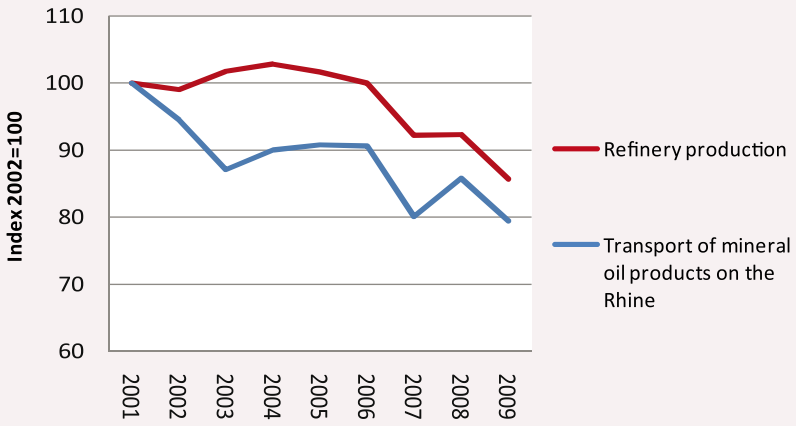
Source: CCNR calculations based on information from the Swiss Oil Association (EV)

► 8 - Future prospects – with special consideration of the mineral oil segment

When discussing the outlook for tanker shipping demand in the years to come, a distinction needs to be made between chemical products, mineral oil products and alternative fuels.

Refinery production must be regarded as a determining factor in future transport demand within the mineral oil segment. The chart below presents a comparison of the trend in refinery production in Western European countries (Belgium, Germany, France and the Netherlands) with the transport of mineral oil products on the Rhine.

Figure 44: Changes in refinery production in Western Europe and transport of mineral oil products on the Rhine



Source: Association of the German Petroleum Industry; destatis; calculations by the CCNR Secretariat

On the whole, the chart indicates that the two variables are related. However, transports, at 20 %, decreased at a higher rate between 2001 and 2009 than refinery production, which declined by 14 %. It could be concluded from this observation that inland shipping forfeited shares in the market for the transport of mineral oil products. Recently several refineries in Europe have been shut down or converted to tank storage facilities. The locations listed in the following were affected: [19]

- Dunkirk refinery, France, 2010
- Reichstett refinery near Strasbourg, France, 2010
- Hamburg-Harburg refinery, Germany, 2010
- Heide refinery, Germany, 2010

Closure of the Strasbourg refinery is not likely to impact Rhine shipping to any great extent. That is because the waterway played only a minor role in the logistics of the refinery.

[19] Source: Corporate information from Shell, Total and Petroplus

Simultaneous with the reduction of refinery capacities in Europe, new capacities are being created in the Middle East (e.g. with a new Total refinery in Saudi Arabia) and in Asian nations. Capacities are in this way being shifted to oil producing countries (in the Middle East) and to mineral oil markets that are still expanding (in Asia). By and large, the activities and announced plans of oil company groups provide indications of the following trends for Europe:

- Concentration of activities on major refinery locations and the merging of mid-sized operations in order to achieve economies of scale (for example, refineries at Cologne-Godorf and Wesseling)
- Elimination of smaller units [20]
- Realignment of refinery production to reflect altered market demand (increase in diesel output, decrease in petrol output) [21]
- Downsizing: realignment is frequently accompanied by a reduction of total capacity (an example is the refinery at Gonfreville, France)

For conventional refinery production, i.e. based on fossil crude oil, further reduction of capacities in Europe and thus of transport demand is expected in the next decades. Increased output and subsequent growth in transport needs can be expected for the chemical industry, particularly in countries such as Germany, Switzerland, the Netherlands and Belgium, which produce significant quantities. The alternative fuels market is an additional source of growing demand for tanker shipping. Biodiesel and ethanol are now being produced at a number of biorefineries in Western Europe (examples can be found at the inland ports of Emden, Würzburg and Straubing).

An additional aspect is that the biodiesel industry very much considers shipping availability when deciding on the location of facilities. Inland tankers are very frequently included in the logistics chain of plants producing alternative fuels. This applies both to the supply of agricultural raw materials (rapeseed, oilseeds, wood chips etc.) and the outgoing delivery of the final products (biodiesel, ethanol).

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[20] The point at which a refinery should be considered “small” is obviously not quite clear. Yet, the examples seen in the past two years have shown that all four of the refineries shut down in France and Germany had an annual crude oil processing capacity of 4 to a maximum of 7 million tonnes. Europe’s largest refinery (Rotterdam-Pernis) has a capacity of 20 million tonnes.

[21] However, reconfigurations of this kind are, for technical reasons, only feasible to a limited extent (a refinery cannot exclusively produce diesel fuel).

► 9 - Summary

A central feature of the tanker shipping industry is that it acts under a highly complex and volatile set of circumstances that are affected by both economic and non-economic factors. This can be seen for the demand side and for freight rates as well as for the supply side.

Summarising the structural changes and business cycle developments in all three areas (i.e. supply, demand and freight rates) and subsequently analysing the outlook for the near and more distant future allows the following observations:

9.1 Demand and freight rates

- A structural shift in transport volumes, i.e. a decreasing proportion of mineral oil products and an increasing share of chemical products, has manifested itself in recent years and will continue into the future. The current share of chemical products is 40 %, while mineral oil products account for 60 % of the volume transported.

- The economic crisis has affected the two sub-segments of the tanker shipping industry in entirely different ways. Whereas demand and freight rates in the mineral oil segment were bolstered, the volume of chemical products transported declined dramatically. In the meantime, however, as of early 2011, the chemicals segment has recovered once again. The mineral oil segment was much less hard-hit by the crisis year 2009, and new demand was generated in 2010.

- Freight rate levels result from the interaction of non-economic and economic factors. Freight rates have followed a linear downward trend in the last three years (2008 to 2010), with 2008 representing a record year within the decade from 2000 to 2010.

- An indicator for industry turnover in the Rhine shipping market can be derived from the relation between freight rates and total volume transported. Freight rates vary much more greatly than the transport volume, so that the percent change in industry turnover is affected to a greater degree by variations in freight rate levels.

- A declining level of industry turnover was typical for 2009 (when compared both from quarter to quarter and with the previous year), a trend resulting from the record freight rates levels seen in 2008. 2010 saw a continued decrease in the amount of industry turnover. This was caused by further decreases in freight rates, even though the total

volume transported increased. Yet the increase in total volume more than compensated the decrease in freight rates.

9.2 Supply

- Compared to many of the preceding years, a very high level of new ship building took place in 2009 and 2010. At 231,000 tonnes in 2009 and 256,000 tonnes in 2010, the rate of new building in Western Europe for both years was more than double that of 2008 (111,000 tonnes). The Netherlands accounted for the largest share by far of newly built vessels.

- The average capacity of a newly built Western European tanker increased from 1,674 tonnes in 2007 to 2,870 tonnes in 2010.

- Conversion of the fleet from single-hull to double-hull vessels is largely taking place by building new double-hull motor tankers. Conversion of existing vessels hardly plays a role in this regard.

- Following the rapid growth of the fleet in 2009 and 2010, the proportion of vessels with double walls in the Western European tanker fleet has continued to increase and is currently estimated at 60 %.

- In addition to new building, purchases and sales of vessels to and from other countries account for changes in total fleet tonnage. The ships purchased by Germany in 2009 originated exclusively from the Netherlands and Belgium. Roughly two thirds of the vessels sold by Germany went to Western European countries and one third was sold to Eastern Europe.

9.3 Comparison of supply and demand

- Supply and demand developed at a similar rate until 2006. In the place of this concurrent trend, from 2007 a gap began to grow between supply and demand. While supply continues to increase at a linear rate, demand has remained almost constant.

- The fleet transport capacity grew by about 35 % between 2003 and 2010. Demand, meanwhile, increased by a mere 4 %.

- Overcapacity has resulted from structural factors in the tanker shipping industry due to the trends in supply and demand.

9.4 Modal split

- Inland shipping in the Rhine region has very large shares in certain market segments related to refinery logistics. In Germany, roughly the same volume of mineral oil products was transported by rail and waterway in 2009 (waterway: 34 million tonnes; rail: 39 million tonnes). Yet the market share held by rail is greater in many regions due to naturally given factors.

- Railways at 41 % and waterways at 38 % have an almost equal market share in the transport of mineral oil products imported to Switzerland.

- A distinction needs to be made in the modal split for refineries in Western Europe: inland shipping holds a large share of the transport market for refineries in the Rhine region, in contrast to the small share of refinery business in other regions.

9.5 Future prospects

a) Short-term

- Double-hull ships represented about an estimated 60 % of the Western European tanker fleet by the end of 2010.

- Conversion of the fleet to double-wall vessels is taking place amidst costly investments in new vessels. The single-hull ships will operate within the same market until the end of 2018, which, given a more or less constant level of demand, will necessarily result in the accumulation of additional structural overcapacities in coming years.

- The consequences of this imbalance could be a reduced utilisation of vessel capacities as well as downward pressure on freight rates.

b) Long-term

- Refinery production output in Western Europe more or less stagnated between 2001 and 2006 and has since decreased. A parallel development can be recognised to a certain extent, particularly within the past three years, when comparing production levels to the volume of mineral oil products transported on the Rhine.

- Given an unchanging modal split, the expected drop in refinery capacities in Europe will lead to a continued decrease in transports of mineral oil products in Western Europe.

- The chemicals segment as well as the transport of alternative fuels, such as biodiesel and ethanol, will be the growth markets for tanker shipping. For their logistics needs, biorefineries can be seen to noticeably favour inland shipping; this fact can be recognised for a large number of biorefineries situated in Germany (at the ports of Emden on the Ems, Würzburg on the Main and Straubing on the Danube).

