INLAND NAVIGATION IN EUROPE

Marketobservation 2012 - 1

Central Commission for the navigation of the Rhine

European Commission

MARKETOBSERVATION N° 15

Situation of the offer and demand in 2011
and analysis of the economic conditions early 2012

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Foreword

In times of great economic uncertainty, a market observation containing quantitative indications should help to fill out the enormous information gaps concerning the future. European economic policy – and also large parts of the economy – is still in the wake of the developments on the financial markets. Several factors do not contribute to an increase in consumer confidence, which would be essential for a prosperous economic development. The most important factors are the debt crisis and the doubts about the stability of the euro, the different strategic orientations in the euro area member states and the political dynamics resulting from the austerity measures in certain countries. Under these circumstances, the presentation of reliable forecasts that are based on economic research must be seen as a "tightrope walk". Nevertheless, the quantitative assessment of the current situation can serve as a guideline for the companies in the inland shipping sector. This quantitative assessment may be considered as the aim of this current publication 2012/1.

In order to enhance the readability and the accessibility, the layout has been adapted. A larger format and a selection of keywords that accompany the text should make the text easier to read and easier to handle.

Special attention was devoted to the segment of tanker shipping. The challenges that have to be faced by this market segment have already been described and analysed in earlier reports: a market based renewal of the fleet over a time span of 10 years. After the introduction of the transition deadlines according to the ADN regulations, about one third of this stretch of time has elapsed. For the sector, difficult years lie ahead. Will the demand be sufficiently stable? Will there be "economic space" for further investments in new capacity? And will it be possible to limit or even reduce the degree of overcapacity during the important years of 2015 and 2016? Many observers are already talking about a new crisis. In order to illustrate the situation, several scenarios have been developed, which combine the introduction of new double hull tankers with the phasing out of single hull ships from the market.

Major concerns are also present in the dry shipping sector. New construction may be declining, thereby limiting the growth rate of the fleet, but the transport demand in important industries and market segments remains extremely weak. In the coming years, it will be extremely important to stabilise the turnover, especially so because a lot of shipping companies still find themselves in a difficult financial situation. A stable turnover could preserve the private capital funds of shipping companies, thereby preventing a kind of "race to the bottom" regarding the depreciation of the ships.

These short-run considerations have to be distinguished from long-term perspectives. According to the political plans for the transport sector, which were elaborated by the European Commission in its White Paper "White paper 2011 - Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system" (March 2012) and in the strategy papers that followed, inland shipping is given the perspective of a significant growth in terms of volume. According to the above mentioned plans, the market share of inland navigation should increase by 20 % until the year 2050. This forecast is not only a perspective, but also a task: in order to compete successfully on a pan-European scale and to continuously meet the enormous infrastructure investment requirements, the achievement of a steady growth is an absolute necessity. It will be possible to realise this growth under the condition that the requirements of the market are met: a mode of transport that is cheap, but – even more important – a mode of transport that is reliable. These criteria must be completed by the societal viewpoint of a safe and environmentally friendly mode of transport. These terms and conditions can only be met if the sector is able to invest in new, highly innovative ships. These investments should incorporate modern technology, as it is also the case for the competing modes of transport.

Finally, the publication does also contain a special report about inland shipping on the Danube. This report was conducted by the Secretariat of the Danube Commission, within the framework of the collaboration between the two River Commissions.

Fact sheet 1:
Restructuring of the tanker fleet through to 2019

1. Introduction

Reorganisation of the fleet

The tanker shipping segment is in a restructuring phase. The progressive exclusion of single hull ships for transporting liquid goods (relevant timings are to be found in the table below) is causing disruption in the balance between supply and demand over a period of several years. This disruption is also being overlaid, and to some extent exacerbated, by the economic cycles affecting the tanker shipping sector (fluctuating demand for chemical products; price changes on the oil market, etc).

In this context, the question arises as to how the transformation of the fleet will play out in the years to end 2018/the beginning of 2019. The pattern of new building activity is of equally critical importance here as the time profile of the departure of single hull ships from the market. Also to be considered is the general environment, such as the limited access to capital in the wake of the financial crisis and the behaviour of the shipping companies.

2. Initial situation

The following table shows the ADN's transitional regulations, which are the basis for the restructuring of the tanker fleet. To some extent these transitional periods have been anticipated by the market participants (shipping companies, shippers, charterers) such that there was early investment in new shipping space resulting in an early and significant expansion in capacity. The predominant overall consequence is a fleet that has exceeded needs-based demand over a very long period of time with negative consequences for freight rates and thus for the shipping companies' income situation.

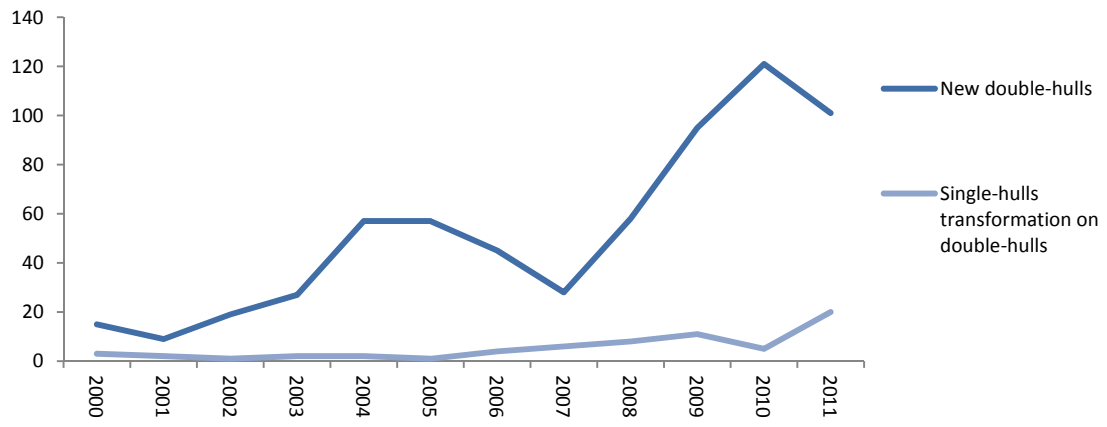
Table 1: *Schematic representation of the transitional periods for transportation in the tanker navigation industry*

End of the transitional period		
31.12.2012	31.12.2015	31.12.2018
Various chemical substances	Petrol, various other oil distillates, hydrocarbons	Diesel, gasoil, light heating oil, kerosene, aviation jet fuel, turpentine substitute

Source: ADN (2011)

Numerous double hull ships have entered the market in recent years. A significant increase in the rate of new construction can be noted from 2008 onwards. This is what emerges from the new construction statistics collated by the EBIS[1]. According to information from the three most important classification companies, the rate of new construction fell for the first time in 2011 – after several years of increases. In addition to numerous double hull tankers, single hull tankers were also built – in very low numbers. They amounted to 12 units in the period 2000 to 2010.

Figure 1: *Number of new double ships and conversion of single hull into double hull*

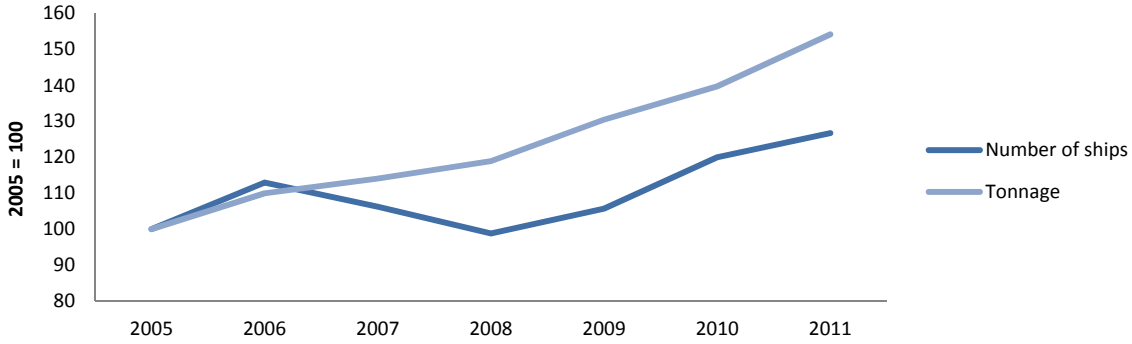


Source: EBIS. Figures for 2011: estimate based on classification company information

Double hull ships have a share of 80 %

According to classification company information, only very few single ships exited the market in 2011.
Capacity in the tanker shipping market has expanded strongly in recent years as a result of the abundant new construction and barely discernible departure of single hull ships, Because ships are becoming ever larger, this means that the tonnage has grown even more strongly, by a significant margin, than the number of ships (see figure). Towards the end of 2010 the proportion of double hull ships within the tanker fleet as a whole must have been approximately 75 %[2]. That means that the proportion will now probably be approaching the 80% mark.

Figure 2: *Growth in the tanker shipping fleet in Western Europe* (index)*



*Source: CCNR calculations based on national statistics. **
Western Europe = Belgium, Germany, France, Luxembourg, Netherlands, Switzerland

3. Medium-term development in demand and supply

To capture the extent of the destabilisation in numerical terms, one needs to take a look at the fundamental factors influencing long-term trends both for the supply and demand side.

Stable trend on the demand side

On the demand side, notwithstanding the fluctuations in interim transport demand, the overall observable trend is one of stability: Over an extended period of time, there is a slight downward trend in the quantity of mineral oil products being transported – owing to structural effects in the global mineral oil market. This decline is offset by increases in the chemical segment, such that between 2003 and 2010 overall tanker navigation transportation volumes have even increased by 4% on aggregate[3].
Overall, the assumption that this demand-side trend (declining transport flows of mineral products are compensated by increasing transport flows of chemical products such that the total transportation volume remains stable) will continue in the next few years appears to be justified. What also needs to be taken into account here is the increasingly important production of alternative fuels such as bio diesel and the high logistical affinity of these groups with inland navigation. This further offsets the losses in the mineral products arena.
The scenarios generated as part of this report therefore assume a very small increase in the volume of liquid goods transported (of 0.5% per year). The rate of 0.5% per year corresponds to the average annual increase in the transportation of liquid goods on the Rhine between 2003 and 2010 (total growth in this period was +4%).

On the supply side, three activities need to be distinguished when it comes to the change in fleet size:

1) New construction (of double hull tankers)
2) The conversion of single hull into double hull
3) The departure of single hull ships from the market

Ad 1) New construction of double hull ships

A further reduction is assumed for the rate of new construction in the years ahead, as is already shaping to be the case for 2011. A number of conclusions about the extent of the reduction can be drawn from the expectations of the classification companies. But the general economic outlook needs to be considered as well, given its important influence on the freight rate level and thus on the investment climate in the shipping sector.

Declining rate of new construction

Ad 2) The conversion of single hull into double hull

Numerically, this activity is not all that important. The reason for this is primarily the high cost of conversion, which from a technical perspective can be described as very complex. A negative incentive is proving to be the rule by which the year of a ship's construction is not changed once the conversion has been completed, which then adversely affects its insurance valuation. The engine unit, and thus the fuel consumption and emissions characteristics, are also not modernised by the conversion from single hull into double hull.

Ad 3) The departure of single hull ships from the market

The bulk of the single hull ships leaving the fleet are scrapped. Almost no alternative use is to be found elsewhere in Europe because there is scarcely any market for tanker navigation in the Eastern European countries. On the other hand, equivalent regulations as in the Rhine area have already been introduced there. The Eastern European countries are therefore also subject to the ADN regulations. Admittedly, a small-scale "export" phenomenon of these ships to countries outside Europe can be observed, but is almost too small to quantify.

Small-scale "export" of single hull tankers to countries outside Europe

4. Basis for the market scenarios

Four scenarios in all have been mapped out. In two of the four scenarios it is assumed that the single hull ships will continue to be operated until the transitional periods end and thereby be part of the active fleet. The other two scenarios, by contrast, assume a continuous departure of single hull ships at a constant annual rate of 20 single hull tankers, corresponding to the figure for 2011[4].

In addition to classification company estimates, the above scenarios are also based on considerations to do with shipowner behaviour. Specifically, these are as follows:

Firstly, from a ship owner's perspective, it is an eminently logical plan to exploit and amortise his investment capital for as long as possible, especially as there will no longer be any market for these ships after the end of 2018.

Secondly, the current situation on the capital market is characterised by a credit squeeze such that many owners of single hull ships will find it almost impossible to access loans for a conversion or new construction.

Thirdly, because of the declining freight rates in the past three years and the special effects of 2011 (low water; blockage of the Rhine) the financial situation of many companies is frequently precarious.

The attitude of numerous chemical concerns and oil companies is tending to undermine this basic assumption. In terms of their shipping activity, the latter appear to be adopting a rejectionist stance with respect to single hull ships even before the transitional periods have expired. This applies more acutely to the chemical sector than it does to the mineral oil segment.
The reason for the rejectionist stance towards single hulled ships is to be sought in image considerations, given many companies' goal of being able to "present" themselves to the public as being as environmentally friendly a means of transport as possible. Although individual mineral oil companies have in the past announced their intention only to use double hull ships from as early as 2008, it has not proved possible fully to implement this plan owing to a limited supply of double hull ships and the associated higher prices of these ships.[5]

Total tanker fleet tonnage amounts to approximately 3 million tonnes

Already before the end of the current year, namely, even before the end of the first transitional period, there are indications that the owners of single hull ships have turned first and foremost to the mineral oil segment, even before the corresponding deadline has expired, namely, even before 31.12.2012.Because of this anticipatory behaviour, and in view of the aforementioned fundamental assumption, there should not be any break at the beginning of 2013 either.

Assumptions also have to be made with respect to further investment activity in double hull ships. At the current time, an estimated 80% of total tanker fleet tonnage (amounting to approximately 3 million tonnes, of which 2.9 million t is accounted for by motor tankers and the remaining small balance of 0.1 million t by tankbarges) comprises double hull tonnage and 20% single hull tonnage.
Currently we can assume that there is considerable overcapacity. Estimates put this at approximately 35%.[6] The degree of overcapacity should in fact be even higher if one considers that the new double hull ships are more productive than the single hull ships. There are various reasons for this productivity effect.

1) Economic and operational reasons

Cost-push increase of productivity

It can be observed that because of the very high capital cost of the new ships, the predominant mode of operation is aimed at the greatest possible utilisation of the expensive capital asset. This is a 24 hour mode of operation, which is adopted in order to recoup the high capital costs.

This mode increases the ships' productivity because for a given ship capacity it enables greater transport output to be achieved. This increases the effective supply on the market even more than would be the case purely with a “tonnage calculation". Similar new ship productivity effects can also be observed in maritime shipping[7].
A further – operational – reason is the reduction in the proportion of empty runs. This can be achieved by skilful organisational scheduling and also has the effect of boosting productivity.

2) Technical reasons

The new double hull ships are also more productive than single hull ships for technical reasons. This is to do with shorter loading and discharging times, in part because of a higher pumping speed. Moreover, greater flexibility is possible because one and the same type of ship can be used to transport different liquids (mineral oil products, chemical substances, vegetable oils).

Shorter loading and discharging times

5. Classifying the scenarios

The scenarios can be differentiated according to 2 criteria

1) The scale of additional new construction to be expected through to 2018
2) The scale of the annual withdrawal of single hull ships through to 2018

The starting point is to explain the assumptions regarding the first criterion:
In all four scenarios, new construction activity from 2012 onwards continues to wane, from an initial level of approximately 120 new double hull ships, as reported by EBIS statistics for 2010. But the decline in new construction activity varies between scenarios.

In **scenarios 1 and 2** it is assumed that the rate of new construction will fall by 20 each year from 2012 onwards until such times as it reaches a level corresponding to the annual rate of new construction in the 1990s. This last-mentioned rate can be seen as a sort of “natural” rate of investment in the tanker navigation industry. According to this implied extrapolation of the latest developments, this natural investment rate would be achieved around 2016.[8]

Approaching the “natural” rate of investment

Scenario 3 and 4 is based on a more pessimistic view as regards the general economic environment, with the rate of new construction declining more rapidly during the period 2012 – 2018 (namely by 40 units each year until the "natural" rate of investment is reached)[9]. Ultimately, this more pessimistic view also takes account of the opinion of "market insiders" that an adequate number of double hull ships – if one takes the servicing of demand at adequate freight rates as a yardstick – has already been reached.

Table 2: Overview of the four tanker navigation scenarios (2012–2019)

Scenario	Implied development as it affects …	
	Single hull ships	Double hull ships
1	Single hull ships operate on the market until 2017/2018	Rate of new construction falls by 20 units each year until the figure of 8 units (= natural rate of investment) has been reached
2	Approximately 20 single hull ships exit the market each year	Rate of new construction falls by 20 units each year until the figure of 8 units (= natural rate of investment) has been reached
3	Single hull ships operate on the market until 2017/2018	More pessimistic assumptions on the state of the economy, driving a steeper decline in new construction numbers
4	Approximately 20 single hull ships exit the market each year	More pessimistic assumptions on the state of the economy, driving a steeper decline in new construction numbers

Source: CCNR Secretariat

Scenarios for the departure of the single hull ships

Let us now turn to the assumptions behind the 2nd criterion concerning single hull ships:

It is assumed in scenarios 1 and 3 that all single hull ships remain on the market until 2017/2018 and then are abruptly withdrawn at the end of the transitional periods. That means that in scenarios 1 and 3, the currently existing number of approximately 380 single hull ships at the beginning of 2011 would all exit the market in 2018 and 2019

Scenarios 2 and 4 on the other hand, assume a progressive departure of approximately 20 single hull ships a year. This equates to a reduction in tonnage of approximately 24,000 t per year. This was based on an average capacity for single hull ships of 1,200 t (statistical average of the West European single hull fleet).

The scenarios can be classified in a matrix view according to the two criteria "continuing presence of single hull ships" and "levels of new construction of double hull ships". The inside fields of the table contain symbols showing the effect arising from the combination of both criteria on changes in capacity. The upshot in three of the four scenarios is an inverse U-shaped development in total fleet capacity (single and double hull together).

*Figure 3: Scenarios in matrix form **

		New construction of double hull ships	
		Moderate decline in the rate of new construction	More pronounced decline in the rate of new construction
Continued presence of single hull ships	Single hull ships remain on the market until 2017/2018	∩ ∩ (Sz. 1)	∩ (Sz. 3)
	20 single hull ships leave the market each year	∩ (Sz. 2)	– (Sz. 4)

Source: CCNR Secretariat

** Key to symbols:*

∩ = slightly inverse U-shaped development in capacity (fleet) to 2018;

∩∩ = markedly inverse U-shaped development in capacity; – = falling capacity

6. Scenario outcomes

The following graphics illustrate the development in tonnage for double hull and for single hull ships based on the assumptions in the four scenarios. The chronological start point is the current split in the tanker shipping fleet between double hull and single hull[10].

Figure 4: *Scenario 1 for the evolution in tanker shipping tonnage to the end of 2018*

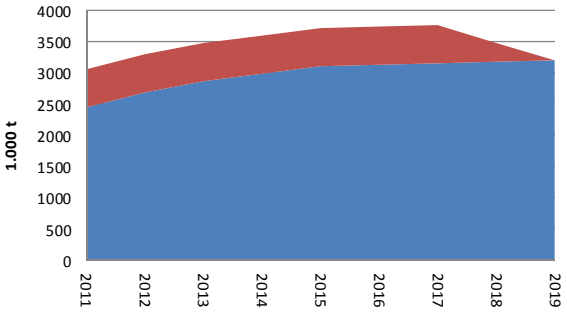


Figure 5: *Scenario 2 for the development in tanker shipping tonnage to the end of 2018*

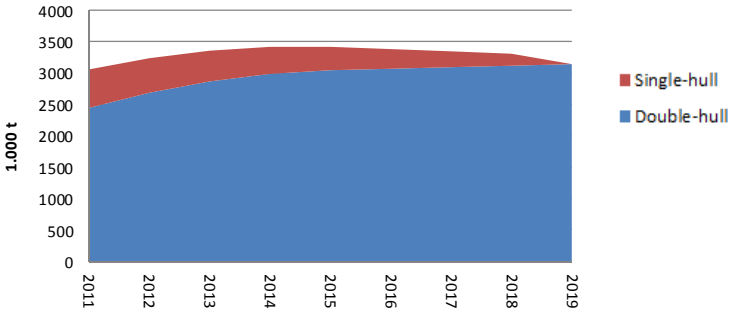


Figure 6: *Scenario 3 for the development in tanker shipping tonnage to the end of 2018*

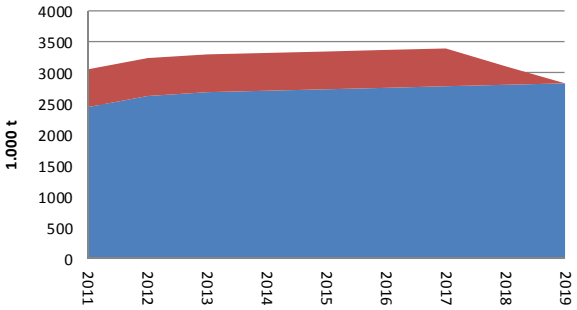
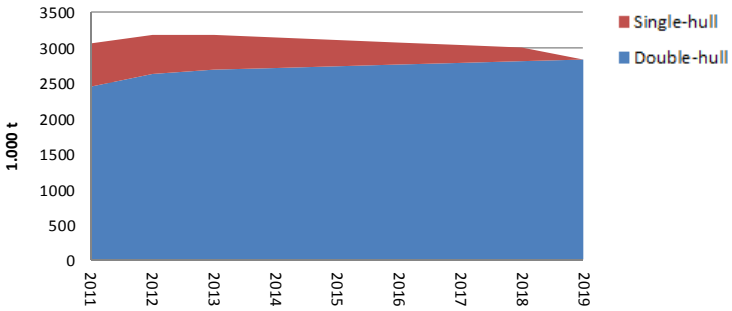


Figure 7: *Scenario 4 for the development in tanker shipping tonnage to the end of 2018*



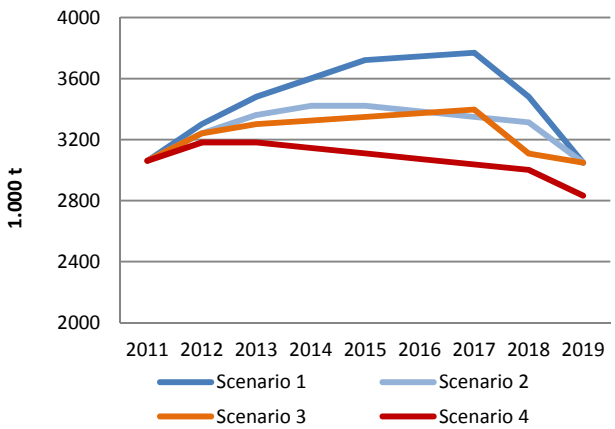
Source: CCNR Secretariat calculations

To illustrate the inverse U-shaped progression, the development in overall capacity for all four scenarios is summarised in a graphic.

It should be noted that in only one of the scenarios is there a significant decline in overcapacity during the period 2012 to 2018. This is scenario 4 in which each year 20 single hull ships exit the market accompanied at the same time by a sharp fall in new construction numbers (by 40 units until such times as the natural investment rate of 8 ships has been achieved)[11].

In the three other scenarios, total tonnage continues to increase until 2017 before then falling back to its initial 2011 level. The most marked overcapacity – viewed over the entire period – occurs with scenario 1.

Figure 8: *Progression in overall capacity according to the four scenarios*



Source: CCNR Secretariat calculations

7. Conclusion

What scenario the actual development path out to 2018 can most probably be assigned to is difficult to judge from today's perspective. But in any case it is becoming clear that if single hull ships remain on the market, then persistent and even increasing overcapacity will be virtually unavoidable. This is because even under those scenarios that factor in a significant reduction in new construction numbers, overcapacity will continue to increase in the years ahead.

Only if a sharp reduction in new construction numbers is combined with a withdrawal of 20 single hull ships per year (at a minimum) will overcapacity fall. This is the case in scenario 4.
If on the other hand, the overcapacity depicted in the three remaining scenarios comes about, then in the period to 2019, there would be a significant imbalance between supply and demand, which would exercise downward pressure on freight rates and, for a number of companies, probably pose a difficult economic challenge as well.

Increasing overcapacity is expected if single hull ships remain on the market

In this context, the question arises whether a situation might come about at some time between now and 2018 in which the sector might find itself in a dangerous "imbalance", resulting in a large number of insolvencies.

Fact sheet 2: General characteristics of the problems facing the Danube navigation market (contribution by the Danube Commission)

1. Introduction

High potential for goods traffic on the Danube

Significant opportunities exist for navigation of the Danube to enhance its potential, with the capability to make a significant contribution to increasing economic prosperity in regions whose economic activity is linked to the Danube.

However, even the existing potential of navigation of the Danube, especially in international trade, is being inadequately exploited while the other traffic arteries are overloaded.

The reasons for this are to be seen first and foremost in the weakness of the transport market, in the inadequate links with the markets of other river basins and in a certain distrust towards transport on the Danube owing to the uncompetitive infrastructure compared with other types of transport.

2. General characteristics of the current state of navigation of the Danube

Insufficient conditions for navigation

The potential for navigation of the Danube is significantly influenced by its economic environs and in particular by the actualities of the transport market. In the past ten years, the development of navigation on the Danube has been influenced by a number of negative factors that are primarily political in origin. From mid-2008 onwards, this was exacerbated by the consequences of the global economic crisis. As a result of these factors:

- overall traffic volumes and traffic density on the Danube lag significantly behind the corresponding key metrics of other European inland waterways[12] formally deemed to be of equal standing,
- the conditions pertaining to navigation of the Danube aggravate the introduction of new, progressive transport technologies and the efficient use of the existing fleet, as a result of which there are only low levels of investment in the existing navigation infrastructure[13]
- the number of ships in the effective transport fleet is in constant decline; hardly any new ships are in operation on the Danube.

The negative factors influencing the state of navigation of the Danube are amplified by:

- the absence of a uniform, co-ordinated and financially secure plan to develop the waterway and
- the specific features of the market, including the low freight rates as a consequence of the predominance of "raw materials" segments throughout the entire transport structure.

Inland navigation information services (RIS)

At the same time, the inland navigation information services (RIS) have developed very quickly as a new means of communication. It should be noted that since the full restoration of unimpeded navigation in the Novi Sad / Serbia region (October 2005) and the accession of new states from the ranks of the Danube Commission member states to the European Union[14] a number of programmes, projects and plans aimed at promoting European inland navigation, primarily initiated by the EU and directly relating as well to the navigation of the Danube have been tackled (inter alia Naiades, Platina, Neli, DaHaR, NEWADA).

The EU strategy for the Danube region as well, creating as it did a new macro-regional development strategy for the Danube states by conducting joint projects in the transport, energy, environmental protection etc sectors, can make an important contribution to promoting navigation of the Danube.

The revised draft agreement on the Regime of Navigation on the Danube[15] also takes account of the new tendencies in the development of European inland navigation. For example, in addition to matters concerning the improvement of the navigation regime, economic aspects are also considered. Based on the aforementioned programmes and projects, together with the actual situation of the Danube transport market and neighbouring regions, the Danube Commission, within the limit of its powers, has articulated the following medium-term strategic tasks for navigation policy.

a) Creation of a uniform normative and legal basis as well as of a uniform Danube traffic corridor that serves the interests of navigation of the Danube as a pan-European traffic corridor VII with high safety standards,

b) Achievement of a high degree of economic efficiency in operating the Danube fleet and other navigation infrastructure assets;

c) Enhanced integration of the navigation of the Danube into the pan-European, liberalised inland navigation market and a strengthening of the ties with the markets of other river basins with a view to increasing the potential of navigation of the Danube.

3. Characteristics of the Danube navigation market

3.1 Specific market features

The specific features of the Danube navigation market can be characterised as follows:

➢ **Legal features:**

- Application of DC regulations of a recommendatory nature,
- Application of specific national navigation regulations in the individual Danube states,
- Application of binding EU Directives in those EU member states that are Danube states.

➢ **Physical features of the Danube:**

- Long navigable length of the river,
- Specific water flow on the upper and lower Danube,
- Alternation between regulated and free-flowing stretches with critical pinch points.

➢ **Traffic organisation features:**

- Nonconformity of navigation conditions on the Danube with the overall concept of international traffic corridors (pan-European corridor VII),
- Low density of transit traffic on the Danube compared with other river basins (including the Rhine),
- Large proportion of goods being transported, not with motor freighters but with convoys,
- Predominance of bulk goods transport,
- Use of tonnage primarily for transporting only one type of goods,

- Insignificant extent of container traffic,
- Large number of fleets (passenger and freight ships) belonging to non-DC member states,
- Alternation between EU and non-EU member state territories for Danube transit traffic,
- Fleets concentrated into large shipping companies (approx. 50) in the DC member states unlike other European waterways on which private (individually operated) navigation dominates to the tune of 45-75%.

Insignifi-cant extent of container traffic

➢ **Fleet features:**

- The use of largely the same types of ship under DC member state flags[16],
- High proportion of ships falling under the Mannheim Act and ships under "third-party flags".

➢ **Characteristics of the landside infrastructure:**

- Long length of the river combined with low port density,
- Low density of industrial consumers close to the river bank,
- Availability of government-owned ports, public ports under private management and company-owned industrial ports.

➢ **Specifics of the Danube riparian states:**

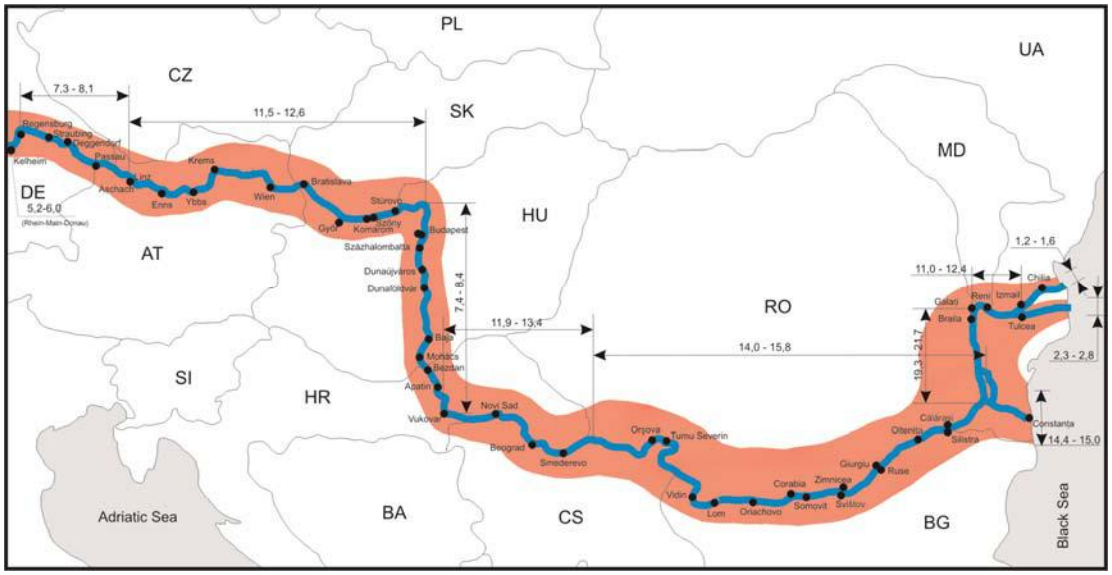
- Different levels of social and economic development of the Danube states, a large proportion of them with limited human and financial resources, resulting in a greater need for international support in attracting financial resources to solve general problems to do with navigation, water management, flood and environmental protection.

The Danube fleet has a carrying capacity of approximately 3.9 million tonnes

3.2 Freight volumes, most important types of freight and transport routes

According to official statistical information for 2008, the DC member states' Danube fleet comprises more than 4,100 ships, the relative proportions of the freight shipping to passenger fleet being 96.7% to 3.3%. The freight fleet has a carrying capacity of approximately 3.9 million tons and a total engine power output of more than 800 thousand kW.

Figure 9: Forecast of the traffic density for the Danube (2020)



Source: Danube Commission

In 2008, the DC member states' fleet carried 79.1 million t of freight, with freight transhipments of approx. 12 billion tkm. Based on the potential of the DC member states' fleet (including decommissioned vehicles) however, a freight volume of 90–92 million t could be achieved while maintaining existing routes and the most important centres of freight concentration.

When it comes to export/import traffic on the Danube, it is predominantly (to the tune of approx. 30%) mining and metallurgy product – iron ores, coal, metal goods – that are carried in pushed convoys of barges.

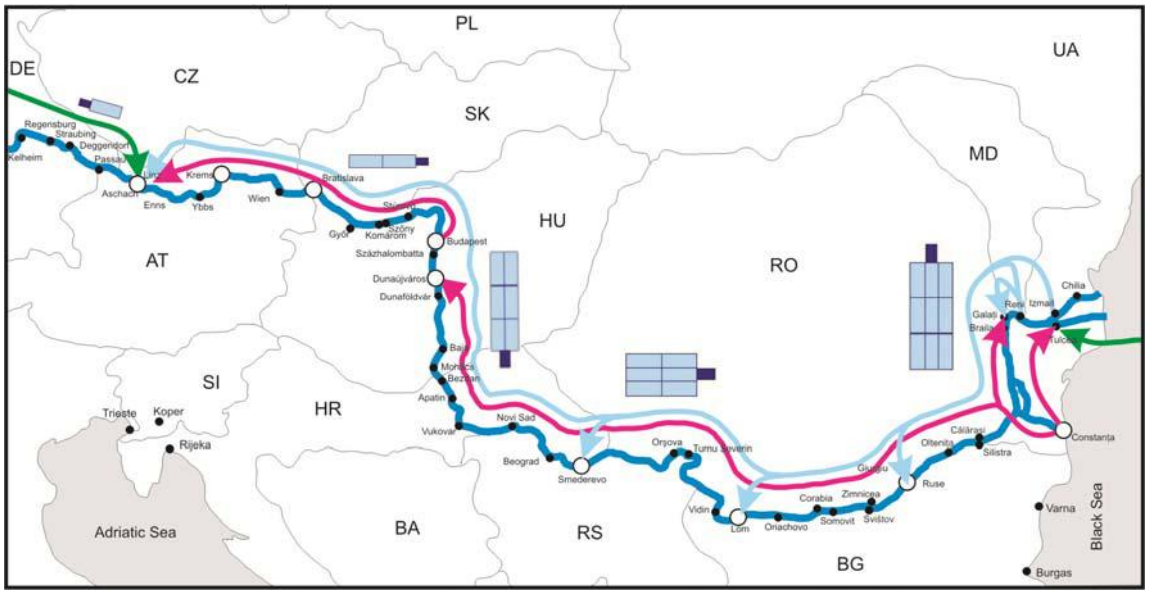
On the Danube, iron ores, coal and metal goods are important

From the end of 2008 onwards, not only did the volume of these transport movements[17] decline but also the economic key performance indicators for navigation of the Danube (the worldwide freight rate index of the 19 most important fell by a factor of 1.5–2 at the beginning of 2009). Despite the rise in freight prices[18] freight rates for bulk goods did not increase, such that the decline in the transport output of these goods (by approx. 30% in the first half of 2009) precipitated a significant deterioration in the economic situation of the navigation on the Danube as a whole.

The greatest goods flow density (2008 data) is experienced by the section between km 150–350 and is attributable to the large volume of goods from the port of Constanța both as cabotage and as far as the middle reaches of the Danube as well as from the ports on the Danube capable of handling ocean-going vessels (Fig. 9).

We can consider the most important routes for transporting iron ore and coal from ports in the sea-going stretch of the Lower Danube to ports on the middle and upper reaches of the Danube and in cabotage as already developed. These routes (Fig. 10) are the backbone of freight transport on the Danube.

Figure 10: Main lines of transport for ore and coal



Source: Danube Commission

Even with a cautiously optimistic forecast, the scale of freight traffic could only attain its 2008[19], level by 2020, provided that the most important iron and steel combines in the Danube region recover their basic output at least by 2013 (possibly with the exception of the Bulgarian combine "Kremikowzy").

3.3 Fleet load factor

If one considers the significant distances (700 to 2,000 km) in the case of the most important international bulk good routes for upstream traffic on the Danube (Fig. 10) efficiency could be increased primarily by:

– significantly increasing the water depth, and thus a heavier load on the barges (units without their own means of propulsion),
– achieving a return load of at least 50% in the case of fleet units without their own means of propulsion and
– achieving an 80% return load in the case of motor freighters.

Aim of increasing the return load of ships

This would require units operating in convoy groups from the Upper and Central Danube downriver also to be loaded with bulk goods or general cargo. Possible variants include:

– grain transports to the ports on the Danube capable of handling ocean-going vessels – potential up to 3/3.5 million t.
– transport of metal products to the ports on the Danube capable of handling ocean-going vessels – potential up to 2.5/3.5 million t.

These freight quantities however, are insufficient for an efficient return load and also have to be "lured away" from other means of transport (rail). The necessary level of return load could be achieved by organisational and infrastructure measures, especially by stepping up the activities of the existing booking offices or by setting up new offices in the most important port and logistics locations on the Danube (inland navigation, rail, road) and switching goods streams from other forms of transport onto the waterways.

Insufficient draught as a main problem

An additional important factor in increasing the barge load factors and at the same time the most important critical parameter in the navigation of the Danube is the loaded draught of the ships and convoys.

The main stock of units (Europe–II B type barges built from the 1980s onwards) was designed for a loaded draught of 2.70 m (loaded ship at rest – "static draught"). The loaded draught that barges are actually guaranteed to have in the course of a year is, however, around 2.20 – 2.30 m. In specific circumstances when transiting critical sections lightening (partial unloading) is required to reduce the draught from 2.30 m to 1.80 m[20] (this issue will be dealt with in greater detail in 3.2).

Both the aforementioned aspects, the load on the return journey and increasing the loaded draught could contribute to a step change in transport efficiency both for convoys and for individual motor freighters.

3.4 "Danube–Sea–Danube Traffic"

Navigation on the Danube possesses three canal links with the Black Sea, the highest transport output achieved on the "Danube–Sea–Danube" section was 14–15 million t, approximately four times the volume of goods being transported on the "Danube–Sea" journey than in the opposite direction.

According to statistics for the past 5 years, the breakdown of ocean–going ships entering ports on the Danube through the "Danube–Sea" canal links was as follows

- 40% with a carrying capacity of up to 3,000 t,
- 50 % with a carrying capacity of 3,000 – 6,000 t,
- 10 % with a carrying capacity in excess of 6,000 t,

Total freight transshipments in the Danube ports navigable by ocean–going ships exceed 20 million t and are an important factor in the Danube navigation market.

3.5 Container traffic on the Danube

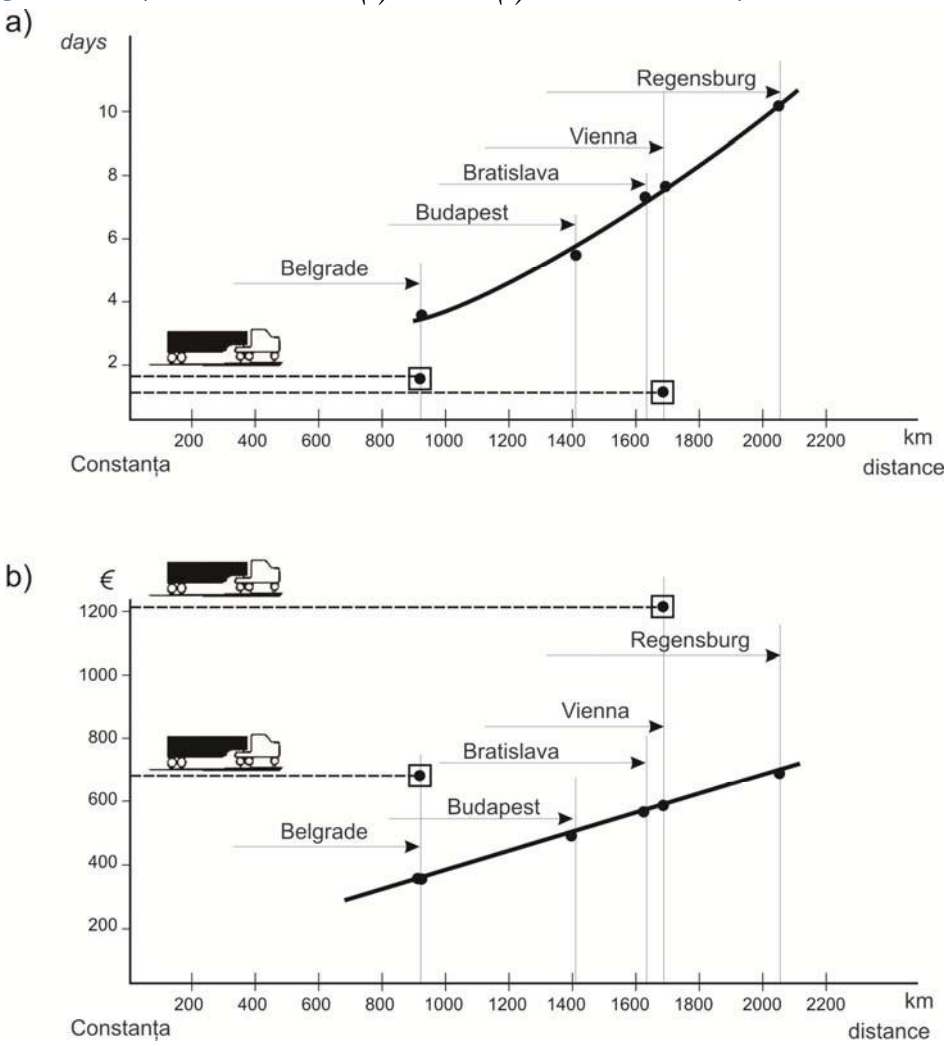
Unlike the Rhine and other inland waterways of Western Europe[21], this type of transport on the Danube is as yet inadequately developed for the following reasons:

- long distances and difficult direct connections between the freight centres for containers arriving from international sea routes (e.g. from the Port of Constanţa) and the most important distribution centres on the Danube (Belgrade, Budapest, Bratislava, Vienna, Enns) and
- the length of time it takes to transport containers to the distribution centres on the Danube owing to navigation conditions, in particular the underdeveloped infrastructure (Fig. 11)[22].

Profitability of container transport requires an improvement in navigability

At the same time the obvious advantages of this form of transport, especially in terms of cost, had already resulted in the commencement of scheduled services (container service HELO1 – from the Port of Constanţa to the ports of the Central and Lower Danube[23]). With appropriate navigation infrastructure, enabling container ships to achieve significantly higher speeds (motor freighters and pusher vessels with barges), one can anticipate a significant increase in container traffic by redirecting the flow of goods from other means of transport onto the Danube.