The inland navigation market in 2010 and early 2011

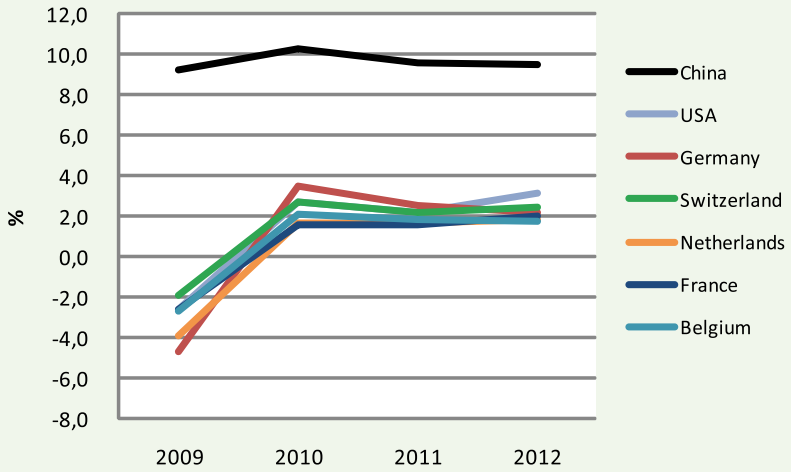
Section 1:
Analysis of transport demand

► 1 - Economic growth: development and prospects

Real economic growth in Western Europe varied in 2010, ranging from 1.6 % (France), 1.7 % (Netherlands), 2.1 % (Belgium) and 2.7% (Switzerland) to 3.6 % (Germany). The average growth rate was 2 % for the EU-27. Exports and industrial production were the key drivers of the economic recovery. This can be recognised from the growth in traffic in containers and ores, both at seaports and at inland ports (refer to the section on seaports and inland ports).

The high level of growth in Germany and Switzerland can be accounted for by the relatively large share of foreign trade and of industry in the GDP of each of these countries.

Figure 45: Real economic growth of selected countries*



*Source: OECD ; IMF; * incl. forecast for 2011 and 2012*

As expected, world trade dampened growth during the latter six months of 2010. The impetus supplied by stocks of goods also dwindled with time. Both factors caused the industrial business cycle to slow down, a trend able to be identified from the decline in steel industry production.

Future changes in economic growth also depend on how inflation develops and thus on developments in the energy markets. Inflation within the Eurozone had already reached a level of approximately 2.4 % by the beginning of 2011, thus already above the target level, due primarily to the increase in oil prices.

The German Wholesale and Export Trade Association (BGA) has forecast an inflation level of up to 3 % for 2011. This will make it necessary for the European Central Bank to pursue a restrictive monetary policy, which, in turn, will hamper economic growth in Europe.

► 2 - Transport demand: development and prospects

Freight transport in Europe was generally in a recovery phase in 2010. However, by the end of 2010 no mode of transport had reached the levels seen prior to the crisis. Specifically, the total volume of marine trade in December 2010 was still 4 % below the pre-crisis level recorded in June 2008.

The differences were even greater for the land-based modes of transport. Rail freight was the farthest of all from its pre-crisis level: transport performance during the third quarter of 2010 was still 14 % below the peak reached in the second quarter of 2008. During the same quarter, the amount of transport performed by road freight was 10 % below the pre-crisis level.

In the case of inland shipping, it is not possible to provide a complete figure for all of Europe due to missing statistics for individual countries. In the country with the second largest total transport volume (i.e. Germany), the figure for late 2010 was still 6 % below the maximum recorded before the crisis. The difference was still about 13 % in France, the country with the fourth largest total transport volume.

The shipping incident that occurred on 13 January 2011 near St. Goarshausen resulted in the Rhine being closed for traffic for several weeks, which subsequently had a considerable effect on transshipment activities at certain ports. Yet the incident will probably have a much more marginal impact on total transport volume in 2011 than originally expected.

Firstly, rail and road freight do not have the capacities required to take over a large volume of goods on short notice. Consequently, in only 25 % of cases was freight shifted temporarily to another mode of transport. Secondly, the river was again cleared for vessel traffic upstream even earlier than expected. Thirdly, many transports were nonetheless carried out by setting course for ports lying before the site of the incident, where the freight was then stored temporarily. This ultimately resulted in transports being rescheduled.

The **Netherlands** is the country with the largest total volume transported on inland waterways in Europe. Based on the large modal split share for inland shipping, [22] the development of transport demand in the Netherlands can be roughly estimated by referring to trends in seaport transshipment (official statistics are unavailable).

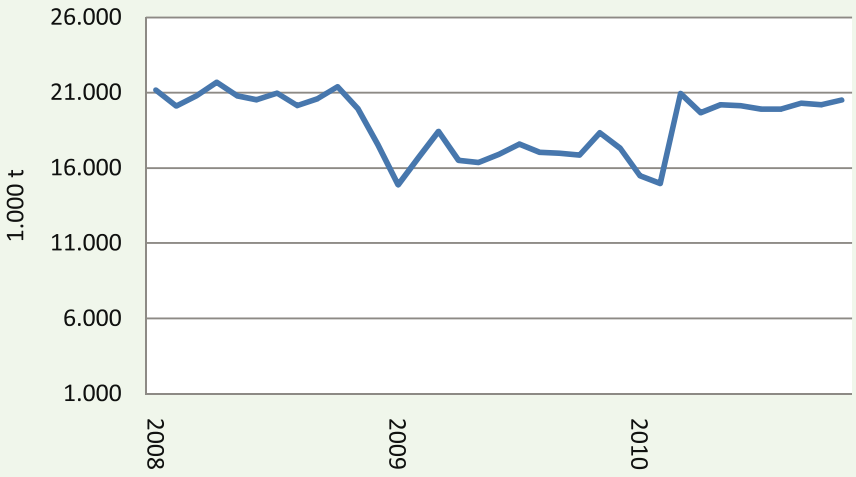
The volume of dry goods transshipped at the seaport of Rotterdam in 2010 increased by 28 % over 2009 and by 12.5 % at Amsterdam. Transshipment of liquid goods grew by 6 % at Rotterdam, while decreasing slightly by 2 % at Amsterdam. Based on the weight of goods transshipped at the two ports, the total volume transported on waterways in the Netherlands can be estimated to have increased by 15 %, whereas the increase was substantially greater for dry cargo shipping than for tanker shipping.

Germany ranks second in Europe in terms of the total volume of goods transported on waterways. The total volume transported increased by 14 % over the previous year. The increase was greatest for imports at 25 %, followed by transit traffic at 17 %. Following the crisis year 2009, transport demand in Germany recovered very quickly and rather soundly from early 2010 (refer to the chart below).

By the end of 2010, the total volume was only 6 % below the peak reached prior to the crisis in April 2008, when 21.7 million tonnes were transported on Germany's waterways.

[22] According to estimates, inland shipping at Rotterdam holds a market share of just under 30 % of all liquid goods and of about 60 % of dry goods. The global market share of waterway transport at Amsterdam is 51 % (having increased by 10 points since 1995).

Figure 46: Monthly transport on waterways in Germany

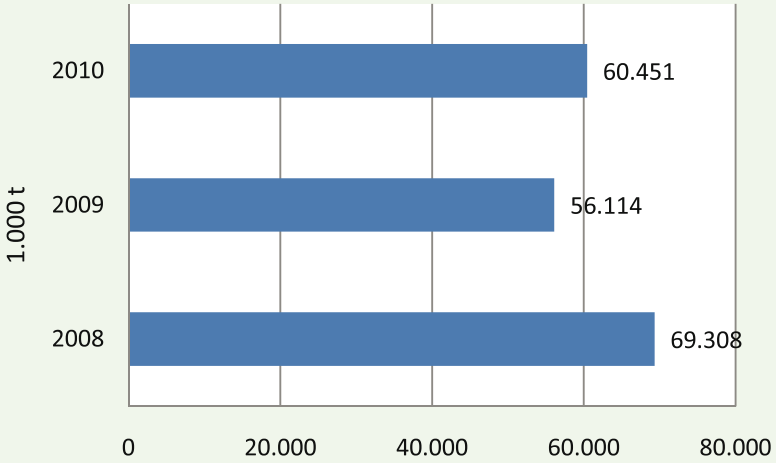


Source: destatis.

In **Belgium**, inland shipping within the hinterland of the seaports of Antwerp and Ghent posted a total increase of 12 %. At the port of Liège, which ranks third among European inland ports after Duisburg and Paris, transshipment of waterborne freight rose by 17 %.

In **France**, the disparity in demand compared with the pre-crisis year 2008 was still somewhat greater by the end of 2010 than in other countries. In 2010, total annual volume in tonnes was 13 % below the level recorded for 2008 but 8 % above the 2009 level.

Figure 47: Annual transport on France's waterways



Source: VNF

2.1 Agricultural and forestry products

In several European countries, the grain harvest in 2010 resulted in yields that were considerably below the average of many years. This was true for Germany (-26 %) and Austria (-28 %). The crop in France, in contrast, was only 2 % below the mean of many years. The abundance of rain in the spring of 2010 additionally had considerable negative impact on fruit, vegetable and potato crops.

Despite the poor harvest, transport demand did not decline. Demand in Germany will probably be above the total of 11 million tonnes recorded for the previous year. The volume transported in France increased by 10 % to reach 10.7 million tonnes. At Liège, Europe's third largest inland port, a sharp rise in the volume of grain imports has been seen as a result of one biofuel manufacturer's needs.

Thus, one explanation for the fact that transport demand is evidently no longer tied to crop yields may be seen in the increased production of biofuels, resulting in demand for shipping agricultural raw materials such as rapeseed, wheat and similar goods.

Another reason is the fact that crop volumes are being replaced by imports: inbound transshipments of grain at Belgium's largest seaport of Antwerp rose by 20 %, with inland shipping of agricultural products

increasing by 11 %. At Amsterdam, the inbound transshipment of grain increased by 28 %.

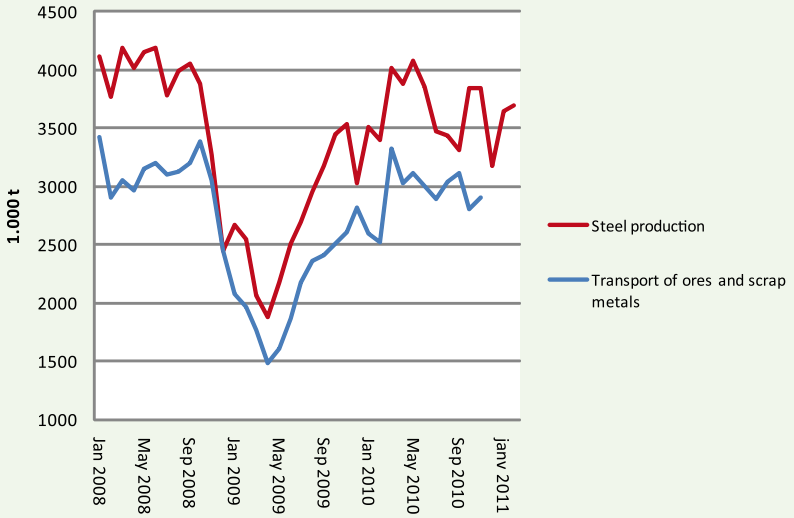
2.2 Animal feed and foodstuffs

The poor crop yields in 2010 did not have any great detrimental effect on the demand for food transports either. Volumes comparable to the previous year (almost 14 million tonnes) were transported on Germany's waterways in 2010. Transport in France was also equivalent to the previous year's level (about 3.5 million tonnes). The shipping of foodstuffs and animal feed in the hinterland of Belgium's two ports of Antwerp and Ghent increased by 17 % to reach 3.8 million tonnes.

2.3 Iron and steel industry

The transportation of ores and scrap metals recovered by May of 2010, achieving once again the average of many years. Activity has become stable at this level, whereas a slight downward trend can be identified.

Figure 48: Transport of ores and scrap metals on German waterways versus steel production



Source: Eurofer; destatis

The major industrial sectors requiring steel for production are: the construction industry (27 % share); the automotive industry (16 % share); and machine construction (14 % share). Following a minor slump in

2010, the construction industry is expected to grow somewhat (+1.5 %) in 2011. Production of machinery in Europe is forecast to increase by 7.5 % in 2011, after growing by 9 % in 2010. Expansion of the automobile industry can be expected to level off sharply (2010: +19 %; 2011: +6 %).[23] Altogether, steel consumption will probably grow at a slower rate in 2011 as compared with the previous year.

It must consequently be expected that transport demands for ores and scrap metals as well as for steel products will slow down. The growth rates seen for inland shipping in Germany (+42 % for ores and scrap metals and +17 % for steel products) and on France's waterways (+57 % for ores and scrap metals and +31 % for steel products) in 2010 can hardly be expected for 2011. An increase of less than 10 % is nonetheless being forecast.

2.4 Solid mineral fuels

Global coal trade grew considerably in 2010 due to base effects from the previous year, with coking coal affected more than steam coal.

Coal transports on Germany's waterways in 2010 were, in fact, slightly above the pre-crisis level reached in 2008 (+2 %). This was equivalent to a 26 % increase over 2009. France saw a 15 % increase. Coal transports in the hinterland of the Belgian seaports of Antwerp and Ghent rose by 14 % to more than 7.3 million tonnes. Deliveries to Liège grew by 36 % after the steel mill located there went into operation again.

Growth rates will most certainly slow down in 2011. On the one hand, steel production will increase at slower rate, while in the energy sector coal will come under pressure from more competitive natural gas prices. The prices for steam coal have risen sharply during the past year (refer to the table).

Table 7: Steam coal prices*

	3/09	8/09	12/09	3/10	8/10
US$/TCE	68	82	90	87	110
€/TCE	52	58	62	61	86

Source: Euracoal ** For use in power plants*

[23] Source: Eurofer

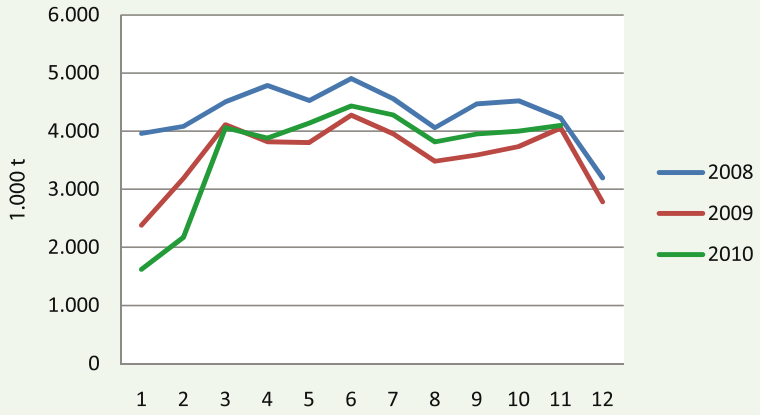
2.5 Stone, earth and building materials

Transport demand stagnated in this segment. The cold winter of 2009-2010 had in Germany a dampening effect on demand, which could not be compensated during the rest of the year. Total demand subsequently fell slightly short of the 43.2 million tonnes recorded for the year before.

Transport on France's waterways stagnated during the past year at a level of about 22.5 million tonnes. The shipping of raw minerals and building materials in the hinterland of Belgium's ports of Antwerp and Ghent increased by 11 %, reaching just under 9 million tonnes.

The chart below clearly shows the detrimental impact which the relatively cold winters of 2008-2009 and 2009-2010 had on transport demand.

Figure 49: Transport of stones, earth and building materials by inland shipping in Germany



Source: destatis. 1 to 12 = months

Investments in construction should on the whole increase slightly in 2011, and growth is expected particularly in private housing construction. Only a small increase in transport demand is forecast, however, due to the winter of 2010-2011, which was again cold.

2.6 Chemical products and fertilisers

Demand in the chemicals segment recovered earlier and more swiftly than in other sectors (refer also to the fact sheet on tanker shipping). On the Rhine, the pre-crisis level of 4.6 million tonnes (value for third quarter 2008) was already reached in the first quarter of 2010. About 5.2 million

tonnes were transported in the third quarter of 2010.

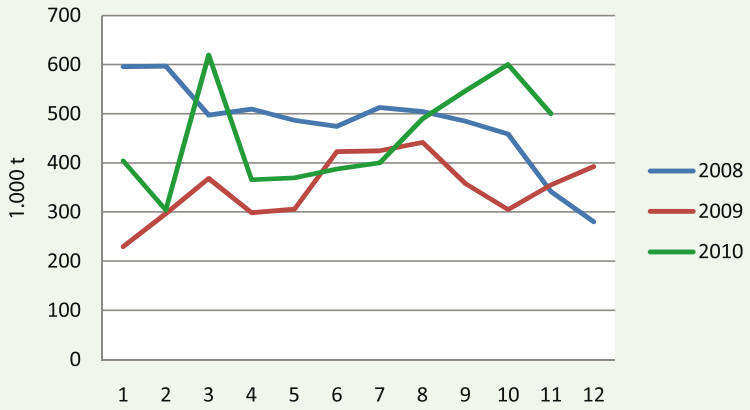
A transport volume of 21 million tonnes is estimated for Germany's waterways in 2010, compared with the 18 million tonnes seen in 2009 (+19 %). Transport on France's waterways increased by 14 % to reach almost 2 million tonnes. Inland shipping in the hinterland of Belgium's ports of Antwerp and Ghent posted a volume of 14.6 million tonnes (+16.5 %).

Transport volumes in all three countries grew at an even higher rate than chemical industry production. Specifically, the European Chemical Industry Council CEFIC reported for 2010 a 10 % increase in production over 2009, whereas this figure was still 5.6 % below the pre-crisis level.

The outlook for 2011 is favourable. According to the forecasts of the European and German chemical industry associations, production will continue to increase in 2011 but at a slower rate.

An increase of about one third was posted for the transport of fertilisers on Germany's waterways in 2010. This corresponds to a transport volume of about 5.6 million tonnes, as compared with the 4.2 million tonnes recorded for 2009 and the 5.7 million tonnes seen in 2008. 1.5 million tonnes were transported in France last year, 16 % less than the year before.

Figure 50: Transport of fertilisers by inland shipping in Germany



Source: destatis

2.7 Mineral oil products

As 2010 progressed, a recovery was seen in the volume of mineral oil products transported. This was partially due to low stocks. On balance, however, the transport volume stagnated in comparison with the previous year because of the weak demand in the first half of the year.
The rise in the price of crude oil, and with it the prices for diesel and heating oil as well as petrol, has accelerated noticeably in recent months. The price climb reached a magnitude of about 20 % only from August 2010 to January 2011, whereas the unrest in North Africa contributed to this development.

On the whole, demand is likely to fall slightly in 2011 due to the continued rise in prices and the decline, for structural reasons, in consumer demand for mineral oil products.

2.8 Containers

Container transport has recovered soundly from the crisis, a fact to be attributed to renewed levels of world trade. On the Rhine, there was an increase of 12 % in comparison to 2009 (190.000 TEU against 170.000 TEU).