Figure 11: Comparison between time (a) and costs (b) about container transport traffic on the Danube (2008)



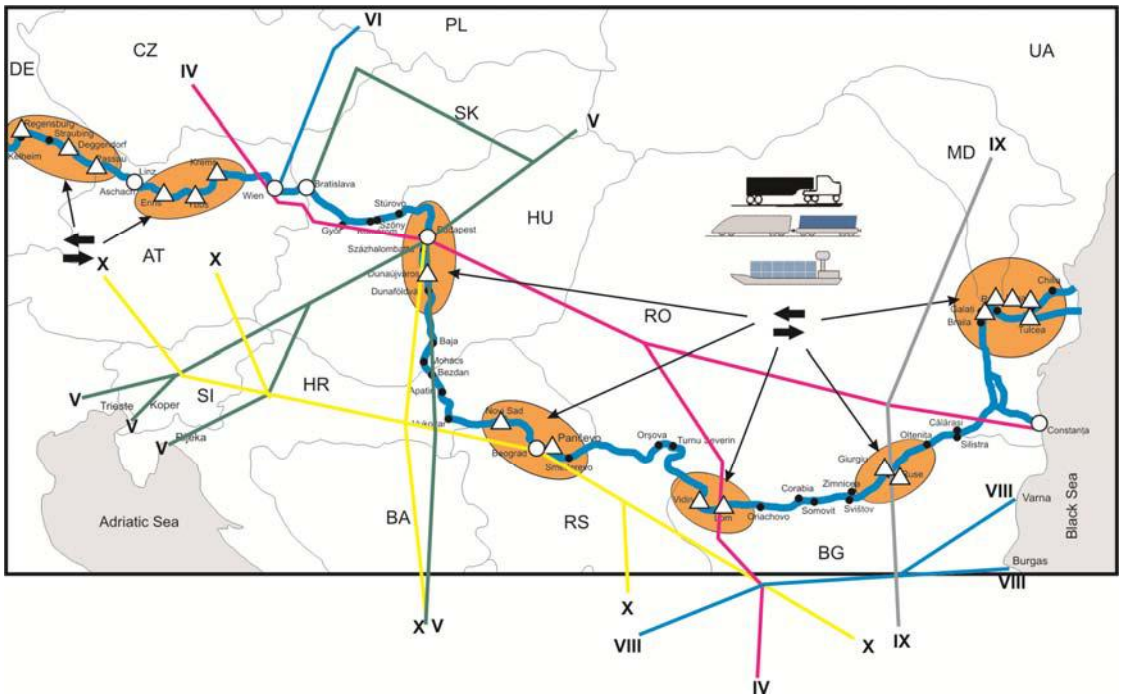
Source: Danube Commission

Intensifying container traffic on the Danube will

- promote the setting up of new logistic transport centres on those stretches of the Danube where international corridor VII and other international traffic corridors coincide (Fig. 12) and

- help to improve the logistics in those ports on the Danube with developed rail and road connections (motorway) and access to sea routes and short-haul sea traffic routes (Short Sea Shipping) on the Danube.

Figure 12: Corridor VII (Danube) connection within paneuropean transport network and possible new logistical centers



Source : Danube Commission

o – Most important logistical centres

Δ – Ports in which new centres could be achieved

3.6 Introduction of new transport technologies

The significantly predominant raw materials makeup of the Danube transport market is traditionally determined by the location of the most important metallurgical centres within the Danube region, which in turn has largely determined the existing navigation and harbour infrastructure as well as the composition of the Danube fleet.

New transport technologies

However, the Danube's transport potential can be realised by introducing faster technologies and new forms of transport with higher freight rates compared with bulk goods transport. Notwithstanding all the priority that should be given to developing container traffic, the future prospects of the following avenues should also be considered:

- new routes for transporting bulky motor vehicles and cars using Ro-Ro ships between ports with specialised berths and building similar berths in new logistics centres,
- Routes for transporting liquid petroleum gas (LPG) from seaports with specialised loading terminals to ports on the Central and Upper Danube,
- Routes for transporting heavy cargo from ports on the Upper Danube and
- Increasing ships' speed of travel and introducing transport technology between the Danube region and other regions requiring no transhipment (e.g. freight barges) – accompanied by a corresponding fundamental improvement in infrastructure.

3.7 Passenger transport

According to the statistics, an average of 120 cabin ships operate on the Danube, transporting 300 – 350 thousand people each year; that is more than 40% of total passenger traffic on European inland waterways.[24] The transport output is broken down as follows:

- "short" routes Passau – Budapest – Bratislava – Vienna – Passau – 30 %
- "long" routes Passau – Danube Delta – Passau – 30 %
- Rhein – Passau – Danube Delta – Passau – Rhine – 30 %

Apart from the routes mentioned above, local and excursion routes (more than 100 ships) are also actively operated in tourist centres (Budapest, Vienna).

Unlike freight traffic, the potential of passenger navigation on the Danube, both in terms of the number of passengers transported and freight fees received, has remained unchanged.

4. Danube navigation infrastructure

4.1 Characterisation of the current situation and fundamental avenues of development

The Danube's poor navigation infrastructure caused by the disparate development of the individual sections constitutes the main obstacle to the emergence of an adequate market and to putting the existing fleet reserve to work (owing to the lack of freight or funds for maintenance, more than 20% of the pushing capacity i.e. more than 30% of the tonnage is idle) as well as to the introduction of new transport technologies.

Based on forecasts of the transport market situation on the Danube, the following avenues can be described as fundamental when it comes to development of the Danube's navigation infrastructure:

- modernisation of the entire Danube waterway to ensure optimal fairway dimensions, especially adequate depths for the calculated loaded draughts of the fleet throughout its entire operating life,
- development of port capacities to exploit new types of goods flows and to step up loading and unloading activities[25],
- Development of communication facilities and nautical installations and of RIS-based information technologies and of both landside and shipborne infrastructure.

4.2 Ensuring the conditions of navigation

The fairway sections of the Danube are characterised based on the classification of inland waterways of international importance pursuant to Table 1 of the European Agreement on Main Inland Waterways of International Importance AGN (ECE/TRANS/120/Rev.1), specified in the "Blue Book" of the UNECE (ECE/TRANS/SC.3/144/Rev.1) with regard to all important rivers.

At the 77th session of the Danube Commission in 2011, it was resolved to accept a new version of the "Recommendations on minimum requirements for standard fairway parameters, hydrotechnical and other improvements on the Danube" (Doc. DK/TAG 77/11). This confirmed the previously approved classification of sectors of the Danube as follows:

a) Kelheim – Regensburg (2411.60 – 2379.68 km) –V b)

b) Regensburg – Vienna (2379.68 – 1,921.05 km) –VI b)

c) Vienna – Belgrade (1921.05 – 1,170.00 km) –VI c) [Belgrade – Tschatal Ismail

d) Belgrade – Sulina (1170.00 – 79.636 km) –VII Tschatal Ismail – Sulina (43.00 sm–0,00 km)]

Pursuant to point (ii) of Annex III of the AGN Agreement, only waterways navigable by ships with a draught of at least 2.50 m can be designated as E waterways (of international importance), with the proviso that this draught must be achievable on an average of 240 days per year, i.e. for 60% of the navigation period and on 300 days pursuant to footnote 3 to (viii).

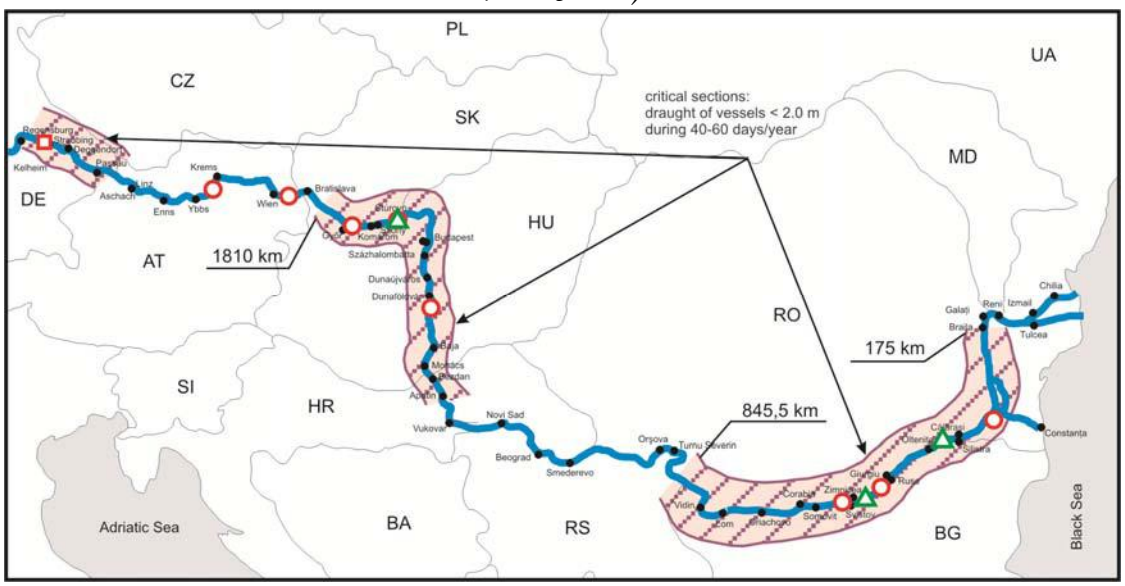
Low water levels are predominant

As such, a loaded draught of 2.5 m (loaded ship at rest – "static draught") was determined for the Danube in the "Recommendations on minimum requirements for standard fairway parameters, hydrotechnical and other improvements on the Danube", which theoretically would have to be guaranteed for the entire waterway from km 0 of the maritime section all the way to Kelheim.

However, as a result of the actual depths of critical sections of the Danube (Fig. 13) in the course of the year only an average loaded draught of 2.20 – 2.30 m is assured. In exceptional circumstances the ships' loaded draught must be reduced to as little as 1.8 m in the critical sectors. There were, however, also instances (September–November 2011) in which depths at the fords were 1.2 – 1.5 m. This therefore permits the observation that the Danube fleet is basically being systematically operated under low water conditions.

Factoring in the squat effect and under keel allowance, the required fairway depth for a loaded draught of 2.5 m cannot be assured without significant capital investment in the construction of additional barrages or without fundamentally redesigning individual Danube sectors.
Implementing projects to develop navigation infrastructure on the Danube requires unconditional compliance with international environmental regulations e.g. on the basis of the "Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River Basin" (Danube Commission, Save Commission, International Commission for the Protection of the Danube River).

Figure 13 : *Critical sectors (bottlenecks) that hinder navigation on the Danube, and announced projects (state of planning: 2009)*



Source : Danube Commission

□ – Construction of barrages

o – hydraulic construction without barrages

Δ – local hydraulic construction

4.3 Proposals by the Danube Commission for developing navigation infrastructure on the Danube

A resolution of the 75th session of the Danube Commission in 2010 adopted a package of proposals containing a list of national infrastructure projects (projects of the DC member states as at 1 December, 2010) as the Danube Commission's contribution to formulating the European Union Strategy for the Danube Region (EUSDR).

The DC's package of proposals was passed to the European Commission and to the coordinators of Priority Area 1a of the EUSDR – "Improvement of Mobility and Multimodality: Inland Waterways".

The DC member states' national infrastructure projects focusing on eliminating "pinch points" on the Danube fairway were formalised in 2011 at the 77th session of the Danube Commission which accepted a "Plan of major works to achieve recommended fairway dimensions, hydrotechnical and other facilities on the Danube".

5. Danube ship fleet

Growth of the fleet until 1990, decline afterwards

The largest expansion of the freight fleet on the Danube took place in the years 1980–1990:

Pusher boats	– Increase compared with 1980: 87.6 %
Motor freighters, including those equipped for pushing convoys	– Increase compared with 1980: 33.0 %
Cargo barges	– Increase compared with 1980: 67.3 %.

In subsequent decades (1990–2010), a significant decline was discernible:

Pusher boats	– Increase compared with 1990: 9.3 %
Motor freighters	– 50% decline as a result of depreciation
Cargo barges	– Decline to 37.8%

This decline is attributable to the slump in the traditional freight basis that had emerged in the years 1970–1980. The Danube fleet was only replenished in the passenger navigation market (cabin ships with a beam of up to 11.4 m).

Taking account of the forecasted freight basis and infrastructure development plans, the Danube fleet might develop in the following main directions:

- Modernisation of the existing fleet built between 1980–2000 and designed for traditional goods streams and the introduction of new logistics systems taking account of the development of the Danube infrastructure and the ubiquitous deployment of RIS,
- Construction of a new fleet, designed for new transport technologies (container traffic, liquid petroleum gas transportation, automotive technology, barge carriers) using new types of propulsion plant, new materials and fully developed automatic ship navigation systems, accompanied by the ubiquitous deployment of RIS on the Danube.

If one assumes that the average lifespan of a motorised inland vessel is typically 35–40 years, then it is worth modernising a fleet that has only reached half of the estimated lifespan (approx. 15–20 years) as it means that new, better operating characteristics can be achieved.

Modernisation could involve the following types of ship in the existing fleet:

Pusher vessels and push-tug vessels	- 47% (approx. 190 units)
Motor freighters	- 41% (110 units)

The fleet should be modernised in the following directions:

Greening the fleet

- Replacement of vessels' main engines by more economical, highly automated, reliable engines;
- Introduction of automated RIS navigational systems with a view to the optimal speed of the ship (convoy) on individual stretches of the Danube, especially at low water in accordance with the criterion of minimising fuel consumption;
- Ensuring environmentally-friendly navigation by modernising vessels' main, and auxiliary engines with a view to reducing the toxicity of the exhaust gases (use of alternative fuels, selective catalytic reduction etc).

6. Professional training of specialists in navigation on the Danube

Brain drain of personnel

As almost no new ships have joined the Danube fleet in the past 15 years (apart from passenger ships and ships belonging to non-DC member states) and because the market recovery is only extremely slow, there has been a discernible migration of highly qualified fleet personnel from the Danube states of Eastern and Central Europe to West European river basins. According to forecasts[26] the number of qualified personnel employed in navigation on the Danube will fall to between 5 – 5.5 thousand people by 2015 (compared with 11 thousand individuals in 2006) with a concomitant increase in average age.

As the potential for navigation of the Danube critically depends on traffic between the river basins[27], the mutual recognition of crew qualifications on the Danube and Rhine will help bolster this potential.

By creating a system of harmonised requirements on individual crew trades, first and foremost on skippers, the Danube Commission can help qualified specialists from other transport sectors, primarily from the maritime navigation sector, make the move into navigation on the Danube.

To this end, the 77th session of the DC in 2011 adopted updated "recommendations by the Danube Commission regarding skippers' tickets" which should come into force in DC member states with effect from 1 January 2013.

The inland navigation market in 2011 and early 2012

Section I: Analysis of transport demand

1. Economic growth: Development and prospects

The world economy has significantly recovered since its nadir in the middle of 2009. This recovery provisionally ended in the middle of 2011, and was followed by a change of direction back towards recession.

This turnaround was caused primarily by fears on the part of market participants and observers that the eurozone debt crisis cannot be overcome. The heightened nervousness of the markets and banking sector in view of the spreading of the currency and financial crisis in the Eurozone ended up by impacting on the real economy.

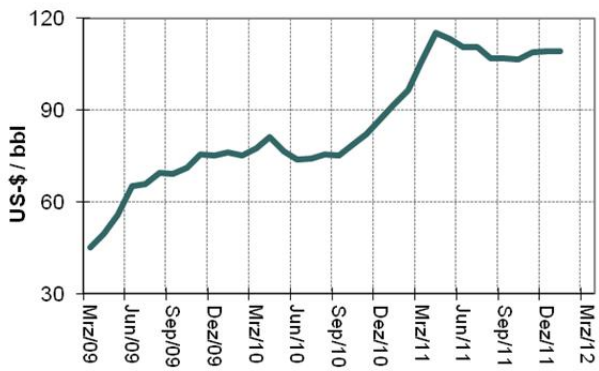
Debt crisis puts a strain on growth

For example, in its April 2012 report, the International Monetary Fund (IMF) says "Faced with the recent escalation in perceived risks in the Eurozone, Europe has fallen back into recession[28]. According to the IMF, the banking sector has played a key role in spreading risks and downward trends throughout large swathes of Europe.

Numerous economic indicators – both macroeconomic and those emanating from the transport sector – point to a slowdown in the second half of 2011. The oil price can be cited here as an important macro economic indicator, its progression being clearly correlated with the slowdown in the second half of the year.

Maritime trade, important in the development of world trade, is of enormous importance for inland navigation owing to the close relationship between seaports and inland harbours. In May 2011, the level of maritime trade between the EU-27 and the rest of the world was only 2% below its pre-crisis peak, reached in July 2008. Faced with the economic slowdown, which was then making itself felt, it lost momentum from month to month so that in December 2011 it was again 5% below the July 2008 level[29].

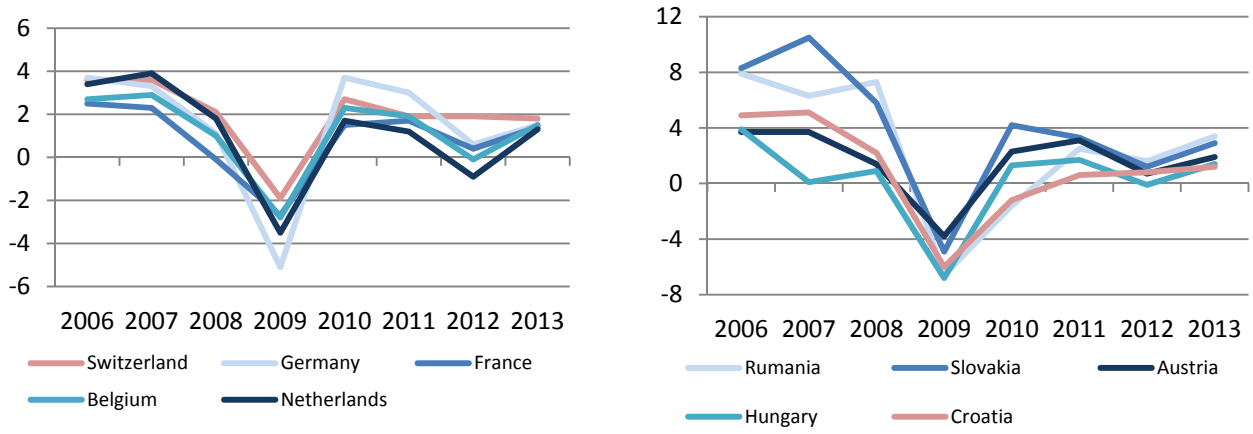
Figure 14: *Oil price movements 2009 to 2012*



Source: International Energy Agency (IEA)

Both Eurostat's and the IMF's general economic outlook assume weaker economic growth in 2012 for most European countries The European economy should consolidate again in 2013.

Figure 15: Real economic growth in the Rhine Basin and Danube region including forecast for 2012 and 2013



Source: Eurostat

The International Monetary Fund points to the ongoing risks facing the European economy. That means that, in the final analysis, the outlook is very uncertain because the economy is in a very fragile phase in which sentiment can again very quickly take a negative turn. The favourable forecast for 2013 only applies on condition that the Eurozone's structural crisis can be adequately overcome, both politically and economically. This is not currently in prospect. The IMF is reckoning on the following growth figures and preliminary estimates for the future:

Table 3: Real economic growth as forecast by the IMF

Country	2011	2012	2013
Rhine Basin states			
Germany	3,1	0,6	1,5
France	1,7	0,5	1,0
Netherlands	1,3	−0,5	0,8
Belgium	1,9	0,8	1,7
Switzerland	1,9	0,8	1,7
Southern Europe			
Italy	0,4	−1,9	−0,3
Spain	0,7	−1,8	0,1
Greece	−6,7	−4,7	0,0
Portugal	−1,5	−3,3	0,3
Total Eurozone	1,4	−0,3	0,9
USA	1,7	2,1	2,4
Japan	0,4	−1,9	−0,3

Source: IMF (2012)

2. Transport volumes: Development and prospects

The positive economic development in 2010 continued in the first half of 2011. Owing to the escalation in the EU debt crisis, this was followed by a slowdown and a fall in industrial production, company expectations and also transport demand in inland navigation.

The worst now seems to be over in important industrial sectors (steel industry, chemical industry) and a turn for the better is underway in May 2012.

Recovery in spring 2012

Inland navigation on the Rhine in 2011 did not just have to contend with the deterioration in transport demand in the second half of the year but with exogenous shocks into the bargain, such as the relatively low water levels in the spring and November as well as the blockage of the Rhine, which lasted for several weeks in January and February. A minor improvement is to be anticipated for 2012, but no out-and-out, strong increase in transportation.

The individual Rhine navigation market segments are put under the spotlight below in terms of their transport demand in 2011. It has to be said that this analysis is complicated in part (in individual segments) by problems associated with the changeover in goods classification from NST/R to NST 2007. A comparison with the previous year between NST 2007 and NST/R is not feasible for all segments. This particularly affects agricultural and forestry products as well as food and feedstuffs.

2.1. Agricultural and forestry products

Approximately 13.3 million t of agricultural and forestry products were carried on the Rhine, the biggest proportion being accounted for by grain at just under 6.9 million t[30]. The second most important subsegment comprised other products of vegetable origin (3.8 million t).

Forestry products accounted for only a very small proportion, with only 129,000 t.

2.2. Fodder and foodstuffs

Just under 6.7 million t were transported in 2011. With 4.3 million t, the most important goods were animal and vegetable oils and fats. Grain mill products and starch together totalled 1.2 million t. Transport movements exhibited fluctuations but there was no evidence of a seasonal cycle in whatever form. For this goods segment as well, no comparison is possible between this year and last owing to the aforementioned statistical changeover in goods codification.

2.3 Iron and steel industry

33.3 Mio. t of ores and scrap transport on the Rhine

With a total volume of 33.3 million t, the transportation of iron ore, nonferrous ores and scrap metal was 5% up on the previous year's figure. A decline did however set in from the middle of the year onwards as a result of the slowdown in European steel production. Quantitatively, the bulk of this market segment is accounted for by iron ore (23.5 million t), which is used as the primary product in steel production. The steel location Duisburg absorbs the major part of these quantities (port transshipments of iron ore in Duisburg in 2011: 20.6 million t), as well as a (significantly smaller) proportion of the scrap metal volume.

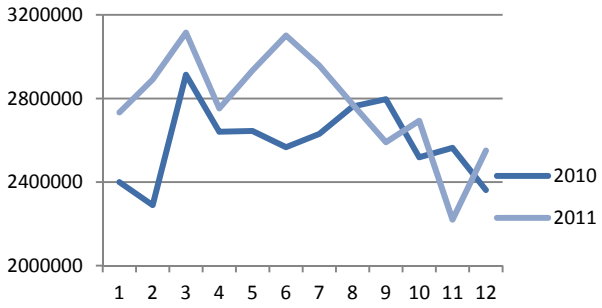
The transportation demand for iron and steel products suffered falls from the middle of the year onwards, followed by high demand in the first half of the year. The peak was reached in July with more than 1.1 million t being transported. From that point onwards quantities dwindled to the December figure of 705,000 t. Despite that, thanks to the strong first half performance, the full year yielded a significant increase of 15% in the context of a total volume transported of 11 million t.

What is the situation for transport demand in the current year 2012[31]? A distinction needs to be drawn here between navigation of the Rhine in Germany and the transportation of steel industry goods in other countries in the Rhine region, such as in Belgium.

Following a fall in the second half of 2011, steel production in Germany, the most important barometer for the transportation of ores & metal wastes on the Rhine, has resumed steady growth in the opening months of 2012, reaching a level of almost 4 million t per month. That means that the transportation of ores & metal wastes on the Rhine in the first four months should also have recovered. If one goes along with the empirical finding that German steel production is a coincident indicator for the carriage of ore on the Rhine, the average transportation level of 3 million t per month should once again have been reached in the opening months of 2012.

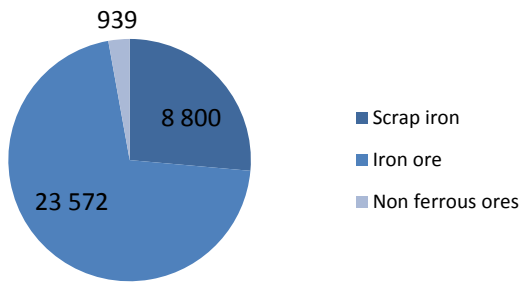
Inland navigation in Belgian on the other hand, is suffering the consequences of the permanent closure of two blast furnaces in Liège, which will permanently reduce the carriage of ores and metal wastes in the region. This is already apparent in concrete figures from the transportation statistics in Wallonia in the first four months of 2012 (see graphic). Essentially we can say that there has been a halving compared with the year before. Transshipments in the sea port of Rotterdam also exhibited declining transshipment volumes of iron ore in the first quarter of 2012, which is attributable to the decommissioning of the Belgian blast furnaces.

Figure16: Transportation of ores and metal wastes on the Rhine (t)



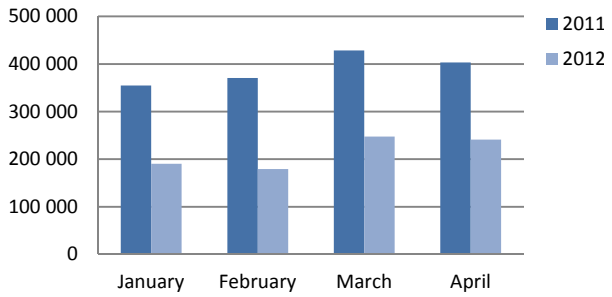
Source: destatis

Figure 17: Freight traffic of iron ore, nonferrous ores and scrap metal on the Rhine in 1,000 t (2011)



Source: destatis

Figure 18: Transportation of ores on waterways in Wallonia 2011 and 2012



Source: Direction générale opérationnelle de la Mobilité et des Voies hydrauliques

There are structural changes going on across the board in the West European steel sector. For example, the European automotive industry is an important purchaser of European steel, but so too is the Detroit region in the USA known as the "motor belt". In recent years that region has been convulsed by structural crises. In Europe, car factories can increasingly be observed relocating to Eastern Europe (Poland, Slovakia, etc.) This requires the steel companies, who as shippers frequently have their own ports, inland ships and trains, to design new supply routes to handle steel, ore, scrap metal and coal logistics.

Delocalisation in parts of the steel industry

2.4. Solid mineral fuels

Inland navigation, especially navigation on the Rhine, plays a very important role in the importing of hard coal. According to information from the German Verein der Kohleimporteure e.V. (Association of Coal Importers), approximately 50% of Germany's coal imports in 2011 (approximately 24 million t) arrived in the country on inland ships. These ships are all loaded with coal in the ARA ports and then travel up the Rhine to Germany. The railway accounts for around 30% of coal imports; in this connection, an increasing volume can be observed being carried on the "Betuwelijn" line that runs from Rotterdam to the Ruhr[32]. The remaining 20% of coal imports arrive in the seaports of northern Germany (Hamburg, Bremen, etc).

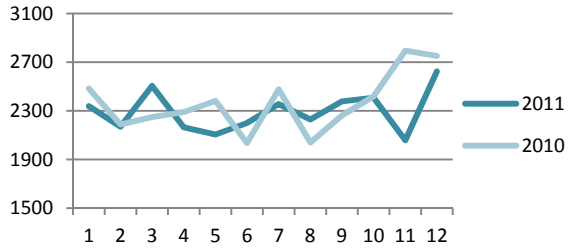
50% of Germany's coal imports arrive per inland vessel

Overall, transport movements of solid fuels (anthracite) on the Rhine were only 1% below the previous year's level. This was primarily attributable to the poor fourth quarter. Only demand for steam coal for power generation was able to retrieve the situation.

A negative impact was felt from the steel industry, which in the autumn felt the effects of the general economic slowdown.

In all, there are currently eight power station projects in Germany involving mineral coal. Three of the power stations under construction are on the Rhine, namely Mannheim, Karlsruhe and Duisberg. All projects, however, are being challenged legally so that their completion will probably be yet further delayed. If they should indeed be completed, this will boost or stabilise coal receipts in the relevant ports.

Figure 19: Transportation of solid fuels on the Rhine (1,000 t)



Source: destatis

The first quarter of 2012 saw a 15% increase in coal deliveries in the sea port of Rotterdam. This was attributable to increased stockpiling of mineral coal as result of the relatively low prices of imported coal. For example, the import prices for steam coal / power station coal (MCIS Steam Coal Marker Prices cif in US-$ / Tonne SKE) in the first four months of 2012, were approximately 20 % below the previous year's level.[33] These low coal prices resulted in increased stockpiling. Transportation on the Rhine will have benefited from this as well.

2.5. Aggregates, soils & building materials

If one looks at the type of goods that fall into this area under the new goods classification system, then there was a volume of 27.8 million t on the Rhine in 2011. A comparison with the previous year reveals a sharp decline of 20%. The most important sub segments in 2011 were:

- 21.7 million t of stone, sand, gravel, soil, peat
- 3.7 million t of cement, limestone and gypsum

The above mentioned decline is mainly attributable to the difficult water conditions. The low water drove up freight rates, which in turn made it excessively expensive to transport low value goods. Sand, soil and building materials can be included among the last mentioned goods.

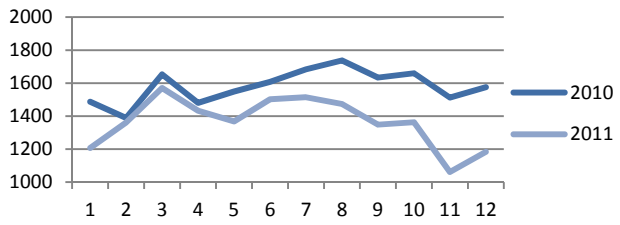
Low coal prices stimulate the demand for coal transport

2.6 Chemical products and fertilisers

The transport of chemical products has fallen by approximately 14% in the current year compared with the year before. The losses set in primarily in the spring with the slowdown in economic activity and continued throughout the rest of the year.

The German chemical industry largely runs in synch with transport demand on the Rhine – is expecting turnover and production to stagnate. Production is anticipated to grow at an average annual rate of between 2 and 2.5 per cent until 2020[34].

Figure 20: Transportation of chemical products on the Rhine (1000 t)

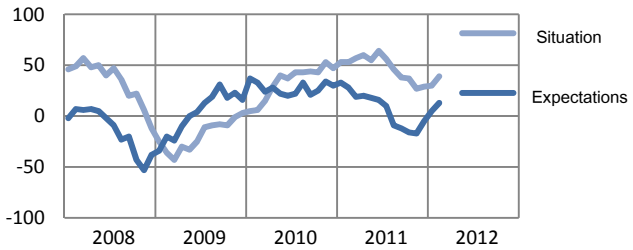


Source: destatis

The German Ifo Konjunkturinstitut regularly employs surveys to investigate the situation and expectations in the chemical industry in Germany. These indicate that the situation and expectations improved towards the end of 2011 pretty much in step with one another. Moreover, they exhibit a very synchronous correlation with transportation demand on the Rhine

This offers hope for transportation demand in 2012 in view of the upturn in how the situation is assessed (see graphic). What is also apparent from the graphic in general terms is that the industry's expectations (with a certain time lag) have always been "vindicated".

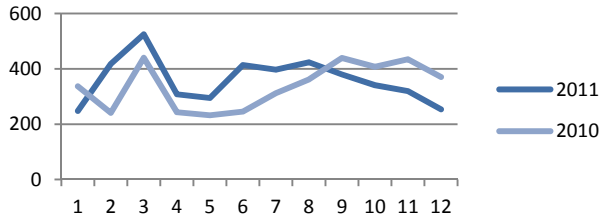
*Figure 21: Situation and expectations of the German chemical industry**



*Source: VCI; ifo Konjunkturinstitut. * net position of positive and negative expectations in representative surveys in the chemical industry*

The fertiliser segment posted a slight increase in transportation volumes of 1% in the past year. As in most other sectors, here too transport demand tailed off towards the end of the year. Transportation volumes totalled 4.32 million t compared with 4.27 million the year before. The strongest month was March with a volume of 525,000 t and the weakest month was January (247,000 t).

Figure 22: Transportation of fertilisers on the Rhine (1,000 t)



Source destatis

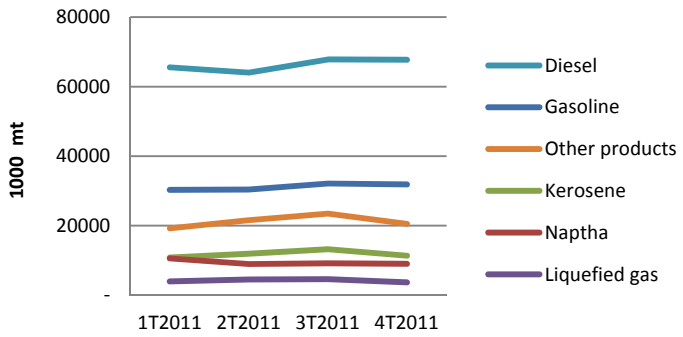
2.7. Mineral oil products

28.2 million t of mineral oil products were transported on the Rhine in the past year, slightly down on the previous year's level. An interim assessment indicates an upward trajectory to August, followed by a downward trend. The overall performance was down on the previous year's level (by approximately 5%).

Structurally, the tanker navigation mineral oil market is primarily based on diesel and light heating oil, the two most important commodities carried. Certain growth prospects still exist for these goods in the European market, which is rather less the case for petrol. The increase to August essentially tracks European refinery output for 2011.

In view of the impending economic recovery, which should be accompanied by a rebound in the price of oil, the outlook for transportation demand in 2012 is rather subdued.

Figure 23: Quarterly refinery output in European OECD countries in 2011



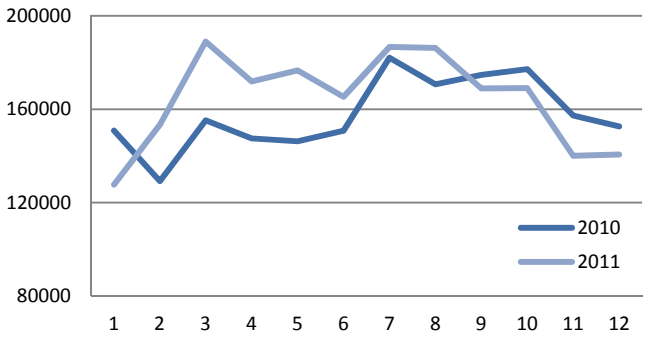
Source: IEA in 1,000 metric tons

2.8. Containers

The development of inland container traffic on the Rhine in 2011 was determined by three main influencing factors:

- Firstly, there was a distinct economic slowdown from the middle of the year onwards, which is clearly evident in the transportation statistics.
- Secondly, the periods of low water resulted in an increase in transportation prices and to temporary losses in market share to the railways. This effect made itself felt on loaded containers.
- And thirdly, the accident at Loreley in January adversely affected shippers' willingness to entrust loaded containers to inland navigation.

Figure 24: Total container traffic on the Rhine in 2010 and 2011 in TEU



Source destatis

The very severe low water periods (March to June and November) increased freight rates for full containers in the form of low water supplements, resulting in a price disadvantage relative to rail. With water levels such as those in November, low water supplements can increase to as much as 50 – 60% of the freight costs. The railways benefited from this by capturing numerous transport movements of loaded containers from inland navigation during this period.

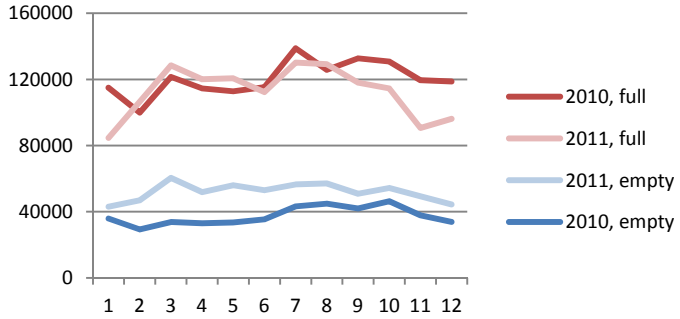
Low water levels provoke a temporary modal shift

By contrast, the price of transporting empty containers was less sensitive to falling water levels so that transportation prices here rose by a lesser amount. In addition, in view of the falloff in loaded containers, many carriers switched to transporting empty containers. This explains the fact that transport movements of empty containers fared better than those of full containers looking at 2011 as a whole.

A total quantity of 1.97 million TEU was carried throughout the year as a whole, compared with 1.89 million TEU in 2010. Of the 1.97 million TEU, 1.35 million TEU were loaded containers (68% of the total quantity).

Loaded containers declined by almost 7%. The number of empty containers transported increased by 39%. Overall quantities increased by 4% (owing to the good first half year performance and the empty containers).

Figure 25: Container traffic on the Rhine in 2010 and 2011 in TEU, split between full and empty containers



Source: destatis

Summary

By and large, transport demand in the dry goods and tanker shipping sectors in 2011 tracked overall economic and business development. Those segments in particular that are very sensitive to the state of the economy, such as ores & metal wastes and chemical products exhibited significant falls in the second half of 2011. The upswing in output in the steel and chemical industry in 2012 however lent fresh impetus to transport demand.
In addition to the state of the economy, however, the most important natural influencing factor, the water level, also affected transportation. This is especially so of container transport, where low water levels caused structural displacements between loaded and empty containers..

3. Transportation by traffic axes and regions

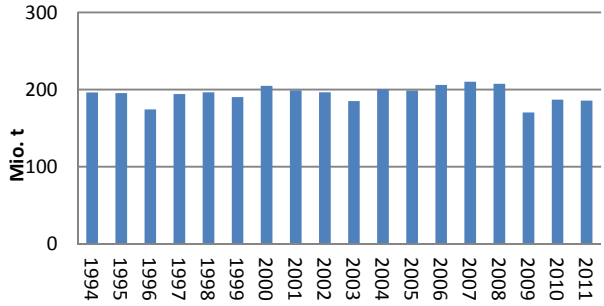
3.1. Rhine

The previous year's result was exceeded by one per cent, with 185.7 million t of freight traffic. Various disruptive factors prevented a better performance. Worthy of mention is the accident involving the acid tanker in January, which caused the closure of the Rhine for a period of several weeks. Other adverse factors were the low water in March and November. And finally the weakening of the economy in the second half of the year also depressed the result.

In the estimation of market participants, the acid tanker accident also damaged the image of inland navigation. For example, according to the Federal German Office for Freight Transport, a number of shippers are planning to reduce the proportion of inland navigation in favour of other means of transport.[35]

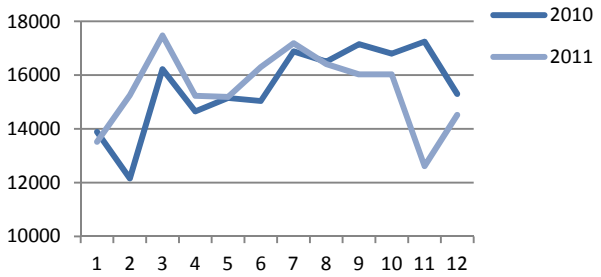
March saw the highest monthly transport volume, at 17.5 million t. This peak was attributable to the fact that following the reopening of the Rhine after the accident, it was finally possible to evacuate the cargos that had been held back in the inland harbours until that point. This had a one-off stimulating effect.

*Figure 26: Freight transport on the Rhine * (1,000 t)*



*Source: destatis * traditional Rhine (Rheinfelden near Basel to the German Dutch border)*

*Figure 27: Freight transport on the Rhine by month, 2010 and 2011**



Source: destatis.

** traditional Rhine (Rheinfelden to the German Dutch border)*

Differences in traffic intensity can be observed between individual stretches of the Rhine. 27.8 million t were transported on the Upper Rhine, 73.8 million t on the Middle Rhine and 172.2 million t on the Lower Rhine[36]. All three stretches of the Rhine suffered minor traffic losses compared with 2010, but the decline was not uniform. The Lower Rhine fared best with freight traffic on the Upper Rhine and on the Middle Rhine experiencing more significant reductions.

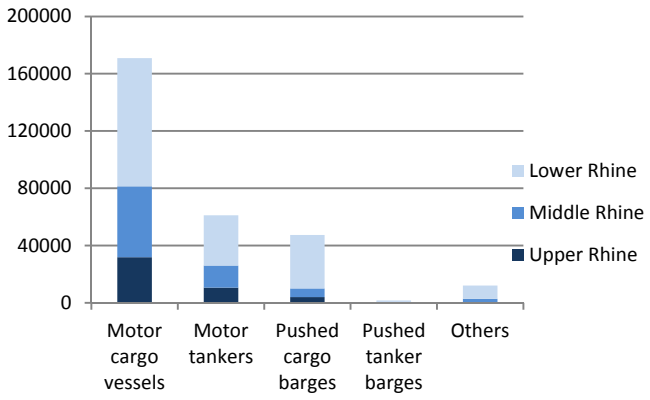
Transportation on the Rhine declines by 1% overall

The differences can be explained primarily in terms of the tanker accident in January as well as the effects of the low water, of varying severity. The acid tanker accident had very adverse effects on the Midde and Upper Rhine, because the ships coming from the south were no longer able to reach the seaports. Transport movements between the seaports and inland ports located north of the accident site, on the other hand, were srill possible on the Lower Rhine.

Above average decrease of transports on the Middle and Upper Rhine

The following graphic shows freight transport for the various stretches of the Rhine and by type of ship. The overwhelming bulk of the traffic is by motor cargo vessels. If one analyses the figures, it will be seen that freight traffic on motor tankers and tankbarges is not evenly distributed across the three stretches of the Rhine. For example, this traffic is somewhat less well represented on the stretch of the Rhine between Strasbourg and Neuburgweier (south of Karlsruhe). Traffic intensity on motor tankers and tankbarges is above average on the stretch of the Rhine between Mannheim and Bingen. This is to do with the chemical industry in the Mannheim/Ludwigshafen area.

*Figure28: Freight traffic by stretch of the Rhine and by type of ship in 2011 (1.000t)**



*Source: destatis * traditional Rhine (Rheinfelden to the German Dutch border)*

3.2. West German canal region (Ruhr, Dortmund-Ems Canal, Ems)

The Ruhr possesses numerous canals, the most important of which are the Rhine-Herne Canal and the Dortmund-Ems Canal. 38.1 million t of freight were transported within the Ruhr district in 2011, compared with 43.4 million t the year before.

The Dortmund-Ems Canal branches northward from the Ruhr towards the Ems, which in turn flows into the North Sea much further north again. Together with the Ems, which adjoins it, the part of the Dortmund-Ems situated outside the Ruhr constitutes an autonomous section of waterway. In 2011, 19.5 million t were transported on this section, compared with 19.8 million t in 2010.

3.3. Moselle

7,513 cargo carrying ship units with a cargo of 12.6 million t passed through the Koblenz lock in 2011. The year before, the figure was 14.3 million t. There was a decline on the French section of the Moselle in Apach as well, by 14% to approximately 7.9 million t. 8.2 million t were recorded at the Luxembourg lock at Grevenmacher and thus 15% less than the year before.

The sharpest drop was experienced at the Koblenz lock for solid mineral fuels (-18%) as well as iron ore and scrap metal. Together with agricultural and forestry products, these two categories of goods constitute quantitatively the most important goods segments on the Moselle, which in the case of coal and ores is attributable to the steel industry in Lorraine and in the Saarland.

Strong decrease of coal and ore transport on the Moselle

Looking at things by month reveals that May and November in particular were very bad months in a multi-year comparison. This applies both to the lock at Koblenz as well as the Apach lock in France and the Grevenmacher lock in Luxemburg. The reason for this was the drought experienced in these months, which was also the main reason for the poor performance for the year.

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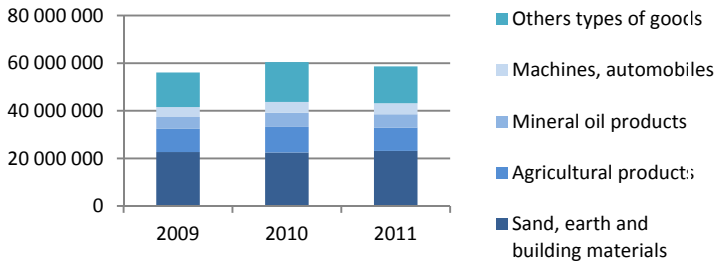
3.4. Waterways in France

3% less freight by volume was transported on French waterways than in the year before. 39.4% of these 58.6 million t in 2011 were accounted for by the "sand, soil & building materials" segment. It even proved possible to increase volumes by 3% in this important segment. In the case of agricultural products, also an important segment (with a 17% share), transport volumes fell by 9%.

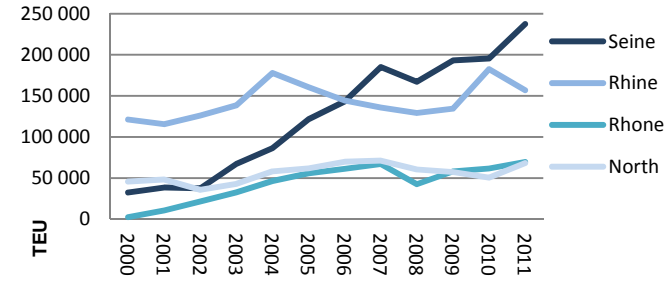
Figure. 29: Transport on inland waterways in France (t)



Source: VNF

532,000 TEU of container traffic were recorded, or 8.6% more than in 2010. Container traffic on the Seine continued to flourish, growing by 21.5%. Since 2000, the quantity of TEUs on the Seine has increased more than sevenfold. Inland container traffic on the French section of the Rhine has declined by 14% year-on-year, whereas the waterways in the north of France and the Rhône have gained ground.