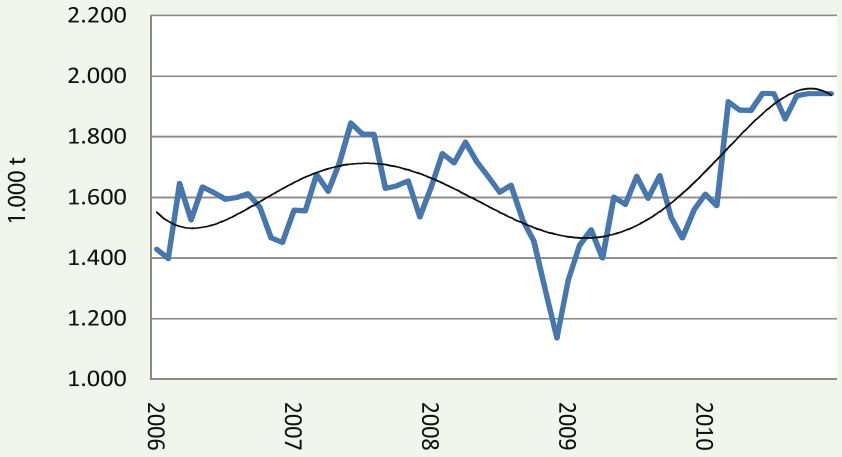
For the Netherlands, the magnitude of growth in container transport can be estimated in spite of official statistics being unavailable. Such an estimate has been made based on inbound container transshipment at seaports in combination with the modal split share of inland shipping and the share of hinterland traffic in transshipment at seaports. The figures refer to activity at the port of Rotterdam. Container transport from Rotterdam on inland waterways is estimated to have increased by about 13 % to a total number of approximately 1.5 million containers, which is equivalent to roughly 2.5 million TEU or 19.6 million tonnes. [24]

[24] Source: CCNR estimate. About 70 % of all containers transshipped at Rotterdam are destined for the hinterland, with feeder traffic accounting for the remaining 30 %. The modal split share of inland shipping in total transport of containers to the hinterland is 33 %. The number of containers was converted to TEU and weight using previously determined conversion factors.

From the Belgian seaports of Antwerp and Ghent, about 23 million tonnes of containers were transported to the hinterland. This is equivalent to an 11 % increase over 2009 and is comparable to the growth rate recorded for Rotterdam. At Liège, Europe's third largest inland port, the volume of container transport rose by 11 %, which is all the more significant when one considers the 23 % drop in rail transports and the 19 % decrease in containers hauled by lorry. The modal split share of inland shipping in container transport from Liège increased from 64 % to 73 % between 2009 and 2010. This modal shift was at the expense of rail transport.

Container transport in Germany rose by about 20 % as compared with 2009 and by 12 % over 2008. The total freight load transported in containers on Germany's waterways in 2010 was approximately 22.4 million tonnes.

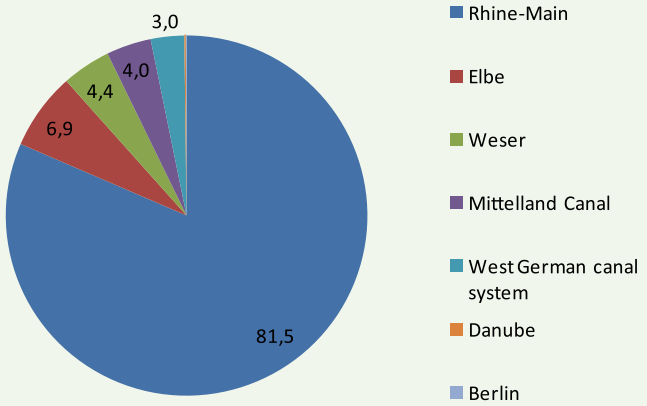
Figure 51: Container transport in inland shipping in Germany



Source: destatis

The preponderance of the Rhine region continues to be very evident: as of late 2010, 81.5 % of all container transports in Germany were accounted for by the Rhine and its tributaries, including the Main, the Mosel, the Lahn, the Saar and the Neckar.

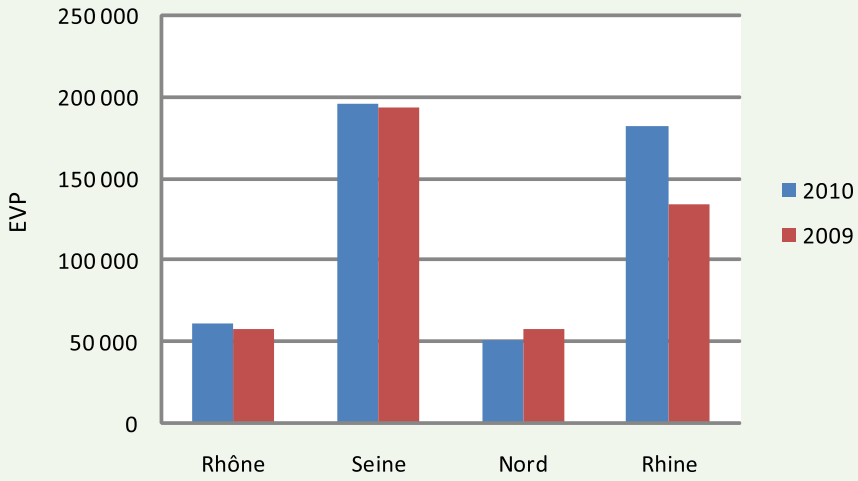
Figure 52: Container transport in inland shipping in Germany according to river region



Source: destatis. Values in %.

490,000 TEU were transported in France last year. This was equivalent to an 11 % increase over 2009. There were considerable differences among individual regions.

Figure 53: Container transport in inland shipping in France according to region



Source: VNF

Container transport on the Rhine showed the greatest increase at +36 %. The extreme northern region of France lost container business. In contrast to the important gains in previous years, container transport in the Seine region increased only slightly.

Table 8: Container transport in inland shipping in France

Waterway region	Change 2009-2010 in %
Seine	+1,2%
Rhine	+35,7%
Nord	-11,9%
Rhône	+5,9 %

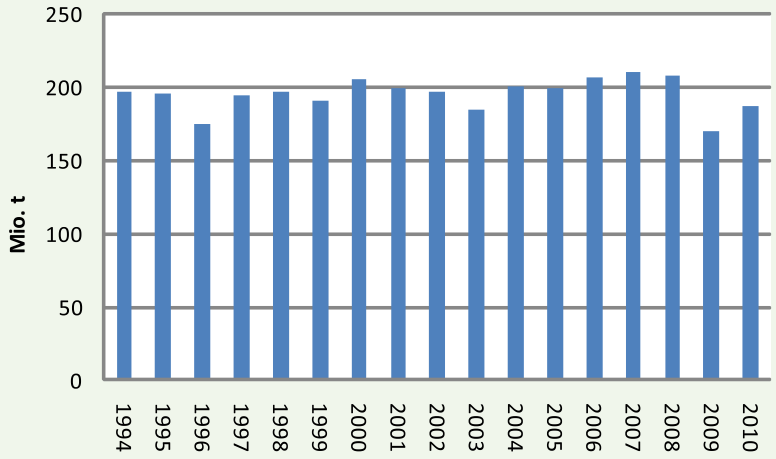
Source: VNF

► 3 - Transports according to axis

Rhine

An increase of 10 % over the previous year was recorded for total freight transport on the Rhine last year. The segments that showed the strongest increase were ores and metal wastes (+36 %) as well as fertilizers (+29 %). In 2010, about 1.9 million TEU were transported by container. This was equivalent to a 12 % increase over 2009.

Figure 54: Annual transport on the Rhine *



*Source: destatis. * traditional Rhine (Rheinfelden until dutch-german border)*

Elbe
There was a downward trend in total freight transport on the Elbe in 2010. Container transport, in contrast, showed an increase. The latter reached a level of almost 100,000 TEU by October 2010, representing a 4 % increase over the previous year.

Mittelland Canal
Freight transport on the Mittelland Canal is equivalent to about 87 % of the volume recorded for the Elbe but only 9 % of the volume shipped on the Rhine. There was an increase of 7 % in 2010 compared with the year before, while container transport reported a 13 % volume loss.

Weser region
Container transport on the Weser experienced highly dynamic growth last year, increasing by 45 % to surpass the volume shipped on the Elbe. Other transports on the Weser showed a 12 % increase.

Main and Rhine-Main-Danube Canal
About 6 million tonnes of freight transport passed through the locks on the Main near Bamberg in 2010, an increase of 9 % over 2009. The freight volume at the Kelheim locks on the Main-Danube Canal increased by 10 % compared with the previous year, amounting to 5.2 million tonnes.

Mosel
Roughly 14 million tonnes of freight passed through the locks at Koblenz to enter the Mosel River. This represents a 20 % increase in volume over the year before. The majority of the increase was accounted for by upstream transports of ores, which make up the largest share of freight on the Mosel. The increase was of a magnitude almost capable of compensating the decline experienced in 2009. Container transport reached a level equal to that seen in 2009, i.e. 5,000 containers or about 6,500 TEU.

Danube
Freight transport along the German section of the Danube can be recorded at the Jochenstein lock, situated on the German-Austrian border. 5.3 million tonnes of freight passed through the border town in 2010, as compared with 4.8 million tonnes in 2009 (+11 %). Container transport along the German section of the Danube is very poorly developed. A mere 2,000 TEU were transported along this stretch up to October 2010, which was actually an increase of 26.5 %.

11.1 million tonnes had been transported on the section of the Danube in Austria, which represents a 18,6 % increase over the previous year. The most significant type of transport was the cross-border import of goods at 6.2 million tonnes. The volume of transit traffic was 2.7 million tonnes. The increase over the previous year was 17 % after the first six months and 27 % by the third quarter.

► 4 - Harbour transshipments

4.1 Seaports

Transshipments at seaports presented a largely positive picture in 2010. There was highly dynamic growth in the areas of ores and scrap metals, coking coal, iron and steel products, chemical products, fertilisers, foodstuffs and fodder as well as in container transshipment. Agricultural products presented a largely positive picture. Declines were recorded only for the transshipment of coal for power plants and of mineral oil products.