Figure 30: Container traffic on inland waterways in France

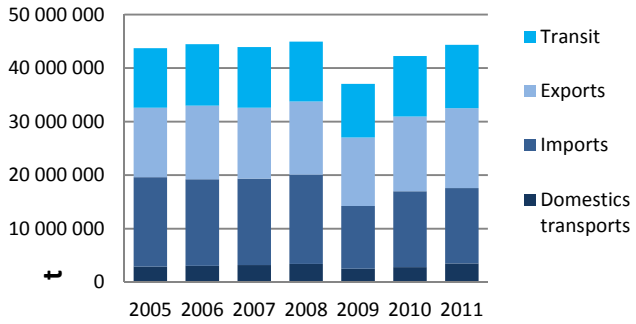


Source: VNF

3.5. Waterways in Belgium

Increases were posted on the Belgian waterways, both in Flanders and in Wallonia. Ship traffic in Flanders increased by 5.7% to reach 72.5 million t; this figure was more than one million tonnes more than the previous record result in 2007. Inland container traffic increased by 518 thousand TEUs (+4% compared with 2010). Container traffic as well broke the record 2007 figure. Transport volumes in Wallonia rose 5% to 44.3 million t. 34% of this was accounted for by cross-border shipments (exports), 32% by cross-border receipts (imports), 26% by transit traffic and 8% by domestic traffic. as.

Figure 31: Transportation on inland waterways in Wallonia



Source: Direction générale opérationnelle de la Mobilité et des Voies hydrauliques

Sand, soil & building materials account for far and away the greatest share of total traffic with approximately 40%. All other segments account for a share of less than 10% apiece. The bulk of sand, soil and building materials is transported on the Malt is striking that, as far as cross-border traffic movements are concerned, Wallonia is far more integrated with Flanders and the Netherlands than with France. 87.5% of cross-border traffic in 2011, from Wallonia abroad, was bound for destinations either in Flanders or in the Netherlands. The remaining exports went to France, Germany and a very small proportion to other countries.

Wallonian inland navigation is closely tied to Flanders and the Netherlands

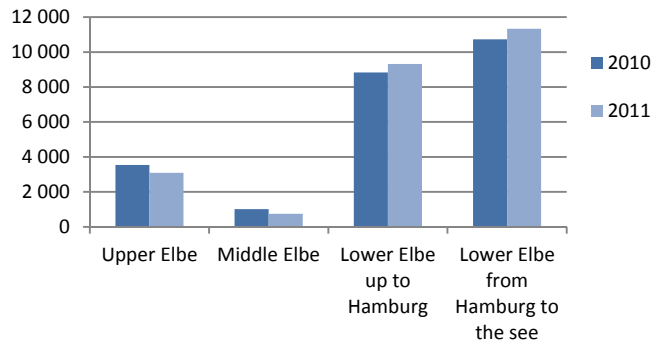
When it comes to imports, the share accounted for by Flanders and the Netherlands is even higher; in 2011 it was 89.4%[37].

3.6. Elbe

Navigation on the Elbe experienced very patchy regional development. Freight traffic on the Upper and Middle Elbe suffered a relatively significant decline of −13% (Upper Elbe) and −17% (Middle Elbe). The drought will have had a negative impact here.

On the Lower Elbe, by contrast, within the catchment area of the seaport of Hamburg, there was an approximately 5% increase in freight traffic. The Lower Elbe in the Hamburg region, as the graphic illustrates, is typically used much more for freight transport than the Upper and Middle Elbe. 11.3 million t were transported on the Elbe between Hamburg and the North Sea in 2011.

*Figure 32: Development of freight transport on the Elbe by river section * (1,000 t)*



Source: destatis

** Upper Elbe = German-Czech border to Magdeburg: Middle Elbe = Magdeburg to Schnackenburg*

3.7. Mittelland Canal

Freight transport on the Mittelland Canal remained broadly constant compared with the previous year, at approximately 15 million t.

3.8. Main and Main-Danube Canal

Freight transport on the Main was 15.5 million t; that corresponds to a sharp decline of 2.9 million t or 16%. Approximately 5 million t of freight were carried on the Main-Danube Canal in 2011, compared with 6.2 million t the year before (−20%). 4.1 million t were recorded at the Kehlheim lock on the Main-Danube Canal, 2.2 million t of which were carried towards the Danube and 1.9 million t towards the Rhine. On a year-on-year comparison 2011 / 2010, traffic bound for the Rhine declined by more, −33%, than traffic bound for the Danube (−18%).

With 1.2 million t in 2011, the "food and feedstuffs" goods category was the most important on the Main-Danube Canal (at the Kehlheim lock). Second place was taken by fertilisers, along with agricultural and forestry products, each with approximately 700,000 t. Agricultural products were transported primarily towards the Rhine. Ores and metal wastes account for approximately 450 thousand t, almost all of which is transported towards the Danube, which is to do with the Austrian steel industry in Linz. Iron and steel goods, totalling approximately 460,000 t, were primarily transported Rhinewards.

Food and feedstuffs are the most important goods segments on the Main-Danube Canal

The reason behind the sharp decline in freight traffic on the Main and Main-Danube Canal will have been primarily attributable to the drought in the spring and in November, which hindered and in some cases blocked traffic coming from both directions (Danube and Rhine).

3.9. Upper Danube

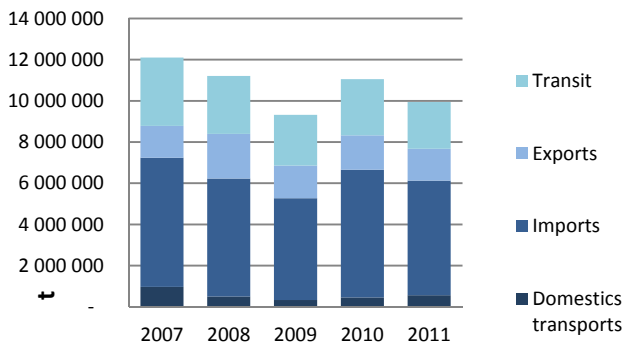
In 2011, freight transport on the German section of the Danube was hampered by the severe drought and consequent obstacles to navigation.

EU study on the German stretch of the Danube

The drought in the spring and in November resulted in numerous ships running aground, blocking navigation. Almost all of these accidents occurred in the difficult to negotiate stretch of the Danube between Straubing and Vilshofen, where the loaded draught in November was only 1.80 m, compared with the minimum loaded draught of 2.80 m. During this period, four accidents occurred within only three weeks. In the wake of each of these accidents, shipping had to be blocked for several days, which explains the steep decline in freight traffic. In February and March 2012 as well, an ore convoy and a coal freighter ran aground in the stretch between Straubing and Deggendorf. The river section in question is currently the subject of an EU inquiry. This survey is to devise an appropriate upgrade scheme. A total of 6 million t were transported on the German Danube between Kehlheim and the Austrian border, compared with 7 million t the year before. At the Jochenstein lock as well (German-Austrian border point on the Danube) the performance was significantly below that of the previous year at 4.5 million t (-15%).

On the Austrian section of the Danube, which is easier and safer to navigate, the decline in freight traffic was less pronounced than in Germany. Despite that, at just under 10 million t, 10% less was carried than the year before (2010: approximately 11 million t). Transit traffic had the worst of it, namely, shrinking by 17%. Cross-border receipts fell by 10%, exports by 7%. Only domestic traffic posted an increase, significantly up at +24%. Domestic traffic was unable, however, to get things back into the black, but at best somewhat mitigate the overall decline.

Figure 33: Freight traffic on the Danube in Austria (t)



Source: Statistik Austria

In 2011, the three most important freight categories on the Austrian Danube were ores & metal wastes (30%), mineral oil products (20%) and agricultural products (16.5%).

3.10. Middle Danube

The stretch of the Danube starting at the Austrian border at Pressburg and running through Slovakia, Hungary, Croatia and Serbia is referred to below as the Middle Danube. 9.9 million t were carried on Hungarian waterways in 2010. By way of comparison: in 2008 it was only 8.8 million t, in 2005, 8.4 million t. No valid figures for Serbia are currently available[38].

Table 4: Freight traffic on waterways in the Middle Danube region (transported volume)

Million t	2008	2009	2010	% 2010 / 2009
Slovakia	8,4	7,8	10,1	+ 40,9
Hungary	8,8	7,7	9,9	+ 28,6
Croatia	6,4	5,4	6,9	+ 27,8

Source: national statistical offices

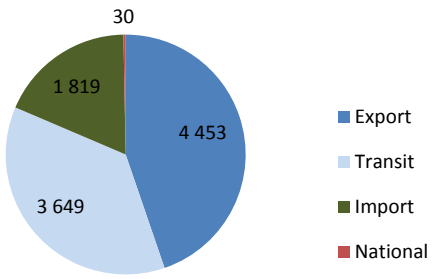
It is apparent in the table above that all three countries posted an increase between 2009 and 2010, which, however, is not surprising in the context of the economic recovery. Figures for 2011 were not yet available for these countries at the time the report was written. The proportions of export and import traffic are considerably lower in the countries of the Lower Danube region then they are in the countries bordering the Rhine. Transit traffic, on the other hand, plays a considerably larger role.

Transit traffic plays a large role on the Danube

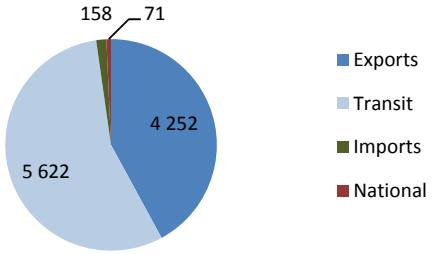
The following graphic illustrates the split for the three countries Slovakia, Hungary and Croatia. In Croatia, transit traffic possesses the relatively largest significance of all three countries. There is scarcely any export and import traffic here. This enables one to conclude that Croatian industry makes little use of the waterways. In Slovakia, transit traffic accounts for 55% (2010 figure). All the same, export traffic here is significant (42% of total traffic). Import traffic is of very little importance. Unlike the other two countries, in Hungary both export and import traffic is in somewhat greater evidence.

Figure 34: freight traffic structure on Slovakian, Hungarian and Croatian waterways
(in thousand t of transportation volume 2010)

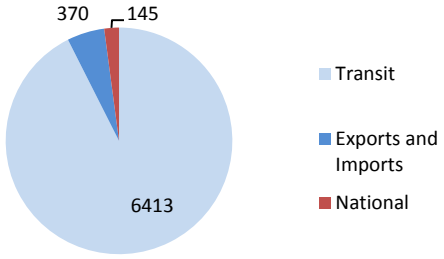
Hungary



Slovakia



Croatia



Source: national statistical offices

3.11. Lower Danube

Freight traffic in Romania in 2011 fell by 8% compared with the year before. The following table shows developments since 2005.

Table 5: Development of freight traffic on Romanian waterways

Year	2005	2006	2007	2008	2009	2010	2011
Freight traffic (in thousand t)	32.827	29.305	29.425	30.295	24.743	32.088	29.306

Source Eurostat

2010 saw an approximately 30% increase compared with the year before, which is part and parcel of the general recovery in freight traffic that was also observed for the countries of the Middle Danube region. 2011 yielded a freight volume of 29.3 million t.

Summary

Overall, developments in inland navigation in Europe In 2011 presented a mixed picture depending on the river or region being studied. In total, the Rhine posted a small decline of 1%, which in the context of the adverse circumstances throughout the year (accident in January, pronounced low water levels in the spring and November) can be seen as a remarkable result. Other waterways, such as the Danube, the Elbe, the Moselle and the Main–Danube Canal suffered losses of approximately 15% (primarily because of the drought and low water levels).

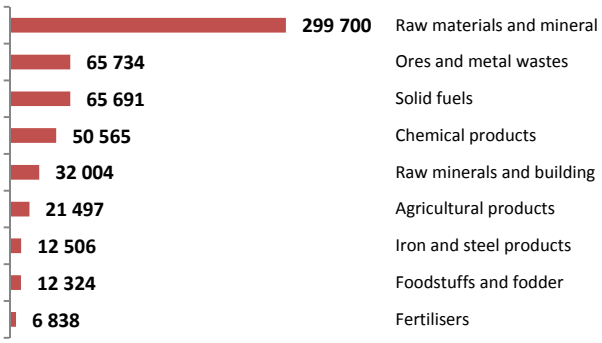
Transport volumes fared relatively well in France and Belgium, where sands, soil & building materials account for approximately 40% of the transport volume. This freight segment responds less sensitively to economic downturns. In Belgium, there was an approximately 5% increase and in France a moderate decline of approximately 3%.

4. Port transshipment

4.1 Sea ports

A high level analysis of transshipments in the most important seaports in the Hamburg–Le Havre range shows relatively stable volumes for 2011. By contrast, patterns in individual ports differ, especially when it comes to individual freight categories. The purpose of the analysis put forward in this chapter is to identify distinctive aspects of seaport development while taking account of the importance of the ports together with their development. Given this approach, the two following figures convey an initial impression.

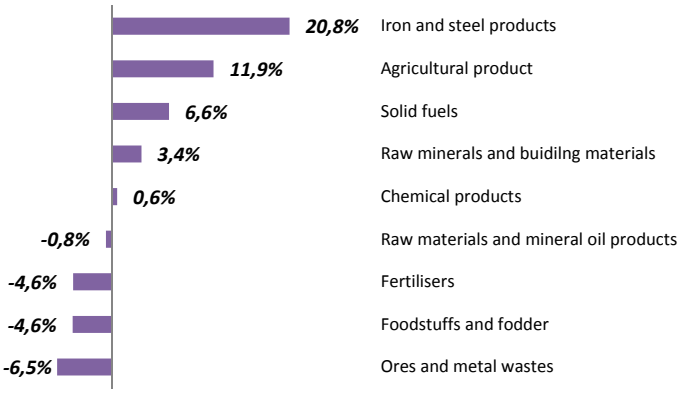
*Figure 35 : Transhipments in the most important ports of the Hamburg–Le Havre range by freight segment (in tonnes)**



Source: CCNR calculations based on data provided by the seaports in question

* Data in millions of tonnes for 2011 for the ports of Rotterdam, Antwerp, Amsterdam, Hamburg, Ghent, Le Havre and Dunkirk; not included is category 9 of the goods nomenclature NST (machinery, automobiles, finished products))

*Figure 36: Development in 2011 seaport transhipments by freight segment in the most important ports of the Hamburg–Le Havre range**



Source: CCNR calculations based on data provided by the seaports in question

**Data in %*

It will be noted that the transhipment of mineral oil products – the latter represent the cornerstone of Northern European maritime traffic – during the past year has increased barely at all. The same is true of chemical products. Overall, therefore, tanker navigation transhipments remained relatively stable (−0.6%).

Liquid bulk −0.6 %

By contrast there was significant growth in solid mineral fuels, agricultural products and especially steel industry products. The ores and other steel industry raw minerals segment on the other hand experienced a discernible decline. The bottom line for the dry goods shipping sector as a whole is a 2% increase.

Dry bulk + 2 %

The "classic" increase of 6% (in tonnes) or 5.1% (in TEU) in the container segment for all the ports[39] included in the study reflects the ongoing general growth tendency in this sub market.

Container traffic: + 6 % (tonnes) / +5 % (TEU)

The following table provides a detailed view, reflecting the development of individual freight segments by port:

*Table 6: Transhipments by freight segment in the most important seaports of the Hamburg–Le Havre range for the period 2011–2012**

	ROTTERDAM	ANTWERP	AMSTERDAM	HAMBURG	GhENT	LE HAVRE
Agricultural products	9,9 (+17,7%)	1,1 (−7%)	0,6 (+61%)	6,2 (−4,7%)	1,7 (+59,6%)	
Foodstuffs and fodder			8,6 (−8,7%)		3,7 (+6,5%)	
Solid fuels	26,7 (+10,9%)	5,4 (+4,4%)	15,7 (+9,5%)	6,0 (+12,6%)	3,1 (−27,5%)	1,3 (−36,7%)
Raw materials and mineral oil products	166,8 (−6,2%)	34,4 (+15,9%)	37,3 (+7,5%)	11,4 (−1,8%)	3,7 (+14,8%)	39,7 (−2,4%)
Ores and metal wastes	37,4 (−6,1%)	2,8 (−13,6%)	0,7 (+16,1%)	8,5 (−8,6%)	5,1 (−15,5%)	
Iron and steel products		8,4 (+28,8%)	0,8 (+3,7%)		3,2 (+7,8%)	
Raw minerals and	13,3 (+8,2%)		6,4 (−4,8%)	5,0 (−1%)	2,6 (+22,9%)	1,7 (+33,3%)
building materials		4,4 (−5,1%)	1,1 (−3,5%)		1,3 (−3,7%)	
Fertilisers	31,7 (+0,5%)	11,1 (−1,6%)	1,4 (−0,7%)	2,6 (+2,4%)	0,4 (−13,5%)	1,7 (−2,5%)

Source: Seaports and Nationale Havenraad

** Data in millions of tonnes for 2011 for the ports of Rotterdam, Antwerp, Amsterdam, Hamburg, Ghent, Le Havre and Dunkirk; not included is category 9 of the goods nomenclature NST (machinery, automobiles, finished products)*

Agricultural products and fertilisers

The ports of Rotterdam and Hamburg occupy an important place in the European seaport transhipment of agricultural products. Because of their function as a "gateway" to the European market, they permit a relatively valid assessment of the general way in which traffic is developing. The decline observed in previous years continued in 2011 (−13% in Rotterdam, −22% in Hamburg); imports of agricultural products on the other hand continued to grow (+25% in Rotterdam, +12.4% in Hamburg).

The quantities of fertiliser transhipped in the port of Antwerp – Antwerp is the most important European port in this segment – remained relatively stable in 2011, at 4.4 million tonnes (−5%).

Foodstuffs and fodder

In the port of Amsterdam, which is an important gateway for the receipt of foodstuffs and fodder in Europe, transshipments declined by 8.7% in 2011. The reason for this was a sharp decline in imports (−11.6%), only partially offset by a recovery in exports. As a consequence, port transshipments fell by 820,000 tonnes. The opposite development can be noted for the seaport of Ghent, where freight traffic has increased by 224,000 tonnes.

Solid fuels

In 2011, important ports posted strong growth for coke and hard coal. +10.4% in Rotterdam, +9.5% in Amsterdam, +4.4% in Antwerp, +12.6% in Hamburg. These raw materials are imported almost wholly for steel production. This resurgence is extremely welcome after a 2010 characterised by stagnation and at times also by decline (−16% in Antwerp).

Increasing imports of hard coal

Ores and metal wastes

When it comes to the transshipment of ores and metal wastes, a general decline is apparent for the most important ports in this industrial sector following a bounce back in 2010. Transshipment volumes in the ports of Rotterdam (−6.1%), Hamburg (−8.6%) and Gent (−15.5%) testify to the slowdown in steel production in Europe in 2011 as a consequence of the temporary or final closure of steelworks and the weakening of steel demand.

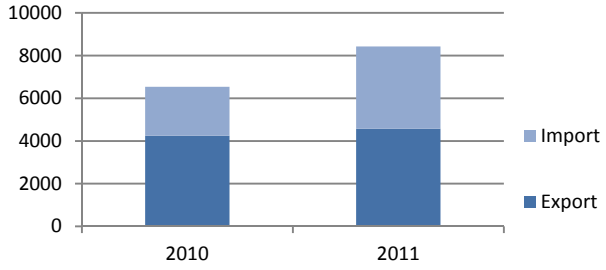
In Dunkirk, the temporary closure of the blast furnaces in Lorraine has not put a damper on ore transshipment volumes; at 11.2 million tonnes, the latter were at exactly the same level as 2010.

Steel products

In Antwerp, the transshipment of steel products enjoyed a rise of 29% to 8.4 million tonnes as a result of the sharp rise in import quantities (+68%). Although the relative volumes of exports and imports still yielded an export surplus, steel exports as a proportion of Antwerp's total maritime transport fell by more than 10 percentage points in the course of 2011, there being a decline from 65% to 54% :

In the seaport of Ghent, Europe's second most important port for steel products, transshipments rose by 7.8% in 2011.

Figure 37 : Patterns in the transshipment of steel products in the port of Antwerp



Source: Port of Antwerp

Raw minerals and building materials

The export of minerals and building materials presented a mixed picture in the various regions: whereas Rotterdam had to put up with a 20% decline in its exports, in Amsterdam, by contrast, they increased by 70%. Overall, transshipments in Rotterdam increased by 8.2%, whereas they fell by 4.8% in Amsterdam. Developments in Hamburg overall were relatively stable.

Mineral oil products

For the port of Rotterdam, mineral oil products are far and away the most important freight category in maritime transport. This port alone accounts for more than half the seaborne imports of crude oil within the Hamburg–Le Havre range. In 2011, 166.6 million tonnes of crude oil were handled there, 80% as imports to Europe and the remaining 20% as exports. Total traffic exhibited a decline of 6.2% (imports + exports).

The three other important ports presented a mixed picture. In Le Havre, transshipment volumes of crude oil and mineral products were 2.3% below the 2010 level.

167 mio. tonnes of mineral oil traffic in Rotterdam

For its part, the port of Antwerp posted a 16% increase, for the most part as a consequence of the strong export performance (+28%). Crude oil transshipments in Amsterdam increased by approximately 7.5%.

Chemical products

The maritime transport of chemical products remained relatively stable in 2011, this statement referring to the two most important ports of Rotterdam and Antwerp. In 2011, they notched up transshipments of 31.7 million and 11.6 million tonnes respectively.

Containers

Hamburg gets ahead of Antwerp

Rotterdam, Hamburg and Antwerp are the three most important seaports for European container traffic. Different growth rates were to be observed here in 2011. Hamburg overhauled the port of Antwerp in terms of transshipment volumes measured in TEU. That restores this German city to its position as the second most important seaport within the Hamburg–Le Havre range.

Table 7: Transshipment volumes in the four most important seaports for containers in 1,000 TEU

Port	2010	2011	Development
Rotterdam	11.148	11.877	+7%
Antwerp	8.468	8.664	+2%
Hamburg	7.896	9.014	+14%
Zeebrugge	2.500	2.206	−11,8%

Source: above–mentioned seaports

Maritime trans–shipments include feeder traffic

Despite all that, developments in seaport transshipments are only an approximate guide to developments in the inland ports. That means that the seaport transshipments figures only go so far as a framework for formulating specific trends for individual freight segments

Admittedly, in addition to hinterland traffic, seaport transshipments also generate downstream maritime traffic, such as for example short–sea–shipping, or medium distance maritime transport (feeder–traffic) between European ports.

It will also be noticed that the majority of mineral oil product transport movements between the seaports and the hinterland are by pipeline, severely curtailing transshipments on inland waterways. The same applies to the proportion of freight transshipments remaining within the port region for local needs.

For these reasons it is appropriate to extend the above analysis to include transshipment patterns in inland ports.

4.2 Inland ports

There follows a description of transshipments in important Western European inland ports. These are mainly ports on the Rhine although the ports of Paris and Liege, (Europe's second and third largest inland ports) are not on the Rhine.

In 2011, Duisburg, Europe's largest inland port, notched up total transshipments of 52 million t, followed by Paris (22 million t) and Liege (15.5 million t). In Duisburg, 45% of transhipped goods were accounted for by ores and metal wastes, 23% by coal and 8% by iron and steel products.

This means that 76%, namely fully three quarters of total freight transshipments, were triggered by the steel industry. This is a clear illustration of the "power of the coal and steel industry, acknowledged in economic literature, to leave its stamp on its surroundings [...], an industry that through the effect it has on its locations has hitherto defined the topology of the principal traffic flows in the global economy".[40]

¾ of the traffic volumes in Duisburg are related to the steel industry

The ports of Paris and Liege are very strongly specialised in agricultural goods and building materials. In the port of Paris, building materials account for approximately 75% of total transshipments, namely almost exactly the same proportion as that of raw materials and steel industry products in Duisburg.

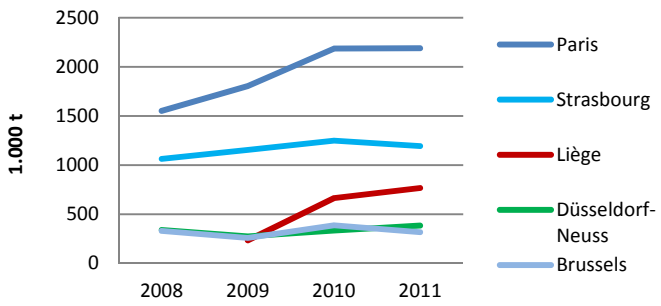
In addition to steel industry raw materials, mineral oil products are also strongly represented in the inland ports on the Rhine, whereas they are only of very minor importance in the port of Paris. Major differences are thus to be seen as far as ports' specialisation on goods segments is concerned.

Agricultural products

In the pan-European arena, the port of Paris is the most important transshipment location for agricultural products. In 2009 transshipments were 1.8 million t, in 2010 2.2 million t, and in 2011 – according to provisional estimates – approximately the same volume[41].

Another French port, Strasbourg, is the most important Rhine port in this segment. Almost 100% of agricultural transshipments in Strasbourg are accounted for by grain. Grain transshipments in 2011 were approximately 1.2 million t, which equates to a small contraction of 4.5% compared with 2010. The steep increase witnessed in Liege in recent years is attributable to imports of agricultural raw materials by a biofuel manufacturer.

*Figure 38: Waterside transshipments of agricultural goods in the most important relevant inland ports**



Source: ports mentioned above

** in the case of Paris, the 2011 figure is an estimate based on the first half of the year*

Foodstuffs and fodder

Important ports in this segment are Neuss-Düsseldorf, Mainz and Mannheim. There are oil mills located in the port area, which typically process agricultural raw materials such as rapeseed and sunflower seed, delivered by ship, into oil and pulp. The pulp is then mainly further refined into animal feed, whereas rapeseed oil is used in numerous ways, including to an increasing extent as a primary product for biofuels.

Oil mills are a major driver of port traffic

Depending on definition, individual products can either be included under the agricultural goods heading or else under the food and feedstuffs heading. One example is the port of Neuss-Düsseldorf. According to the Federal Statistical Office, large quantities here are classified as agricultural produce, whereas the port itself classifies them as food and feedstuffs[42]. This market report follows the port's definition. Accordingly, in 2011, Neuss-Düsseldorf recorded 2.6 million t of ship transshipments for food and feedstuffs, representing a small decline compared with 2010 (2010: 2.7 million t).

Another important port for food and feedstuffs is the port of Mainz, with 680,000 t of transshipments in 2011. The port is the site of an oil mill belonging to the Cargill food company.

A special factor concerns an oil mill in the port of Mannheim, which burnt down in 2010 and which had still not been brought back into production as at the end of 2011. It is expected to be back in commission by the beginning of 2012. The oil mill produces rapeseed oil and rapeseed pulp as a byproduct.

This rapeseed pulp is supplied to feedstuff manufacturers. As recently as 2009, the port was achieving a volume of 1.8 million t; in 2011 it was only 0.4 million t (as a result of the after-effects of the mill fire).
In Basel, approximately 400,000 t were unloaded, which is 8% more than the year before. Conversely, the quantity of food and feedstuffs loaded fell by 36% to approximately 92,000 t.

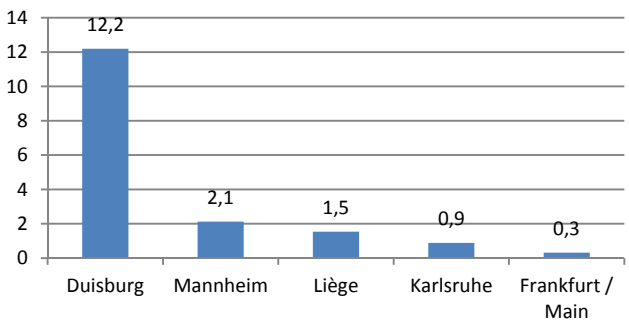
Coal

In 2011, 12.2 million t of coal were transshipped in Duisburg. In Mannheim it was 2.1 million t, and thereby approximately 5% less than the year before. In Karlsruhe, volumes increased by 9% to 0.9 million t. The future of coal transshipments in this Rhine port seems to be assured in the medium-term. For example, in the spring, a new unit is to be added to the existing coal-fired power station. In Basel and Neuss-Düsseldorf, on the other hand, coal transshipments fell in 2011.

Decrease of traffic in Liège

In Liege as well, a traditional centre of the steel industry, coal transhipments decreased. The ongoing structural crisis in the Belgian steel industry resulted in the announcement by the ArcelorMittal Group in October 2011 of the permanent closure of the blast furnaces in Liege Ougrée and Liege Seraing. Coal transshipments declined from 1.8 million t (2010) to 1.5 million t (2011).
The decline should become even more acute this year and next, when the full effects of the closure of the two blast furnaces are felt.

Figure 39: Coal transshipments (in million t) in selected European inland ports, 2011

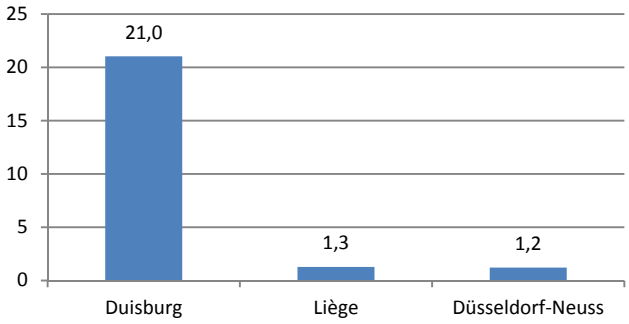


Source: destatis; port of Liege

Ores & metal wastes

According to information from the Federal Statistical Office in 2011, 20.6 million t of iron ore, 430,000 t of non-ferrous ores and 2.6 million t of scrap metal for remelting were transhipped in the port of Duisburg.
Ore traffic in Liege fell from 1.6 million t (2010) to just under 1.3 million t (2011) as a result of the permanent closure of the blast furnaces there. It should be borne in mind that the full effects of the closure will not be felt until 2012. Ore and scrap metal transhipments in 2011 in the port of Neuss-Düsseldorf increased to 1.3 million t. Here, by way of comparison, the figures in Neuss-Düsseldorf for the preceding years: 2008 1.36 million t, 2009 0.84 million t, 2010 1.20 million t, 2011 1.29 million t.

Figure 40: Ore transshipments (in million t) in selected European inland ports, 2011



Source: destatis; port of Liege

Scrap metal is delivered to the port of Kehl to be melted down again in the electric steel works there. On the long-run average, the port of Kehl receives approximately 2 million t of scrap metal each year; this equates to one tenth of Germany's total scrap metal volume. Each day, approximately three ships laden with scrap metal dock in the port of Kehl.[43] Reliable statistical data on the level of deliveries in 2011 are not currently available.

20.6 mio. tonnes of ore traffic in Duisburg

Iron & steel products

Approximately 4.3 million t were transhipped in Duisburg, in Liege around 1.1 million t. The latter equates to year-on-year growth of 4%. This illustrates that finished steel products have not yet suffered from the Liege steel crisis. There is currently uncertainy as to what extent the production capacity in Liege for finished metal products will remain intact. The port of Kehl on the Rhine near Strasbourg, site of an important electric steel works, posted transhipments of approximately 0.75 million t of iron and steel products.

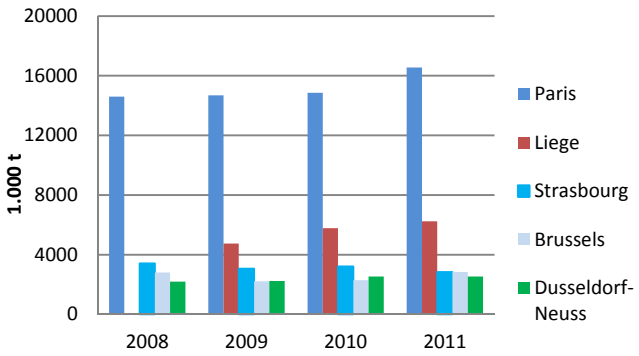
In Basel, transhipments of these goods declined by 30% in 2011 to around 0.4 million t. Italy's economic problems in particular played a causal role here, manifesting themselves in lower steel demand. Basel acts as a transit port and transhipment location for steel products travelling up the Rhine to Basel, from where they are loaded into rail wagons bound for Italy.

Aggregates, soils & building materials

In this segment, two of Europe's three largest inland ports (Paris and Liege) also exhibit the highest transhipment volumes. In Paris, sand and building materials account for a share of approximately 75% (namely ¾). Transhipments in the French capital increased from 14.8 million t. to 16.5 million t (+11%), Liege saw an increase from 5.8 million t to 6.2 million t (+8%).

In Strasbourg 2.7 million t of gravel and approximately 0.1 million t of other building materials were either delivered or dropped off by inland ships. This result represents a significant decline compared with the year before (2010: 3.2 million t). In the Rhine port of Neuss-Düsseldorf, the previous year's result of approximately 2.5 million t was equalled.

*Figure 41: Waterside transhipments of aggregates, soils & building materials in important European inland ports**



*Source: named ports. * Figure for Paris for 2011 is based on growth in the first half of 20111*

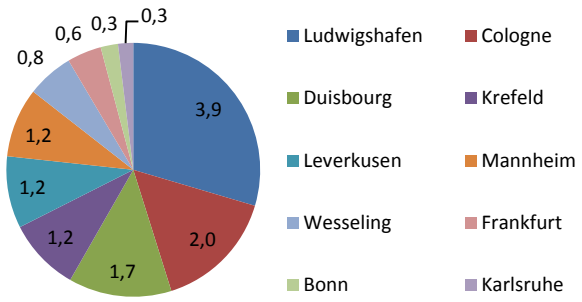
Sand and building materials make up ¾ of the port traffic in Paris

Chemical products

The chemical goods transhipments of 0.1 million t and 0.2 million t respectively in the ports of Paris and Liege (Europe's second and third largest inland ports) are lower than in each of the ten most important Rhine ports for this segment. This illustrates the particular importance of the Rhine for the logistics of the chemical industry in Europe.

The ports of Wesseling and Leverkusen belong to the Greater Cologne area such that we can talk about two "chemical clusters" on the Rhine of approximately equal size (Ludwigshafen and Cologne), with transhipments of approximately 4 million t per year.

Figure 42: Waterside transhipments of chemical products in European inland ports (million t, 2011)



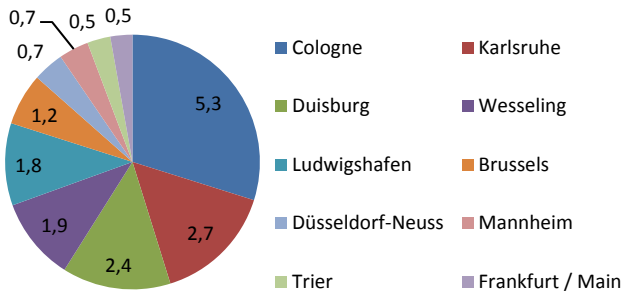
Source: destatis

Mineral oil products

Cologne is the largest Rhine port for mineral oil products and also Europe's largest port. Total transhipments dipped slightly in 2011 (by approximately 4%).

Owing to statistical problems (mineral oil products are not shown separately), there are no usable figures for the port of Liege for this segment. Transhipments of mineral oil products in the port of Paris are relatively small (approximately 0.3 million t per year).

Figure 43: *Waterside transhipments of mineral oil products in European inland ports (million t, 2011) **



*Source: destatis * excluding Liege*

Detailed analysis shows that Cologne exceeded the previous year's result for light heating oil, diesel and kerosene; in the case of petrol, light mineral oils and black oil on the other hand, there were losses.

There was a somewhat more severe decline in Mannheim (of 14%). This is explained by lower transhipments of biodiesel because deliveries of rapeseed oil from the port's oil mill had not yet resumed by the end of 2011. Rapeseed oil within the port is transported to a biodiesel manufacturer by pipeline. This company primarily uses inland ship for distributing the biodiesel. Each month, approximately 10 ships leave for Karlsruhe, Antwerp and Rotterdam, where the customers are major mineral oil concerns (Shell, BP)[44].

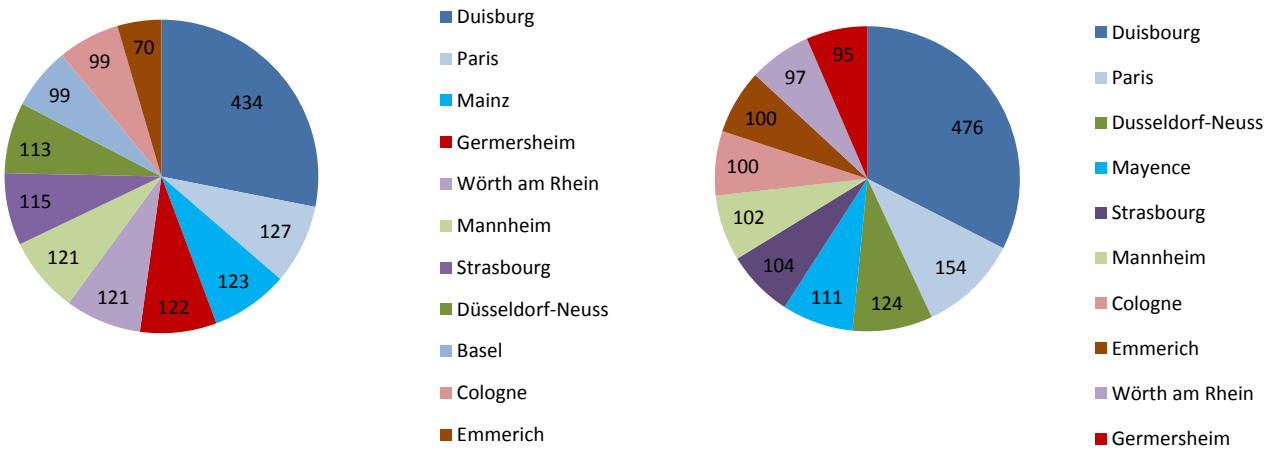
Port of Cologne is No. 1 in the mineral oil segment on the Rhine

Port of Mannheim provides Shell and BP with biodiesel

Containers

The two figures below show container traffic, measured in TEU, in the eleven most important European inland ports for 2010 and 2011. It is interesting to note that Europe's two largest inland ports of Duisburg and Liege also head the rankings for container traffic, not however the third largest inland port Liege, which lags relatively far behind in the container traffic stakes with approximately 29,000 TEU.

Figure 44: *Waterside container traffic in the eleven largest container inland ports in 2010 (left) and 2011 (right) in 1,000 TEU.*

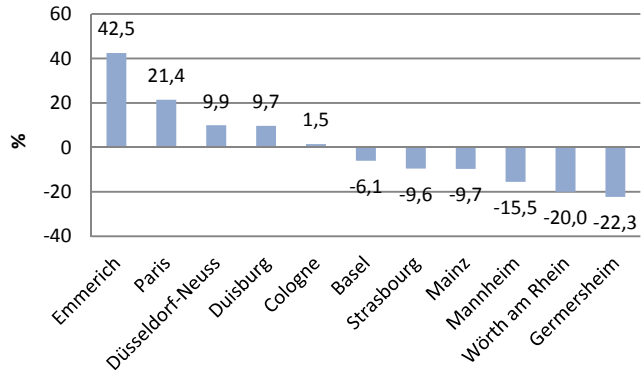


Source: Destatis; ports of Basel, Paris, Strasbourg

Total transhipments for the eleven largest container ports in 2010 and also 2011 were approximately 1.5 million TEU. There were major differences however in how the individual ports fared. This is illustrated in the following graphic, which shows the percentage change in waterside container transhipments in the eleven ports.

What is striking is that the ports on the Upper Rhine (Basel, Germersheim, Mannheim, Mainz, Strasbourg, Wörth am Rhein) have suffered losses whereas the ports on the Lower Rhine (Emmerich, Duisburg, Neuss–Düsseldorf, Cologne) have posted increases.

Figure 45: *Rate of change of waterside container traffic in inland ports (2011/2010)*



Source: CCNR calculations

In all probability this performance can be attributed to the shipping accident at St. Goarshausen in January, following which the Upper Rhine suffered serious cargo losses whereas the impact on the Lower Rhine was far less severe. For example, the Federal Office for Freight Transport also concluded that the closure of the Rhine in January and February had primarily affected the ARA ports and Upper Rhine region. The goods flows bound for the Upper Rhine region were transhipped onto other means of transport in ports on the Lower Rhine.

Declining volumes in the ports on the Upper Rhine

Summary

Trends in seaport transshipments overall presented a mixed picture. Solid fuels (with the exception of regional special effects, such as in Ghent and Le Havre), iron and steel products and agricultural products mainly enjoyed growth. In the case of ores and metal wastes, however, the picture in the most important seaports tended to be characterised by decline. The same was also true of chemical products.

For the most part, transshipments in the inland ports continued the trends in the seaports; this is true when looking at the freight segments in conjunction with hinterland transport regional trade routes. In regional terms, there was a disparity in container transshipments between increasing numbers in Lower Rhine ports on the one hand and falling transshipments volumes in the ports on the Upper Rhine on the other hand.

Section II: Analysis of transport supply (fleet and freight rate)

1. Fleet development: new construction

1.1. Dry shipping

14 new motor cargo vessels (33,000 t) were built in Western Europe in 2011 and approximately 15 new pushed cargo barges (36,000 t). The average tonnage for the motor cargo vessels was approximately 2,400 t. The result is a significant decline compared with 2010 (see table).

The new motor cargo vessels were split between individual size classes as shown in the graphic. Almost all the new ships were put into service in the Netherlands. Most new construction in 2011 was accounted for – as in the year before – by the 3,000 – 4,000 t category.

However, the number of new ships falling into this category in 2011 was sharply down on the year before. In the next smaller category of ship (2,500 to 3,000 t), a similar decline in new construction activity was felt, as was the case for the segment of smaller ships (1,500 to 2,000 t).

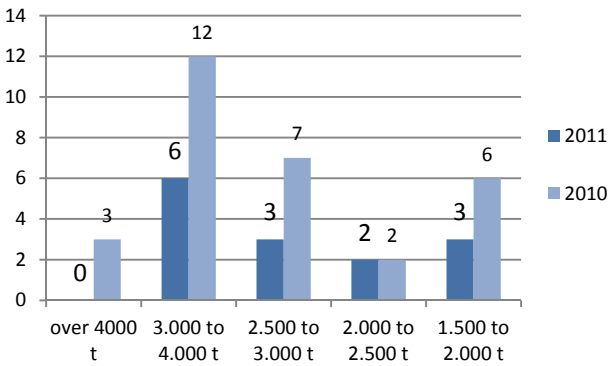
Overall, if one aggregates motor cargo vessels and pushed barges, significant fluctuations in new construction activity are apparent in recent years. A wave-like trajectory can be seen, reflecting the economic cycles in the shipping industry.
The increase in the period 2005 – 2008 reflects the expansion in freight transport and world trade in this period. The slump in the past two years can be laid at the door of the economic crisis and the uncertain economic outlook. The crisis resulted in a slump in volumes and freight rates in inland navigation, reducing the willingness to invest in new ships.