Bulk agricultural products and fertilisers

Handling of cereals in Antwerp increased by 20 % while remaining constant in Rotterdam. 12 % less agricultural products were transshipped at Ghent. The volume of fertilisers handled at Antwerp (Europe's most important seaport for this freight category) increased by 56 % to a total of 4.7 million tonnes. The comparable volume at Amsterdam rose by 38 % to 1.2 million tonnes and at Ghent by 19 % to 1.3 million tonnes.

Foodstuffs and fodder

There were increases at all major seaports except for Rotterdam. At Amsterdam, where the transshipment of foodstuffs and fodder plays a very significant role, the volume of animal feed handled increased by 6 % to almost 6 million tonnes. An increase of 26 % was achieved for oilseeds, in fact. The transshipment of fodder and foodstuffs also increased in Ghent, specifically by 10 %.

Coal

A situation with two facets can be observed in this case. As steel manufacturing increased, coking coal was able to record growth, whereas power station coal made losses because of its price disadvantage when compared with natural gas. On balance, transshipment of coal at the major ports either stagnated (Rotterdam -1.7 %; Amsterdam + 3%) or declined (Antwerp -16 %). Volumes increased at ports which predominantly supply steel mills with coking coal, such as Ghent and

Dunkirk. Coal transshipments almost doubled at Ghent and rose by 10 % at Dunkirk.

Ores and scrap metals

These sectors showed a consistently positive trend. The port of Rotterdam posted a 71 % increase, thereby reaching again a level of almost 40 million tonnes. The upward trend slowed down somewhat during the fourth quarter, however, a development probably related to steel production, which also slowed down.

At the port of Ijmuiden, situated in Amsterdam's harbour area and serving the local steel mill with ores and coal, there was a 35 % increase. At Dunkirk, the steel smelting furnace began operating again, so that transshipment of ores rose by 45 % to total 11.3 million tonnes.

Table 9: Transshipments of ores and scrap metals at seaports

Seaport	2010	2009	Change 2009-2010 in %
Rotterdam	40,0		+71
Dunkirk	11,3	6,1	+85
Ghent	6	3,8	+58
Antwerp	3,3	2,6	+24

Source: Specified ports

Iron and steel

In 2010, Antwerp improved the result in this category by 13 %, achieving a total of 6.5 million tonnes. A transshipment volume of exactly 3 million tonnes of iron and steel products was achieved at Ghent, representing a 41 % increase.

Containers

The growth rates at the major ports ranged between 13 % and 16 %. In contrast to this trend, the port of Amsterdam showed a decrease.

Tableau 10: Transshipment of containers at major European seaports

Seaport	Transshipments in million TEU	% change over previous year
Rotterdam	11,1	+14
Antwerp	8,5	+16
Hamburg	7,9	+13
Le Havre	2,4	+5
Dunkirk	0,2	- 6
Marseille	0,95	+9

Source: Specified ports

Crude oil and mineral oil products
At just under 25 million tonnes, the volume of containers transshipped at Antwerp was 3.4 % below the previous year's level. Virtually no change was seen at Le Havre (-0.6 %). The decline in refinery activities at two other important French seaports (Marseille and Dunkirk) had a significant effect on harbour transshipments.

At Marseille, a strike at the oil terminals lasting several weeks resulted in a subsequent decline in the volume transshipped. The downward trend at Dunkirk was even more drastic after the Total refinery was shut down in the autumn of 2009. The result was a decline of 38 % in 2010.

Chemical products
Rotterdam, Le Havre and Antwerp are the three most important European seaports in this segment. Rotterdam saw an increase of 8 %. Transshipment of goods belonging to the freight category 'other liquid goods' (mostly chemical products) increased by almost 9 % at Le Havre. Ghent posted an increase of 28 %.

4.2 Inland ports

The trend among transshipments at seaports was further reflected in inland shipping in most segments. This holds true especially for ores and scrap metals, coal, iron and steel, chemical products and containers.

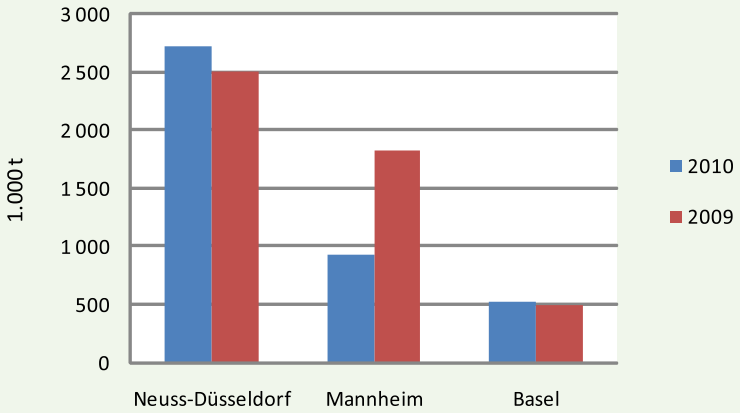
Bulk agricultural products and fertilisers

At Strasbourg, the Rhine's most important port for handling agricultural products, the transshipment volume rose by 8 % in 2010 to reach a total of 1.3 million tonnes. Neuss-Düsseldorf, which ranks second behind Strasbourg in this segment, saw a 21 % increase. The volume of incoming agricultural products at Basel fell by 12 % between 2009 and 2010, while grain transshipments at Liège increased by 183 % during this period. In the fertilisers segment, transport by inland shipping from Antwerp rose by 50 % to a total of 2.5 million tonnes but fell by 7 % at Ghent to a level of 1.2 million tonnes.

Foodstuffs and fodder

There were gains in this segment, similar to those seen at seaports. Transshipment at Neuss-Düsseldorf increased by 8 % over 2009 and by 1 % at Basel. The gain at Strasbourg over the previous year was 11.6 %. The decline at Mannheim (-50%) is to be attributed to a fire at the fodder and rapeseed processing plant, located at the harbour, in April 2010.

Figure 55: Transshipment of foodstuffs and fodders at selected Rhine ports

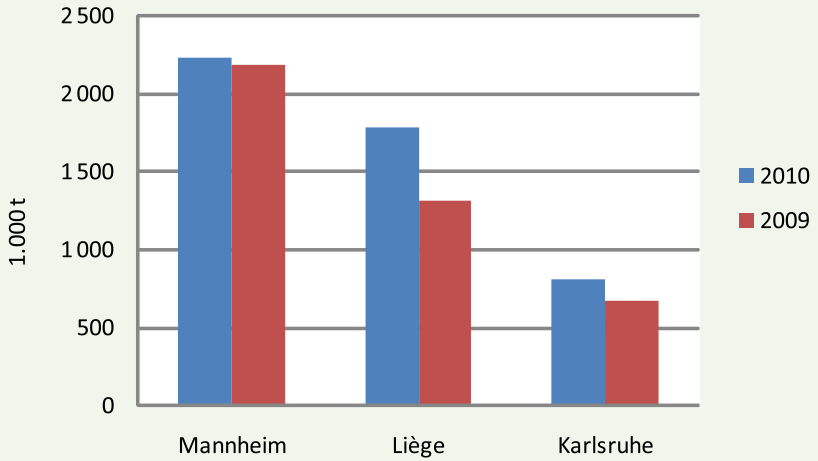


Source: Specified ports

Coal

The balance in this segment at European inland ports was varied. Transport activities at Liège grew by 36 %, to a level of 1.8 million tonnes, after the steel mill located there went into operation again. Inland transport of coal at Ghent, another steel port, actually increased by 89 %. Yet, other ports experienced a stagnating trend (e.g. Mannheim and Neuss-Düsseldorf) or even a decline (Basel at -24 %).

Figure 56: Transshipment of solid fuels at selected inland ports



Source: Specified ports

As detailed above in the chapter on marine transport, the differing results are related to the specialisation of individual ports in steam coal for power plants and in coking coal. Ports such as Ghent and Liège, which principally supply coal to steel mills, benefited unconditionally from the recovery in the steel industry. The remaining ports, where largely steam coal is transshipped, had to take losses in the wake of less competitive coal prices, as compared with natural gas, in the energy sector.

Ores and scrap metals

The volume of ores handled at Liège increased by a factor of three to reach 1.5 million tonnes. Substantial increases were also seen at other Belgian ports, including Antwerp and Ghent. The table below presents a comparison of maritime and inland shipping with regard to growth in ore transports.

Table 11: Comparison of the changes in marine and inland shipping of ores

Port	Change 2009-2010 in %		Million tonnes in 2010	
	Maritime	Inland	Maritime	Inland
Antwerp	+24	+12	3,3	2,0
Ghent	+57,6	+39,5	6,0	3,1

Source: Specified ports

Maritime ore transports increased at both ports to a greater extent than inland shipping of such products. The market share of the waterway in ore transshipments at Ghent is about 50 % and more than 60 % at Antwerp. The volume of ores handled at Rhine ports rose as well. Neuss-Düsseldorf recorded a 40 % increase to a total of 1.2 million tonnes.

Iron and steel products
More than 1 million tonnes of steel products were transshipped at each of the ports of Liège and Ghent. This is equivalent to a 52 % increase for Ghent and an 11 % gain for Liège. Transshipment of such goods at the Rhine ports increased as well, by 47 % at Karlsruhe and by 4.5 % at Mannheim.

Stone, earth and building materials
The majority of ports experienced increases. Strasbourg, the most important port on the Rhine in this segment, was able to improve on the 2009 balance by 5 %, achieving 3.2 million tonnes in 2010. Neuss-Düsseldorf, ranking second among Rhine ports, saw a 13 % increase (2.5 million tonnes in total). A decline of 9 % was posted for Karlsruhe.