Table 8: New construction activity for dry goods shipping in Western Europe 2011/2010

New construction		2011	2010	Change in %
Number	Motor ships	14	30	– 53 %
	Cargo barges	15	35	– 57 %
Tonnage	Motor ships	33,000	85,000	– 61 %
	Cargo barges	36,000	50,000	–28 %

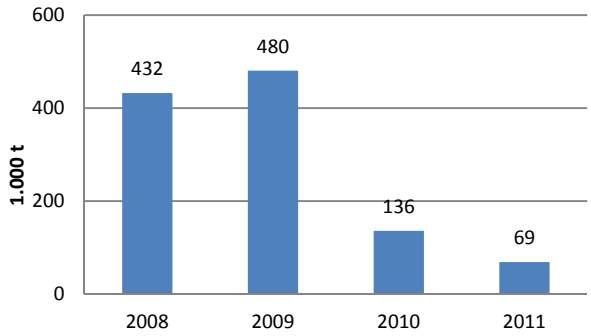
Source: IVR

Figure 46: Number of motor cargo vessels in Western Europe by tonnage class in 2011 and 2010



Source IVR

Figure 47: New construction tonnage in Western Europe in the dry goods shipping sector (2008–2011)



Source IVR

1.2. Tanker shipping

64 new tankers came onto the market with a total capacity of approximately 176,000 t. The new ships' average capacity was therefore just under 3,000 t. The new construction dynamic of recent years slowed significantly in 2011 (−47% in tonnage terms compared with 2010).

The split between tonnage classes reveals that it was primarily the very large ship category (> 4,000 cargo capacity) that exhibited significantly less new construction than the year before. In the category 3,000 – 4,000 t, new construction numbers were similar to the year before. This category was numerically the most important in 2011.

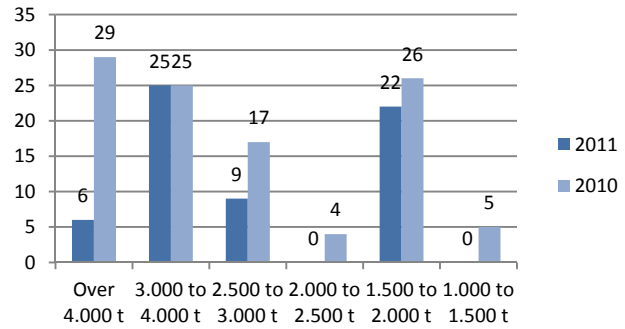
If one compares the new construction figures with those for the dry goods shipping sector, it is striking that the slowdown in tanker navigation did not occur until approximately one year after that of the dry goods shipping sector.
This time-shifted decline in tanker navigation is attributable to the restructuring of the fleet from single hull to double hull, resulting in a structurally higher level of new construction activity. It should also be noted that the economic crisis had a less adverse effect overall on tanker shipping than it did on the dry goods shipping sector.

Table 9: New construction activity for tankers in Western Europe 2011/2010

New construction		2011	2010	Change in %
Number	Motor ships	64	105	−43%
	Cargo barges	2	0	n.i.
Tonnage	Motor ships	176.000	339.000	−47%
	Cargo barges	3200	0	n.i.

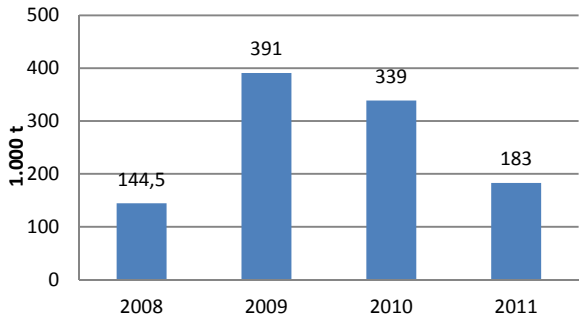
Source: IVR

Figure 48: Number of motor tankers in Western Europe by tonnage class in 2011 and 2010



Source: IVR

Figure 49: New construction tonnage in Western Europe in the tanker shipping sector (2008 – 2011)



Source IVR

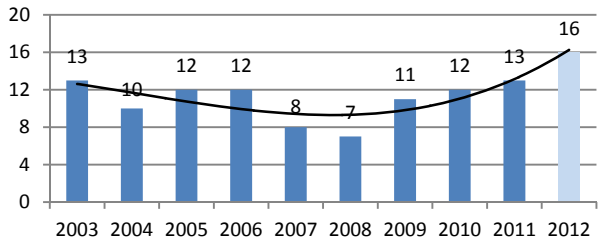
1.3 Passenger shipping

Thanks to the boom in river cruises, passenger navigation new construction activity is again on the increase. A rise in annual new construction numbers can be noted in recent years (see graphic). According to the order books, 16 new ships can be anticipated for 2012.

The following graphic shows the distribution of new river cruise ships by the number of passengers. Size categories were created in increments of 20 passengers.

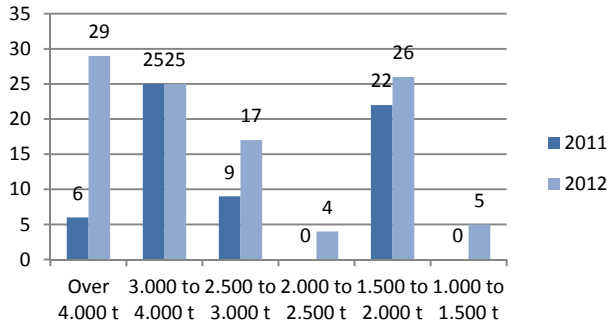
It is apparent here that the size class "passenger accommodation for more than 180 and fewer than 200" has the highest frequency among current new construction.
The second most frequently occurring are new ships with passenger capacity of more than 160 and fewer than 180.
Primarily German, Swiss and US American companies are to be found among the shipping companies or river travel organisers putting the new river cruise ships into service.

*Figure 50: Number of new river cruise ships on the European market**



Source: Deutscher Reiseverband (German Travel Association)
** 2012: Forecast*

*Figure 51: Number of new river cruise ships on the European market by passenger capacity size classes**



Source: Deutscher Reiseverband (German Travel Association) ** 2012: Forecast*

Trends in tourism are promoting passenger shipping

The day excursion industry is also benefiting from the boom in passenger navigation. The new ships exhibit a trend towards a high level of comfort and luxurious specification. Because of the absence of statistics for the whole of Europe reference is made to the figures for Germany. Here, the stock of day excursion ships has risen slightly in 2011, from 797 ships (2010) to 799 ships (2011). This change in the stock of ships came about as a result of the addition of 9 ships and departure of 7 ships. Overall passenger capacity changed from 189,509 places to 188,008 places. This corresponds to an average capacity of 235 places per ship.

The positive growth in day excursion ships is to be seen in the context of travel behaviour. Accordingly, day trips and short holiday trips (duration of between two and four days) are becoming ever more important. The economic potential of these short trips or day trips is very high and there is still a relatively large growth potential[45].

2. Freight rates

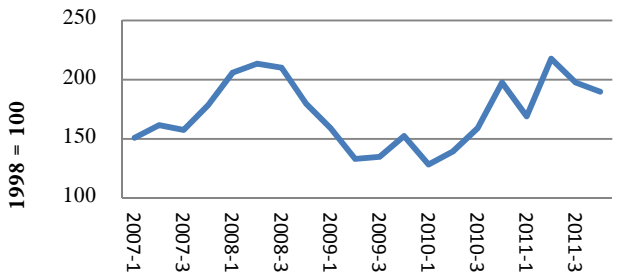
2.1. Dry shipping

Decline of freight rates in the second half of 2011

The sustained upturn in transportation demand, which began at the outset of 2009, provisionally peaked in mid-2011. At this time, freight rates had already recovered to the pre-crisis level (mid-2008) and even briefly exceeded it. The positive economic climate was supported in the first half of 2011 by the falling water level. It generated an additional demand for ships in view of the fact that in some cases the large motor cargo vessels could only be loaded to 40% of their capacity because of the water conditions.[46]

In the second half of the year, on the other hand, there was a slight downward trend in freight rates, as indicated by the following index. This was mainly to do with the falling off in demand as a result of the general slowdown in economic activity. This development was overlaid with the influence of water conditions. Although a very severe low water situation arose in November, this was unable to compensate for the dampening effect of the economic situation.

Figure 52: Freight rates development in the dry goods shipping sector



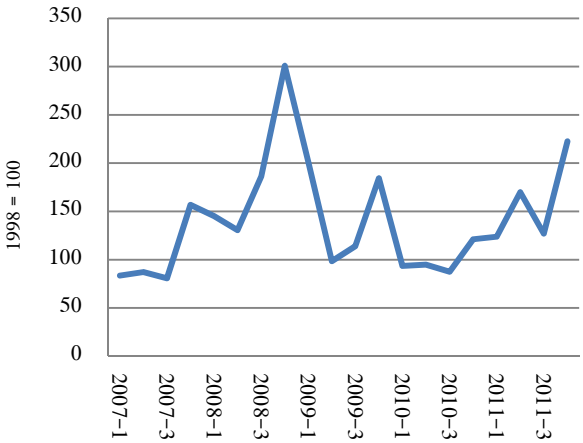
Source: NEA / Rabobank

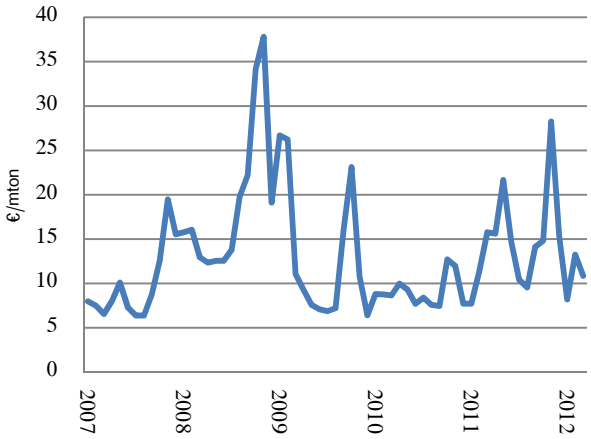
2.2. Tanker shipping

Low water levels lead to higher freight rates

Freight developments in the tanker shipping market overall were influenced more markedly by changes in water levels. For example, the level fell from January to May, whereupon freight rates in May reached an initial annual peak.

*Figure 53: Freight development in the tanker sector as a whole (left) and in the diesel/heating oil market (right)**





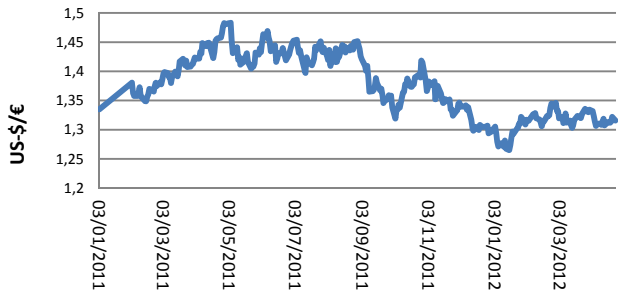
Source: NEA / Rabobank (left-hand graphic) and PJK International (right-hand graphic);

** right-hand graphic: Data are averaged per month for a number of travel areas between Rotterdam and destinations on the Rhine, in € per metric tonne*

In addition to the water level, changes in the Euro-dollar exchange rate, important when purchasing oil products, also played a role.

For example, in the first four months of 2011, the euro appreciated against the dollar, which made oil products effectively cheaper from the European consumers' perspective. This benefited not just transportation demand but freight rates as well.

Figure 54: Development of the US dollar / euro exchange rate (January 2011 – beginning of May 2012)

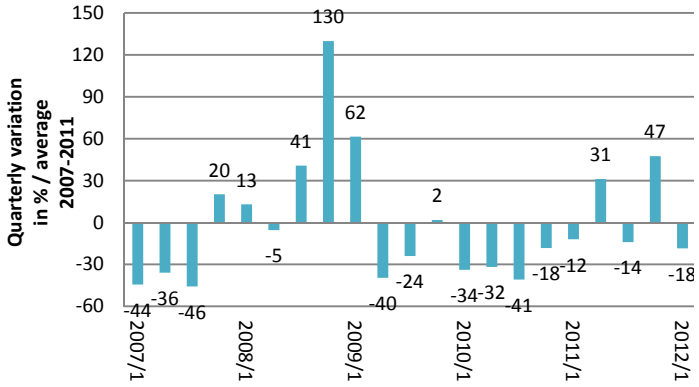


Source: www.finanzen.net

Freight volumes in the third quarter were unable to benefit from the usual delivery of heating oil before the winter and there was a decline. In the fourth quarter, the very low water levels (November) resulted in a shortage of the effectively available supply of freight capacity, which significantly drove up transportation prices. In the fourth quarter, freight rates were 47% above the long-term average (see figure).

The beginning of 2012 was characterised by a resumption in a slight upward movement of product prices in view of market nervousness surrounding the political trouble spots in the Near East. Together with water levels that were again starting to rise, this exerted downward pressure on freight rates. Also playing a role in this is the increasing cost of crude oil imports following the depreciation of the euro.

Figure 55: Percentage freight rate variances in the tanker navigation sector (diesel/heating oil market) per quarter from the multi-year average level (2007-2011)



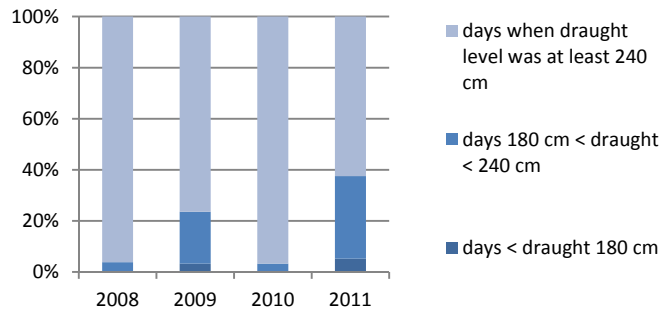
Source: CCNR Secretary calculations based on PJK International data

Section III: Water conditions and operating capacity

1. Water conditions on the Rhine

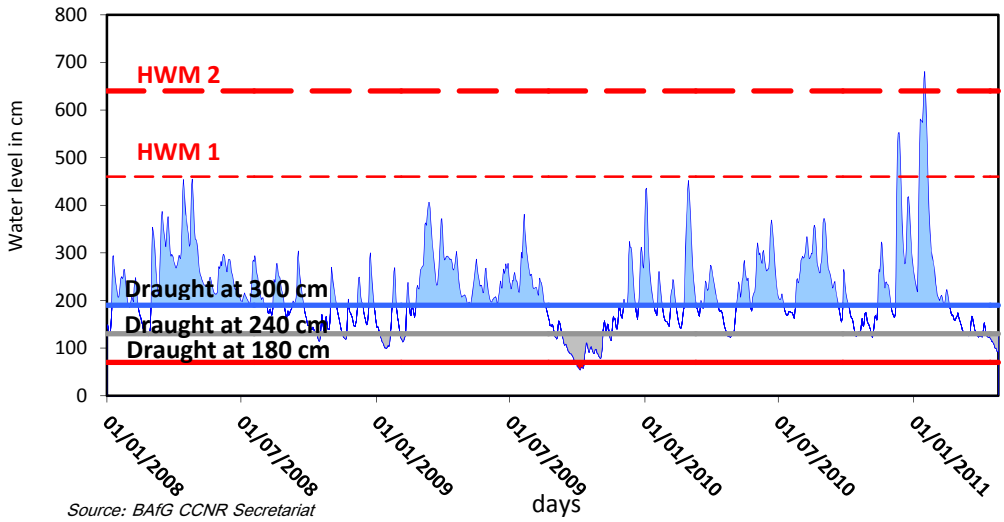
2011 was characterised by changeable water conditions on the Rhine. The year got underway in January 2011 with a high water period, hampering shipping. High watermark 2 was reached and exceeded in Kaub on 3 days, bringing navigation to a complete halt. High watermark 1 was exceeded for 12 days in January 2011.

Figure 56: Water conditions on the Rhine at Kaub



Source: BAfG, CCNR secretariat

Figure 57: Water conditions on the Rhine at Kaub



Source: BAfG CCNR Secretariat

Thereafter, water conditions gradually fell such that in the months of April and May low water significantly hampered transport volumes. In the months of June and July, water conditions permitted ships to achieve their normal loaded draught. From the late summer onwards, water conditions again deteriorated, with the lowest levels being reached in October and mainly in the month of November with large vessels no longer able to negotiate certain stretches. On average, 2011 proved to be distinctly irregular compared with 2010, enabling ships to be fully unloaded for much of the year.

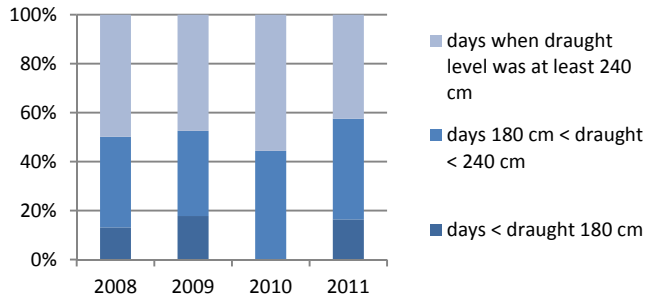
Low water levels were present in spring and in November 2011

2. Water conditions on the upper reaches of the Danube at Hofkirchen

2011 proved to be a year of extremes for the water level on the Danube at Hofkirchen. Exactly as on the Rhine, a period of low water was particularly apparent during the autumn months. Overall, the achievable draught for ships was less than 180 cm on 60 days and less than 240 cm on 210 days As a result, the low water significantly impaired the ability to unload on this stretch during this year.

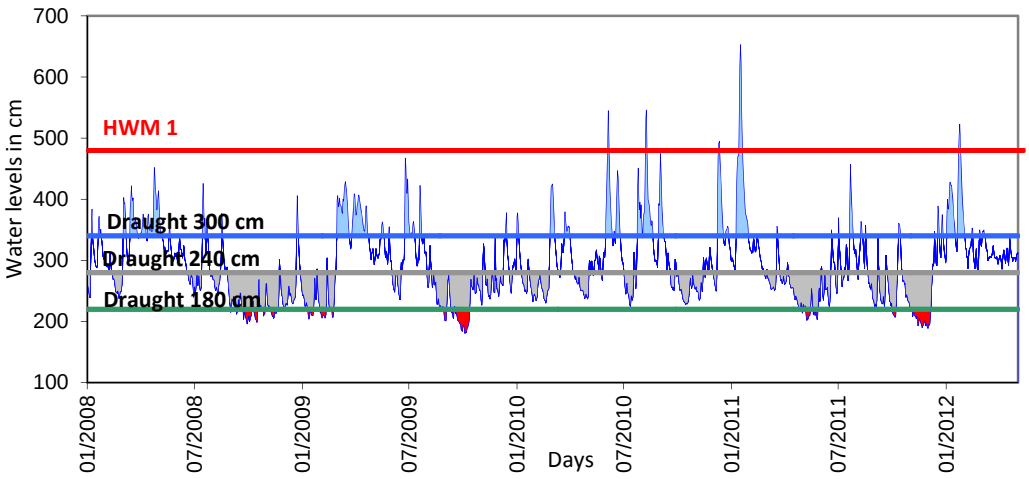
In 2011, inland shipping on the upper Danube was not hindered by ice.

Figure 58: Water conditions on the Danube at Hofkirchen



Source: BAfG, CCNR Secretariat

Figure 59: Water conditions on the upper reaches of the Danube



Source: BAfG CCNR Secretariat

3. Water conditions on the Elbe at Magdeburg

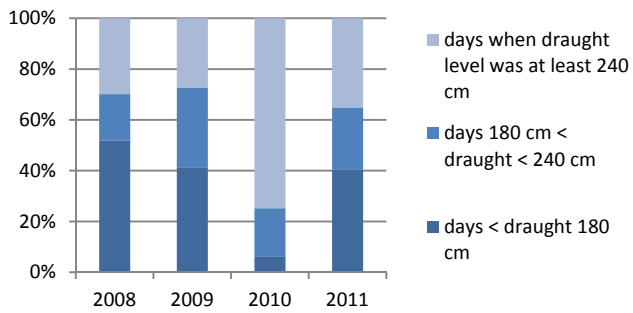
For the Elbe near Magdeburg, the year 2011 was characterized by average water conditions. The capacity utilization of the ships was therefore rather weak. The previous year had offered much better conditions, concerning the achievable draught of the ships.

In 2011, shipping was blocked for 7 years due to high water levels.

Apart from august, low water periods were mostly predominant during the time from May until mid-December.

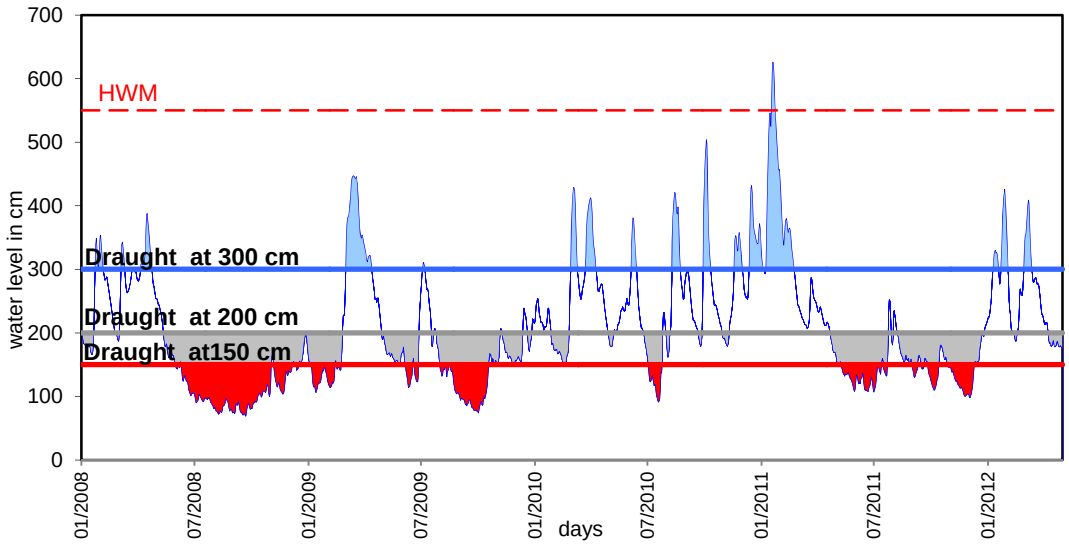
Inland shipping was not hindered by ice in 2011.

Figure 60: Water conditions on the Elbe at Magdeburg



Source: BAfG, CCNR Secretariat

Figure 61: Water conditions on the Elbe at Magdeburg



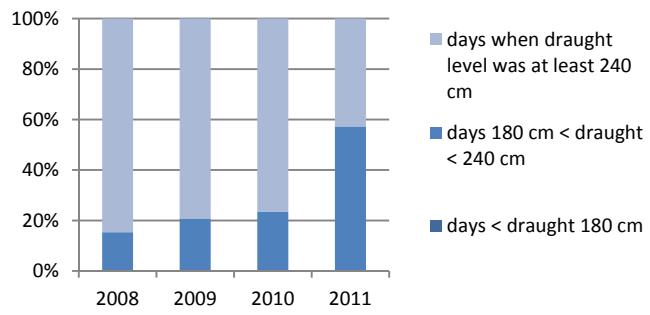
Source: BAfG, CCNR Secretariat

4. Water conditions on the Moselle at Trier

On the Moselle nearby Trier, draught levels fell below the level of 240 cm during 209 days. Although the minimum point of 180 cm was not reached, water conditions over the whole year were considerably under the average level that could be observed in previous years. At the beginning and at the end of the year, inland navigation was blocked for 17 days.

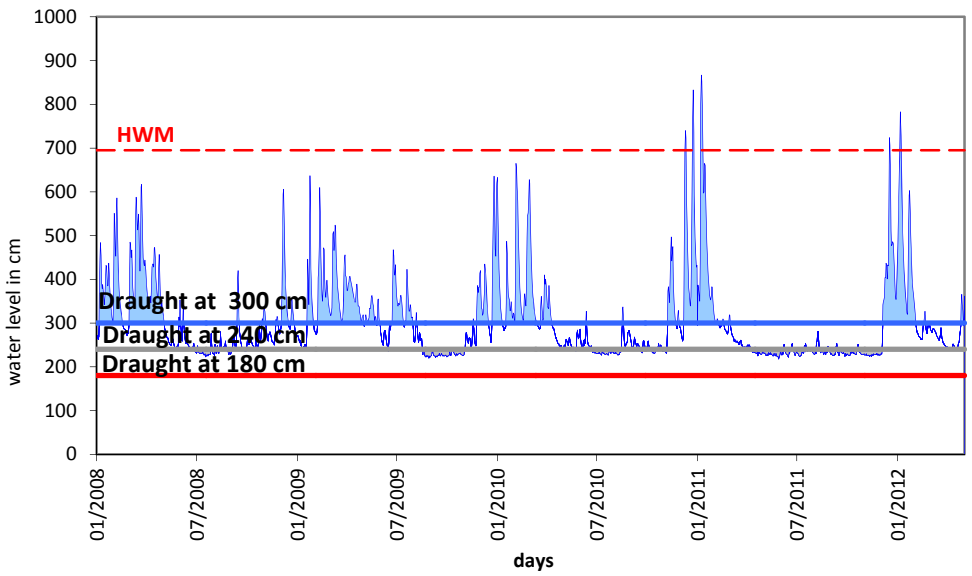
Overall, water levels fluctuated around 240 cm between April and December, thereby often settling at a level below, although the draught did not sink under the value of 215 cm. In 2011, inland navigation was not closed due to ice.

Figure 62: Water conditions on the Moselle at Trier



Source: BAfG, CCNR Secretariat

Figure 63: Water conditions on the Moselle at Trier



Source: BAfG,, CCNR Secretariat

Conclusions

When it comes to the transport demand in inland navigation the developments and trends that were described in this publication confirm the fact of clear differences between market segments. Segments with a rather stable pattern can be distinguished from those that are more cyclical. The supply side – both in dry shipping as well as in tanker shipping – shows distinctive signs of overcapacity.

Important segments of the inland shipping market are closely tied to the economic evolution of the corresponding client industries. Among these are the steel industry, the chemical industry and the important transport of fertilizers. Transport demand reflects to a large extent the business cycle of these branches. Concerning the volumes transported, they are among the most important ones.

- With a total volume of 33.3 million t, the transportation of iron ore, nonferrous ores and scrap metal on the Rhine was 5% up on the previous year's figure. A decline did however set in from the middle of the year onwards as a result of the slowdown in European steel production.

- The transport of chemical products on the Rhine has decreased by approximately 14% in 2011 compared with the year before. The losses set in primarily in the spring with the slowdown in economic activity and continued throughout the rest of the year.

The transport of mineral oil products and coal depends (in the short run) on raw material prices on the world markets. In the long run, energy policy is of great relevance.

For the container market, macroeconomic fluctuations in world trade play an important role, concerning the size and the direction of goods movements. Hence, inland navigation is extremely dependant on the demand from external factors.

Competition with other modes of transport (rail and road transport) is also of importance. Railways offer new services on important corridors between seaports and the hinterland. These services are offered in market segments where inland shipping traditionally has an important market share. This can be seen especially in the container market. Therefore, these competitors are an important factor that has to be kept in mind when analysing the transport demand in inland navigation.

In this regard, it can be observed that inland shipping's role as a "price leader" is threatened by competition from the railway sector. Also the effects that came along with low water levels in spring and in autumn, resulting in a temporary loss of market shares, are pointing into this direction.

Overall, the Rhine posted a small decline of 1%, which in the context of the adverse circumstances throughout the year (accident in January, pronounced low water levels in the spring and November) can be seen as a remarkable result. Other waterways, such as the Danube, the Elbe, the Moselle and the Main-Danube Canal suffered losses of approximately 15% (primarily because of the drought and the resulting low water levels).
The experience of low water conditions should lead to a higher attention regarding the reliability of the inland waterway transport mode. Therefore, the concept of co-modality – as an instrument which enables to guarantee the continuing flow of goods within logistic chains – should be considered as highly important.

Annex 1: Freight capacity offering:

	Motor cargo vessels			Pushed cargo barges			Total dry goods shipping		
31.12.2011	**Units**	**Tonnage**	**Engine power**	**Units**	**Tonnage**	**Engine power**	**Units**	**Tonnage**	**Engine power**
	Number	T	kW	Number	T	kW	**Number**	**T**	**kW**
Germany	916	1 165 148	511 926	789	828 968		**1 705**	**1 994 116**	**511 926**
Belgium	806	1 047 382	524 590	230	452 579		**1 036**	**1 499 961**	**524 590**
France	860	606 513	203 935	383	449 894		**1 243**	**1 056 407**	**203 935**
Luxembourg	8	6 777	3 414	0	0		**8**	**6 777**	**3 414**
Netherlands (*)	3 993	5 003 466	2 645 356	1 135	2 057 708		**5 128**	**7 061 174**	**2 645 356**
Switzerland	17	30 004	16 538	4	5 647		**21**	**35 651**	**16 538**
Poland (2010)	109	67 571	32 713	431	212 445		**540**	**280 016**	**32 713**
Czech Republic	44	44 000	20 000	145	67 000		**189**	**111 000**	**20 000**
Total	**6 753**	**6 923 479**	**3 958 472**	**3 117**	**4 074 241**		**9 870**	**12 045 102**	**3 958 472**
Austria	6	6 219	2 935	54	84 807		**60**	**91 026**	**2 935**
Slovakia	26	18 363	11 647	119	185 888		**145**	**204 251**	**11 647**
Hungary	78			300			**378**		
Romania	75	67 749	39 241	984			**1 059**	**67 749**	**39 241**
Bulgaria	26	31 135	17 067	161	243 719		**187**	**274 854**	**17 067**
R. of Moldavia (**)	8	15 917		26	24 653		**34**	**40 570**	**0**
Croatia (**)	8	5 068	3 266	98	61 584		**106**	**66 652**	**3 266**
Serbia	62	62 903	15 029	345	400 499		**407**	**463 402**	**15 029**
Ukraine (**)	84	179 544	116 511	472	736 691		**556**	**916 235**	**116 511**
Total	**373**	**386 898**	**205 696**	**2 559**	**1 737 841**		**2 932**	**2 124 739**	**205 696**

(*) Source IVW, registered fleet on 31.12.2011
(**) Source Danube Commission, Status 2010
Other sources: national registers, IVW, VNF, WSD-Südwest

31.12.2011	Motor tankers			Pushed tanker barges			Total tanker shipping		
	Units	Tonnage	Engine power	Units	Tonnage	Engine power	Units	Tonnage	Engine power
	Anzahl	**T**	**kW**	**Anzahl**	**T**	**kW**	**Anzahl**	**T**	**kW**
Germany	419	759 454	362 912	44	46 395		**463**	**805 849**	**362 912**
Belgium	216	357 715	166 045	8	15 815		**224**	**373 530**	**166 045**
France	44	54 229	13 986	47	74 934		**91**	**129 163**	**13 986**
Luxembourg	16	24 601	14 358	2	8 435		**18**	**33 036**	**14 358**
Netherlands (*)	1 240	2 220 974	1 285 558	51	83 017		**1 291**	**2 303 991**	**1 285 558**
Switzerland	55	145 496	63 656	3	6 517		**58**	**152 013**	**63 656**
Poland (2010)	2	3 204	0	0	0		**2**	**3 204**	**0**
Czech Republic	0	0	0	0	0		**0**	**0**	**0**
Insgesamt	**1 992**	**3 565 673**	**1 906 515**	**155**	**235 113**		**2 147**	**3 800 786**	**1 906 515**
Danube States (**)									
Austria	5	5 601		15	22 055		**20**	**27 656**	**0**
Slovakia	4	4 520	2 333	32	45 888		**36**	**50 408**	**2 333**
Hungary	2			4			**6**	**0**	**0**
Romania	4	5 383	2 093	97	72 957		**101**	**78 340**	**2 093**
Bulgaria	4	2 942	1 584	5	6 284		**9**	**9 226**	**1 584**
R. of Moldavia (**)	5	4 199		0	0		**5**	**4 199**	**0**
Croatia (**)	5	4 592	4 272	21	22 979		**26**	**27 571**	**4 272**
Serbia	5	3 019	2 142	37	37 533		**42**	**40 552**	**2 142**
Ukraine (**)	3	3 492	1 543	22	30 476		**25**	**33 968**	**1 543**
Total	**37**	**33 748**	**13 967**	**233**	**238 172**		**270**	**271 920**	**13 967**

(*) Source IVW, registered fleet on 31.12.2011
(**) Source Danube Commission, status early 2010
Other sources: national registers, IVW, VNF, WSD-Südwest

	Tug boats			Pusher boats			Total		
31.12.2011	Units	Tonnage	Engine power	Units	Tonnage	Engine power	Units	Tonnage	Engine power
	Number	T	kW	Number	T	kW	Number	T	kW
Germany	140		29 367	285		107 776	**425**		**137 143**
Belgium	10		3 431	94		48 903	**104**		**52 334**
France							**93**		**50 592**
Luxembourg	0		0	11		8 061	**11**		**8 061**
Netherlands (*)	479		107 354	649		324 246	**1 128**		**431 600**
Switzerland	2		817				**2**		**817**
Poland (2010)							**0**		**0**
Czech Republic							**89**		**26 000**
Total	**631**		**140 969**	**1 039**		**488 986**	**1 852**		**706 547**
Danube States (**)									
Austria	0		0	10		9 200	**10**		**9 200**
Slovakia	1		239	41		41 929	**42**		**42 168**
Hungary	53			26			**79**		**0**
Romania	69		28 081	183		214 666	**252**		**242 747**
Bulgaria	13		6 116	38		36 723	**51**		**42 839**
R. of Moldavia (**)	10		8 977	1		1 500	**11**		**10 477**
Croatia (**)	32		8 922	10		5 205	**42**		**14 127**
Serbia	82		14 713	40		52 824	**122**		**67 537**
Ukraine (**)	15		13 926	73		112 694	**88**		**126 620**
Total	**275**		**80 974**	**422**		**474 741**	**697**		**555 715**

(*) Source IVW, registered fleet on 31.12.2011

(**) Source Danube Commission, status early 2010

Other sources: national registers, IVW, VNF, WSD–Südwest

Annex 2: New construction status

Ship type	2008			2009			2010		
	Number	Tonnage	kW	Number	Tonnage	kW	Number	Tonnage	kW
Motor cargo vessels	90	319 377	128 168	103	339 580	160 154	30	85 331	39 273
Pushed cargo barges	58	112 956		65	140 872		35	50 384	
Total	**148**	**432 333**	**128 168**	**168**	**480 452**	**160 154**	**65**	**135 715**	**39 273**
Motor tankers	52	144 581	49 678	131	391 058	133 439	105	338 759	124 598
Pushed tanker barges	0	0		0	0		0	0	
Total	**52**	**144 581**	**49 678**	**131**	**391 058**	**133 439**	**105**	**338 759**	**124 598**
Pusher boats	4		1 684	8		12 760	2		2 156
Tug boats	4		3 890	5		7 780	1		810
Total	**8**		**5 574**	**13**		**20 540**	**3**		**2 966**
Cabin ships	4		5 432	17		17 072	16		5 872
Excursion ships	20		5 252	12		3 686	12		5 177
Total	**24**		**10 684**	**29**		**20 758**	**28**		**11 049**

Ship type	2011			Total		
	Number	Tonnage	kW	Number	Tonnage	kW
Motor cargo vessels	14	33 048	13 242	**237**	**777 336**	**340 837**
Pushed cargo barges	15	35 768		**173**	**339 980**	**0**
Total	**29**	**68 816**	**13 242**	**410**	**1 117 316**	**340 837**
Motor tankers	64	176 617	74 545	**352**	**1 051 015**	**382 260**
Pushed tanker barges	2	3 262		**2**	**3 262**	**0**
Total	**66**	**179 879**	**74 545**	**354**	**1 054 277**	**382 260**
Pusher boats	2		1 268	**16**		**17 868**
Tug boats	0		0	**10**		**12 480**
Total	**2**		**1 268**	**26**		**30 348**
Cabin ships	9		11 392	**46**		**39 768**
Excursion ships	9		2 441	**53**		**16 556**
Total	**18**		**13 833**	**99**		**56 324**

Source: Estimation of the CCNR Secretariat based on the data of IVR established with the data from WSD–Südwest for the German ships.

Glossary

ARA – Häfen: Abkürzung für die drei großen europäischen Häfen Amsterdam, Rotterdam und Antwerpen.

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 navigation: navigation downriver

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

Dry hold: Used for the transport of dry cargo.

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

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

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.

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

Production/yield: The notion of production/yield as used in this publication is intended to define in index form the activity of inland waterways transport, taking into account a given level of demand and the freight rates applied on the market.

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.

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

Information sources:

International organisations

Danube Commission

European Union

Eurostat

International Energy Agency (IEA)

International Transport Forum

International Monetary Fund (IMF)

Industry associations

Verband der Chemischen Industrie (VCI) – Chemical Industry Association

Verband der deutschen Kohleimporteure (VDKI) – Association of German Coal Importers

National authorities

Bundesamt für Güterverkehr – Federal Office for Freight Transport

Bundesanstalt für Gewässerkunde – Federal Institute for Hydrology

Romanian National Statistical Office

Statistical Office of the Republic of Croatia

Statistical Office of the Republic of Austria

Statistical Office of the Republic of Serbia

Statistical Office of the Republic of Slovakia

Statistisches Bundesamt Deutschlands – Federal German Statistical Office

Hungarian Central Statistical Office

Inland navigation organisations

CBRB

EBIS

ELWIS

EBU

IVR

Nationale Havenraad

Voies Navigables de France

Direction générale opérationnelle de la Mobilité et des Voies hydrauliques (Wallonie)

Ports

Amsterdam

Antwerp

Basel

Brussels

Kehl

Cologne

Le Havre

Liege

Mainz

Mannheim

Neuss–Düsseldorf

Paris

Rotterdam

Strasbourg

Private companies:

Keyrail

PJK International B.V.

Rabobank

Research institutes

Ifo Konjunkturinstitut

NEA Consulting

Studies

Bundesamt für Güterverkehr (2011): Marktbeobachtung Güterverkehr – Bericht Herbst 2011 (Market observation freight transport – report autumn 2011)

Deutscher Tourismusverband (2012): Zahlen – Daten – Fakten 2012 (Figures – Data – Facts 2012)

Deutscher Reiseverband (2011): Der Kreuzfahrtenmarkt Deutschland 2011 – The German cruise market 2011

ING Economisch Bureau (2012): Herstelpad binnenvaart loopt vertraging op.

International Monetary Fund (April 2012): World Economic Outlook: Growth resuming, dangers remain.

Freight broker Ernst Russ (2012): Mehrzweckfrachter mit Zwischendecks und Schwergutgeschirr 2011/2015 (Multipurpose freighters with 'tween decks and heavy cargo equipment 2011/2015).

Voigt, Hans-Gerhard (1966): Der Montangüterverkehr über See im Entwicklungsprozeß der Weltwirtschaft, in: Seewirtschaft – Beiträge zur ökonomischen Entwicklung in Seehäfen und Seeschiffahrt, Hamburg 1966

Websites

www.finanzen.net

Footnotes

[1]European Barge Inspection Scheme

[2]Cf. ING Economisch Bureau (2012), Herstelpad binnenvaart loopt vertraging op

[3]See CCNR Market Report 2011-1

[4]This figure (of 20 single hull ships) was estimated from classification company information

[5]Source: Bundesamt für Güterverkehr – Federal Office for Freight Transport

[6]Cf. ING Economisch Bureau (2012): Herstelpad binnenvaart loop vertraging op, p 20

[7]Cf. the market study by the chartering broker Ernst Russ "Multi-purpose freighters with 'tween decks and heavy cargo equipment 2011/2015.

[8]The natural rate of investment was calculated by assuming an average ship capacity of 3,000 t for a new double hull ship. Because the average rate of new construction in the 1990s was 24,000 t, this translates into the addition of approximately eight new double hull ships per year from 2016 onwards.

[9]The rate of new construction is assumed to fall by 40 units per year until the level of the 1990s (natural rate of investment) has been achieved

[10]Cf: ING Economisch Bureau (2012), Herstelpad binnenvaart loopt vertraging op

[11]It needs to be borne in mind that shrinking overall capacity as in scenario 4 also has a positive effect on freight rates, which may in turn result in a renewed increase in new construction activity. Such effects should be assumed although it is not really possible to quantify them in these scenarios

[12]What also needs to be considered is the low density of major industrial centres and the correspondingly lower demand for transport services in the Danube basin e.g., compared with the Rhine.

[13]What is meant by navigation infrastructure on the Danube is the Danube shipping lane as well as the harbour terminals, harbour fleet, communication systems and RIS.

[14]Currently 6 DC member states are also members of the European Union

[15]The review of the agreement on the regime of navigation on the Danube (1948 Belgrade Agreement) has been ongoing since 1993.

[16]Mainly pushboats or tugs and "Europe" type barges are used for freight transport. motor freighters account for only approximately 11% of the Danube shipping fleet.

[17]In 2009, transport demand compared with 2008 fell by more than 45% and freight volume by 20–40%. More than 50% of the tonnage remained idle

[18]In 2011, iron ore prices rose 30% compared with 2010 (120–160 USD/tonne).

[19]The EUSDR envisages a 20% increase in freight traffic in 2020 compared with 2010.

[20]As a result of the low water in 2011, approximately 70 fords with a depth of between 1.6 and 1.2 m were formed on the Lower and Central Danube.

[21]Container traffic on the inland waterways of Western Europe is in second place after the transportation of metallurgical industry goods.

[22]It currently takes 8–11 days to deliver containers on the Constança–Budapest route.

[23]During its one year of operation, this line transported 6,600 containers

[24]Approximately 250 cruise ships are operating on European inland waterways. 10 – 15 new ships enter the market every year

[25]In 2009/2008 freight transshipments in Danube ports totalled 57.9 and 63.5 million t respectively

[26]Source: IVDS (Internationale Vereinigung der Donauschifffahrt – International Association of Danube Shipping).

[27]An average transport volume of 4.5 – 5 million t is achieved on the Danube–-Rhine–Danube sector.

[28]International Monetary Fund (April 2012); World Economic Outlook: Growth resuming, dangers remain.

[29]Source: International Transport Forum

[30]A comparison with the previous year is not currently possible as the composition of this goods segment has changed considerably as a result of the changeover from NST/R to NST 2007

[31]Official statistical data for transport demand on the Rhine are not yet available for 2012. But conclusions about transport demand in the steel segment can be drawn from parallel indicators (such as German steel production).

[32]According to information from the operator of this line (Keyrail), 30% more trains ran on the Betuwelijn in 2011 than the year before. Cf: “Geen dod spor meer” (http://www.keyrail.nl)

[33]Source: VDKI

[34]Source: VCI

[35]Cf. Federal Office for Freight Transport (2011), Market observation for freight transport – autumn 2011 report

[36]Because of the traffic statistics methodology, these figures cannot be aggregated!

[37]CCNR Secretariat calculations based on data from the Voies Hydroliques Wallonie

[38]Official data for Serbia cannot currently be used as they do not contain any transit traffic

[39]Aforementioned ports + port of Zeebrugge, owing to its importance for container traffic

[40]Source: H.-G Voigt (1966), The traffic in coal and steel products overseas in the development of the global economy in: Seewirtschaft – Beiträge zur ökonomischen Entwicklung in Seehäfen und Seeschiffahrt, Hamburg 1966. (Maritime affairs – Contributions to economic development in sea ports and maritime shipping, Hamburg 1966.)

[41]This estimate is based on growth in the first half year and the proportion of agricultural goods in total Paris transshipments (approximately 10%).

[42]This is attributable to the fact that the port classifies on the basis of the old NST/R system, whereas the German statistical office works to the new NST 2077 classification

[43]Source: Handelsblatt

[44]Source: Company information Mannheim Bio Fuel GmbH

[45]In 2011 gross revenue of 79.5 billion euro was generated in Germany from day trips at the place in which the stay occurred. The number of these day trips totalled 2.84 billion. Average per capita daily expenditure was 28 euro. Source: Deutscher Tourismusverband (2012), Zahlen – Daten – Fakten 2012 (German Tourism Association 2012, Figures – Data – Facts 2012)

[46]Cf. Federal Office for Freight Transport (2011), Market observation for freight transport – autumn 2011 report

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