Chemical products
A positive trend was seen at almost every port. Mannheim achieved a level of 1.6 million tonnes, a volume once again above the 2008 pre-crisis level (1.3 million tonnes). This result is equivalent to a 44 % increase over 2009. With 9 % growth over the previous year, the port of Cologne achieved almost 2 million tonnes.

Inland shipping activities at Europe's two most important ports for chemical products, Rotterdam and Antwerp, improved in the wake of the recovery in the chemical industry. The volume of chemicals shipped inland from Antwerp increased by 17 % to reach 13.7 million tonnes. Transshipment of chemical products at Ghent totalled 0.9 million tonnes, representing an 8.5 % increase compared with 2009.

Crude oil and mineral oil products
Almost 5 million tonnes were handled at Cologne, the largest petroleum port on the Rhine, in 2010. This represents a minor, 4 % increase over the previous year. Transshipment at Karlsruhe fell by 8 % and totalled 3.7 million tonnes. The balance achieved by Strasbourg was 2.7 million tonnes, a 28 % increase. At Neuss-Düsseldorf there was an 11.2 % increase to a total of about 0.8 million tonnes.

Containers

The recovery of the global economy has favoured container transport. Transshipments were additionally fostered by investments in the infrastructure at certain ports. Specifically, the port of Neuss-Düsseldorf invested in an additional container gantry, allowing three inland vessels to be processed simultaneously. Basel achieved the second best result in the container segment in the port's history.

Table 12: Container transshipment at selected Rhine ports

Port	1,000 TEU		Change in %
	2010	2009	2010/2009
Neuss-Düsseldorf	680	570	+19,3
Mannheim	121	96	+26,1
Strasbourg	115	75	+54,2
Basel	99	71	+39,4

Source: Specified ports

Section 2:
Transport supply

► 1 - Evolution of the fleet

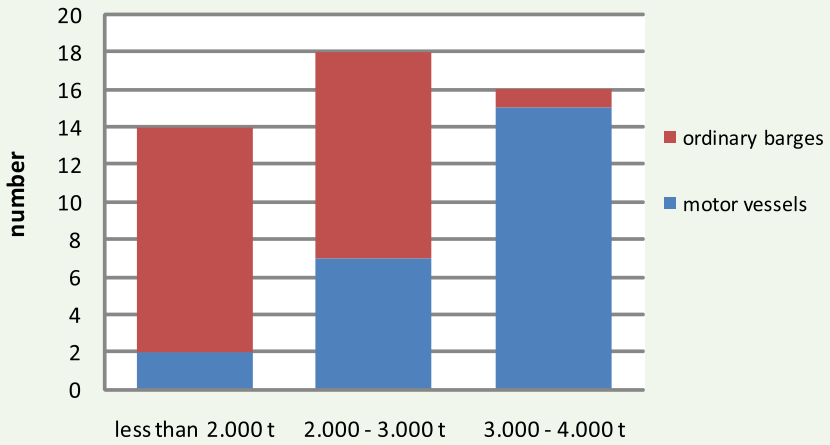
1.1 Dry cargo shipping

In 2010, 54 dry cargo ships with a total capacity of approximately 114,000 tonnes were introduced to the market in Western Europe. About 24 of these 54 vessels were pushed barges. Significantly less new ship building was thus seen in 2010 than in the previous year. In terms of tonnage, the decrease in new ship building amounted to about 67 %.

The average tonnage of newly built vessels was approximately 2,500 tonnes, 20 ships had a capacity of less than 2,000 tonnes. These vessels were almost without exception pushed barges.

18 ships belonged to the 2,000 to 3,000 tonne category, with motor cargo vessels and pushed barges each representing about one half of this group. The 16 largest vessels had a tonnage of 3,000 to 4,000 tonnes. These vessels were without exception motor cargo vessels.

Figure 57: Newly built dry cargo vessels in Western Europe by tonnage (2010)



Source: IVR; WSD Südwest

The reasons for subtraction of vessels were in detail: sales to other countries; scrapping; conversion; and other reasons for subtraction. In the Netherlands, 24.000 tonnes were scrapped in the year 2010, in Germany about 15.000 tonnes. These vessels had been manufactured between 1908 and 1983. Most of the scrapped ships were motor vessels, and only a few ordinary barges.

From Germany, 29 dry cargo vessels, representing a total capacity of about 40,000 tonnes, were exported, with the largest percentage by far going to the Netherlands. The conversion of vessels was not very often, and in the few cases it was mainly relevant for ordinary barges.

1.2 Tanker shipping

As described above in the fact sheet on tanker shipping, 2010 was again a year which saw a very high level of new shipbuilding activity. At a total of 82 ships and 256,000 tonnes of additional total tonnage, the 231,000 tonnes that had been added in Western Europe during the previous year was exceeded by 10 %.

A small quantity of vessels was eliminated from the market due to scrapping. The total in Germany and the Netherlands was about 4 ships having a total capacity of approximately 4,500 tonnes. Consequently, when scrapped vessels are taken into account, Western Europe saw a significant net increase in fleet capacity (i.e. about 250,000 tonnes).

Although purchases and sales of ships do account for a certain portion of changes, most vessels are sold or purchased among Western European countries. Such sales and purchases consequently have practically no impact on the number of vessels belonging to the Western European fleet. Some single hull vessels were sold to countries outside the EU, where the ADN rules are not in force. Their exact number however cannot be found out statistically.

The most important factor currently responsible for changes in fleet capacity is the conversion of single-hulls to double-hull vessels (refer to the fact sheet). The average size of tankers continues to increase. This may be seen as an effect of economies of scale on inland and marine shipping. Specifically, marine vessels receive bunkers from inland bunker ships, with the capacity of these vessels growing at a rate commensurate with the increasing size of marine tankers.
The vigorous level of new shipbuilding should on the whole continue or even increase during the current year and on into 2012. One reason for

this is renewed growth of the tanker shipping industry and increasing freight volumes, signs which encourage the industry to invest in new vessels. In addition, it will still probably be some time before all the double-hull vessels required by the tanker shipping market have finally been built.

1.3 Passenger transport

According to figures supplied by the Southwest Waterways Directorate (Wasserschifffahrtsdirektion Südwest), 12 passenger vessels were put into service last year in Germany. In the Netherlands, seven new ships entered the market, mainly hotel ships.

There are some purchases and sales of ships between European countries, but the number of ships leaving the European market is very small. The growing number of vessels additionally reflects the unbroken upward trend in the passenger transport market.

Source: WSD Südwest and IVR

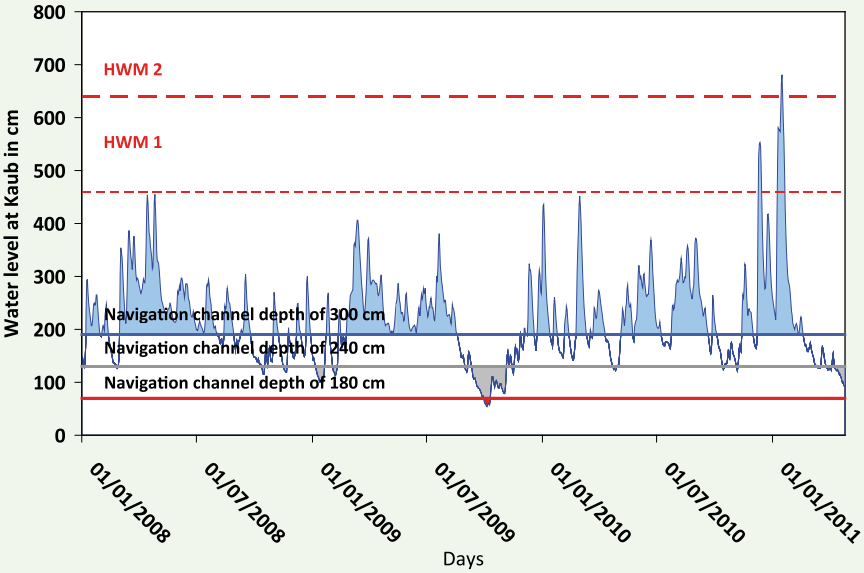
Section 3:
Water conditions and operating capacity

3.1 Water conditions on the Rhine

For most of 2010, water conditions on the Rhine allowed vessels to be loaded to full capacity (according to draught). High water periods came only later, in December and January 2011, which impaired navigation.

The Rhine consequently had to be closed for shipping due to high water on three days in January 2011, when the high water mark 2 was exceeded. The high water mark at Kaub was exceeded on a total of five days in 2010 and on 12 days in January 2011.

Chart 58: Water conditions on the Rhine at Kaub



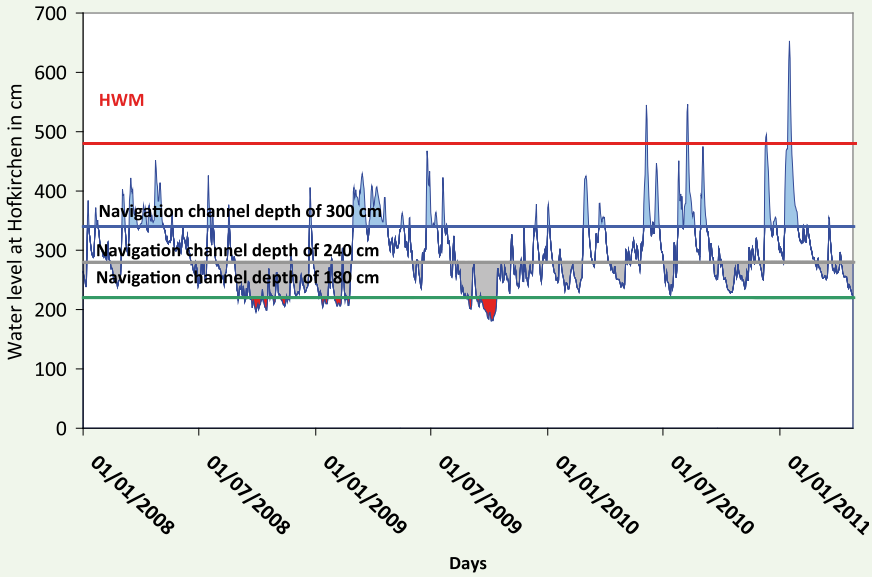
Source: BAfG

3.2 Water conditions on the upper reaches of the Danube

The navigation channel depth was not less than 180 cm on any day in 2010, unlike the previous year, when this was the case on more than 50 days. High water levels occurred towards the end of the year and during the first weeks of 2011, specifically on eight days in 2010 and six days in January 2011. This had not been the case in the two previous years.

Although the Danube itself was not frozen over, the Main-Danube Canal had to be closed between 28 January 2010 and the 1 March 2010 (32 days), which consequently impaired inland shipping.

Chart 59: Water conditions on the Rhine at Hofkirchen



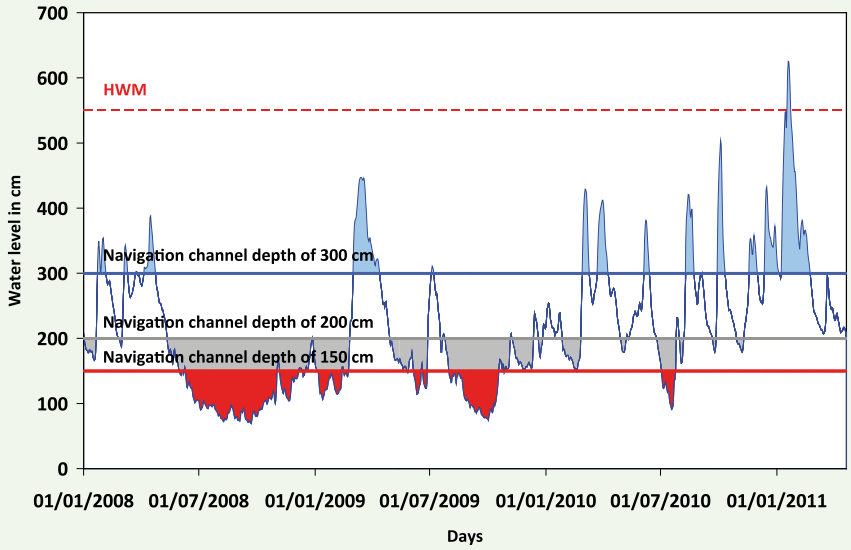
Source: BAfG

3.3 Water conditions on the Elbe

Water conditions on the Elbe were for the most part favourable for shipping in 2010. Compared with previous years, low water levels prevailed on very few days. The navigation channel depth was less than 150 cm on only 22 days, compared with 150 days in 2009.

Several sections of the Elbe were closed to shipping for one week in January 2010 due to ice.

Chart 60: Water conditions on the Elbe at Magdeburg

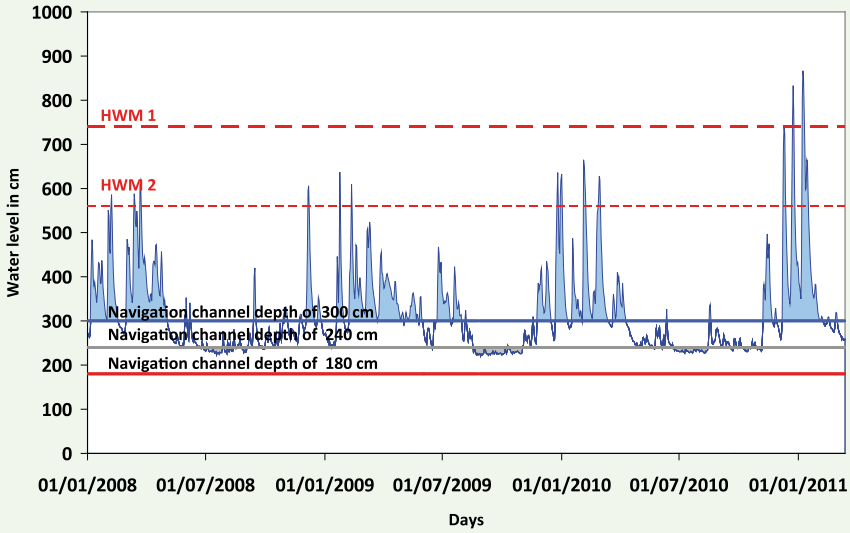


Source: BAfG

3.4 Water conditions on the Mosel at Trier

Hardly any low water periods were seen on the Mosel at Trier. At the end of the year, in contrast, the river was closed to shipping for seven days due to high water levels.

Chart 61: Water conditions on the Mosel at Trier



Source: BAfG

Summary: Water conditions on waterways in Western Europe were favourable in that conditions allowed optimal utilisation of vessel loading capacities for most of the year.

SUMMARY

In the middle of the year 2011, there are clear indications that the goods transport in inland shipping has returned to its normal rhythm of cyclical and seasonal fluctuations. With the recovery in 2010, the strong decrease in the steel industry and the chemical industry that had started in autumn 2008, as well as the decline in container transport, have now been overcome.

From today's point of view, it can be stated that the inland shipping industry suffered from overcapacities and extreme economic situations. As the transport demand has almost reached its pre-crisis level again, no structural changes can be observed. The steel production in the Rhine region is on its usual level, the chemical industry has regained strength, and also in the energy sector the coal transport has returned to its normal level. The transport of building materials, mineral oil products and agribulk is also on its pre-crisis level.

However, freight rates are not keeping pace with the growing transport volumes. A rise in the transport prices could only be observed during certain times. Obviously, the growing number of ships entering the market is creating a downward pressure on the freight rate level, which makes it impossible to observe a complete recovery. Furthermore, there are not many ships leaving the fleet by way of scrapping or sales.

On the liquid cargo market, the number of double hull tankers keeps on growing. At the same time, not many single hull ships are withdrawn from the market. In a future report, the middle to long run development of the tanker shipping fleet will be analyzed in greater detail, thereby keeping in mind the arrangements of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN).

At the end of this summary, some remarks about the obstacles that have hindered inland navigation during the year 2010, should be made. At the beginning of the year, the canals in Germany were facing ice run. Later, Rhine shipping was blocked for a long time by an accident at the Loreley as well as by high water levels. This longest blocking during the history of Rhine shipping has shifted some cargo to other transport modes, but only temporarily. As rail and road did not have sufficient capacities, most of the transports were delayed. This had severe consequences for the production process of several industries. This situation showed that

inland shipping is highly dependent on external factors. Besides, it has shown the importance of reliability for the image of a modern transport service.

Annex 1

Fleet Structure at the end of 2010

31.12.2010	Motor cargo vessels			Pushed cargo barges			Total dry goods shipping		
	Units	Tonnage	Engine power	Units	Tonnage	Engine power	Units	Tonnage	Engine power
	Number	T	kW	Number	T	kW	Number	T	kW
Germany	914	1183160	547733	784	852004		1698	2035164	547733
Belgium	878	1062837	716257	224	440150		1102	1502987	716257
France	850	578128	183968	390	450687		1240	1028815	183968
Luxembourg	10	9189	4850	0	0		10	9189	4850
Netherlands [25]	3580	4097901	2181595	975	1631741		4555	5729642	2181595
Switzerland	15	28081	15306	3	5647		18	33728	15306
Poland	109	67571	32713	431	212445		540	280016	32713
Czech Republic	47	47265	20773	178	78588		225	125853	20773
Total	**6403**	**7074132**	**3703195**	**2985**	**3671262**		**9388**	**10745394**	**3703195**
Austria (2004)	5	7058		54	84807		59	91865	0
Slovakia	14	20697	11013	133	215624		147	236321	11013
Hungary							0	0	0
Romania	304	369066	13978	603	1076065		907	1445131	13978
Bulgaria	13	10328	10728	152	74893		165	85221	10728
Moldavia (*)	9	4065	11150	48	41829		57	45894	11150
Croatia (*)	67	17171	65924	252	350261		319	367432	65924
Serbia	66			345			411	0	0
Ukraine (*)	94	132479	207045	403	623784		497	756263	207045
Total	**572**	**560864**	**319838**	**1990**	**2467263**		**2562**	**3028127**	**319838**

(*) indicative, source Danube Commission for 2007

[25] Registered fleet according to IVW

31.12.2010	Motor tankers			Pushed tanker barges			Total tanker shipping		
	Units	Tonnage	Engine power	Units	Tonnage	Engine power	Units	Tonnage	Engine power
	Number	T	kW	Number	T	kW	Number	T	kW
Germany	418	761161	380891	44	48290		462	809451	380891
Belgium	219	329362	206472	9	12807		228	342169	206472
France	40	53338	11470	0	0		40	53338	11470
Luxembourg	16	27754	13838	2	8435		18	36189	13838
Netherlands [25]	943	1323883	792567	43	65314		986	1389197	792567
Switzerland	53	136796	62907	2	4043		55	140839	62907
Poland	2	3204		0	0		2	3204	0
Czech Republic	1			0			1	0	0
Total	**1692**	**2635498**	**1468145**	**100**	**138889**		**1792**	**2774387**	**1468145**
Austria (2004)	5	5601		15	22055		20	27656	0
Slovakia	3	3669		2	4043		5	7712	0
Hungary	6	6219	2915	1	2375		7	8594	2915
Romania	10	19318		0	0		10	19318	0
Bulgaria	0	0	0	0	0		0	0	0
Moldavia (*)	0	0	0	0	0		0	0	0
Croatia (*)	0	0	0	0	0		0	0	0
Serbia	5	0	0	37	0		42	0	0
Ukraine (*)	0	0	0	0	0		0	0	0
Total	**29**	**34807**	**2915**	**55**	**28473**		**84**	**63280**	**2915**

(*) indicative, source Danube Commission for 2007

[26] Registered fleet according to IVW

31.12.2010	Tug boats			Pusher boats			insgesamt		
	Units	Tonnage	Engine power Units	Units	Tonnage	Engine power Units	Units	Tonnage	Engine power Units
	Numbe	T	kW	Numbe	T	kW	Numbe	T	kW
Germany	135		27093	290		145636	425	0	172729
Belgium	12		4439	104		62477	116	0	66916
France							1240	0	0
Luxembourg	0		0	14		11799	10	0	11799
Netherlands [25]	438		98255	558		270060	4555	0	368315
Switzerland	1			4			18	0	0
Poland	14		1657	198		54867	540	0	56524
Czech Republic	56		8040	112		47094	225	0	55134
Total	**656**		**139484**	**1280**		**591933**	**9388**	**0**	**731417**
Austria (2004)	0		0	10		9200	59	0	9200
Slovakia	9		7290	36		40570	147	0	47860
Hungary	0		0	0		0	0	0	0
Romania	31		7409	32		7733	907	0	15142
Bulgaria	14		6448	24		28083	165	0	34531
Moldavia (*)	2		1692	4		1248	57	0	2940
Croatia (*)	48		995	9		5475	319	0	10661
Serbia	84		15223	40		52824	411	0	68047
Ukraine (*)	16		14366	74		113054	497	0	127420
Total	**204**		**53423**	**229**		**258187**	**2562**	**0**	**315801**

(*) indicative, source Danube Commission for 2007

Remark : As a common fleet register is not available for Europe as a whole, different sources were used to establish a picture of the european inland fleet.

[27] Registered fleet according to IVW

Annex 2

New Ships

Ship type	2002			2003			2004		
	Num.	Tonnage	kW	Num.	Tonnage	kW	Num.	Tonnage	kW
Motor cargo vessels	45	113114	56138	34	89676	41894	28	71326	34400
Pushed cargo barges	29	37180		28	78156		14	23636	
Total	**74**	**150294**	**56138**	**62**	**167832**	**41894**	**42**	**94962**	**34400**
Motors tankers	22	65548	30547	45	131455	50332	54	139718	61236
Pushed tanker barges	2	178		1	1800		3	2427	
Total	**24**	**65726**	**30547**	**46**	**133255**	**50332**	**57**	**142145**	**61236**
Pusher boats	2		1276	0		0	1		992
Tug boats	3		11670	1		279	1		177
Total	**5**		**12946**	**1**		**279**	**2**		**1169**
Cabin ships	17		13251	10		7238	5		4021
Excursion ships	9		4834	1		1566	1		662
Total	**26**		**18085**	**11**		**8804**	**6**		**4683**

Ship type	2005			2006			2007		
	Num.	Tonnage	kW	Num.	Tonnage	kW	Num.	Tonnage	kW
Motor cargo vessels	34	87645	27490	33	93985	26637	35	111655	31460
Pushed cargo barges	12	11401		18	18385		29	54336	
Total	**46**	**99046**	**27490**	**51**	**112370**	**26637**	**64**	**165991**	**31460**
Motors tankers	46	130860	43736	28	77565	24637	23	50333	16534
Pushed tanker barges	2	2527		0	0	0	0	0	0
Total	**48**	**133387**	**43736**	**28**	**77565**	**24637**	**23**	**50333**	**16534**
Pusher boats	0		0	0		0	1		0
Tug boats	0		0	0		0	0		0
Total	**0**		**0**	**0**		**0**	**1**		**0**
Cabin ships	5		6280	4	1644	3186	2		1816
Excursion ships	5		2832	2	1959	2244	1		1570
Total	**10**		**9112**	**6**	**3603**	**5430**	**3**		**3386**

Ship type	2008			2009			2010		
	Num.	Tonnage	kW	Num.	Tonnage	kW	Num.	Tonnage	kW
Motor cargo vessels	68	226750	92944	72	237668	114002	24	73000	36000
Pushed cargo barges	38	70260		44	97461		24	37000	0
Total	**106**	**297010**	**92944**	**116**	**335129**	**114002**	**48**	**110000**	**36000**
Motors tankers	47	117500	31870	87	228020	72778	79	250000	42000
Pushed tanker barges	0	0		0	0		3	5230	
Total	**47**	**117500**	**31870**	**87**	**228020**	**72778**	**82**	**255230**	**42000**
Pusher boats	3		1684	6		11188	2		1368
Tug boats	3		0	6		1697	0		0
Total	**6**		**1684**	**12**		**12885**	**2**		**1368**
Cabin ships	3		5092	9			3		2871
Excursion ships	6		3092	1			4		2828
Total	**9**		**8184**	**10**		**0**	**7**		**5699**

Source: IVR and Secretariat CCNR

GLOSSARY

20-foot Equivalent Units (TEUs): Unit of measurement for registering containers according to their dimensions and for the description of the capacity of container vessels and terminals. One ISO 20-foot container (20 feet long and 8 feet wide) corresponds to 1 TEU.

ARA ports: Abbreviation for the three major European ports of Amsterdam, Rotterdam and Antwerp.

Demand of transport: demand coming from the industry to the shipping industry for transportation of goods. Is calculated in Tons and TKM.

Downstream: Refers to the part of an inland waterway located between a given point and the embouchure or confluence.

Draught: Height of the immerged part of a vessel; thus draught affects the loading level.

Dry hold: Used for the transport of dry cargo.

Econometric ratio: Estimated ratio between two or more values (e.g. production of steel, transport on inland waterways, imports of coal, etc.) on the basis of statistical data, using electronic calculation procedures. This estimate is used in making forecasts.

Electric steel: Electric steel is produced by melting down scrap metal using electric arc technology.

Freight: Refers to goods being transported or the price of transport.

Handling: Trans-shipment of goods from one means of transport to another. transport.

Hold: Compartment covering the larger part of a commercial vessel, for the storage of cargo to be transported.

Inland navigation / inland waterways transport: Transport of goods or persons on board a vessel intended for transport on a given network of inland waterways.

Inland waterway: Navigable inland waterways that may be used with a normal load by vessels with a minimum deadweight of 50 tonnes. Inland waterways include navigable rivers, lakes and canals.
Loading depth of a ship: Mesure of the loading capacity of a ship as it can be used in accordance to the water depth.

Offer of transport or of capacity: Total loading capacity of the available fleet, expressed in tonnes.

Oxygen steel: Steel produced from iron ore and coal using blast-furnace technology, passing through a number of stages (injection of oxygen, etc).

River/sea transport: Transport of goods on board a river/sea vessel (seagoing vessel designed for use on inland waterways), carried out entirely or partly on the inland waterways network.

Service: Refers to the service of the transport of goods, expressed in tonnes/kilometre.

Tanker hold: Used for the transport of cargo in tankers.

Tonnes/kilometre (Tkm): Unit of measurement for transport services, corresponding to the transport of one tonne over one kilometre of an inland waterway. Determined by multiplying the volume carried in tonnes by the distance travelled in kilometres.

Transshipment: Unloading of a cargo from one seagoing freight vessel and loading onto another seagoing freight vessel, even if the cargo has remained on land for any length of time before the transport continues.

Upstream navigation: Navigation travelling upstream.

Upstream: Refers to the part of an inland waterway located between a given point and the source.

Water conditions: Height of the water in a river or canal, in cm.

SOURCES OF INFORMATION:

International Organisations

Danube Commission
Eurofer
Euracoal
Eurostat
International Monetary Fund (IMF)
International Transport Forum (ITF)
OECD
World Steel Association

National authorities

German Federal Institute of Hydrology
Inspectie Verkeer en Waterstaat
Croatian Ministry for Infrastructure and Transport
Plovput
Serbian Ministry for Transport
Serbian Chamber of Commerce
Statistical Office of Germany
Statistical Office of Austria
Statistical Office of Serbia
Statistical Office of Croatia
Statistical Office of Slovakia
Statistical Office of Hungary
Statistical Office of Romania
Wasserschifffahrtsdirektion SüdWest

Industrial Organisations and Associations

Federal Association of Wholesale, Foreign Trade and Service (BGA)
Swiss Oil Association (EV)

Inland Shipping Organisations

Bureau Voorlichting Binnenvaart
Croatian Inland Navigation Development Centre (CRUP)
EBIS
ELWIS
EBU
Expertise en Innovatie Centrum Binnenvart
IVR
Via Donau
Voies Navigables de France

Ports

Amsterdam
Antwerp
Dunkirk
Hamburg
Karlsruhe
Cologne
Le Havre
Liege
Mannheim
Marseille
Neuss-Düsseldorf
Rotterdam
Strasbourg

Private Companies:

CMC Sisak
ConocoPhilips
German BP
Dunavski Lloyd
Helologistics
Mineral Oil Refinery Oberrhein
PCK GmbH
Petroplus
PJK International B.V.
Shell
Total

Other Sources

Jonkeren, O. (2009), Adaptation to Climate Change in Inland Waterway Transport; Tinbergen Institute research series No. 460; Dissertation thesis at the University of Amsterdam 2009

COLLABORATORS

European Commission
Mr Dieter (Administrator)

CCNR Secretariat
Hans Van Der Werf (Head of Project)
Jean-Paul Weber (Administrator)
Norbert Kriedel (Econometrician)
Angelika Espenhahn (secretarial duties)
Bernard Laugel (printing)
Contact : jp.weber@ccr-zkr.org

Group of experts
Christian Van Lancker (OEB)
Frédéric Swiderski (ITB)
Manfred Kamphaus (UENF)
Jan Veldman (OEB)
Michael Gierke (BAG)

NEA
Hans VISSER
Bredewater 26
NL-2715 ZOETERMEER

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