Executive Summary Report

Medium and Long Term Perspectives of IWT in the European Union

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EXECUTIVE SUMMARY

Introduction

This summary presents the key findings and policy recommendations of the study '*Medium and Long Term Perspectives of Inland Waterway Transport in the European Union*', which was carried out by the consortium led by NEA with the partners Planco, via donau, CE Delft and MDS Transmodal. The study is funded by the European Commission Directorate-General MOVE and started in January 2011 and ended on 23rd of December 2011.

The summary starts with an explanation of the study objectives and subsequently sets the background of the study and the current position of Inland Waterway Transport (IWT). Next the assessment of the performance of the industry is presented, seen both from the demand side as well as from the supply side of the market. The results from the SWOT analysis provide the basis to identify the key problems and challenges for IWT for the coming decades. Additionally, a quantitative forecast on the expected transport performance of IWT is given based on a business-as-usual (baseline) scenario for horizons 2020 and 2040. Based on the problem analyses and the outlook the policy objectives are presented and finally the conclusions and recommended policy packages and measures are presented. This provides the strategy for the inland waterway transport policy.

In addition to the broad and extensive expertise within the consortium, the basis for this study was provided through desk research, stakeholder consultations on the 5th of July and the 23rd of November 2011 and through a broad range of interviews with key users and operators in the inland waterway transport industry.

Study objectives

The study '*Medium and Long Term Perspectives of Inland Waterway Transport in the European Union*' provides the European Commission with a comprehensive basis to define the inland waterway transport policy within the general transport policy for the medium and long term.

The more specific objectives of the study were:

- to investigate and analyse the current situation of the EU inland waterway transport sector in the context of the economic crisis,
- to analyse the strengths and weaknesses of the sector,
- to explore the prospects and potential of inland waterway transport within the European transport system in the medium and long term, also taking into account the likely impacts of the economic crisis and the challenges and issues to be tackled in the future,
- to give concrete recommendations for policy measures with regard to inland waterway transport at EU level and comply with the priorities set out in the Transport White Paper,
- to make suggestions for the development of a medium and long term European strategy in support of inland waterway transport.

Particularly within the framework of rethinking and developing new transport policies, the study provides answers to the further positioning of IWT in the context of the new policy (for instance, the new White Paper on Transport, revised TEN-T Guidelines, EU 2020 agenda).

Background

Transport policy

Transport is fundamental to our economy and society. However, when looking 40 years ahead, it is clear that transport cannot develop along the same path. Oil will become scarcer in the coming decades and will have to be sourced from increasingly uncertain supplies. Furthermore, congestion on the roads and climate change are major concerns, as well as the social costs of accidents and noise. In the recently published White Paper on Transport '*Roadmap to a single European Transport Area- Towards a competitive and resource efficient transport system*' (2011) ambitious goals have been set aimed at substantially reducing oil dependency and carbon emissions without sacrificing efficiency and the freedom of movement that transport offers. The main policy objectives in the White Paper are grouped around three general themes:

I. Developing and deploying new and sustainable fuels and propulsion systems.
II. Optimising the performance of multimodal logistic chains, including making greater use of more energy-efficient modes.
III. Increasing the efficiency of transport and of infrastructure use with information systems and market-based incentives.

The first theme primarily contains goals for the automotive, airline and maritime shipping industry but it also applies to some extent to IWT. For example the use of Liquefied Natural Gas (LNG) as an alternative fuel and diesel-electric power

trains can be mentioned. The second and third groups contain more direct goals for the IWT industry. IWT is an energy efficient mode and provides capacity on waterways and is therefore marked as one of the modes that should increase its modal share. In this respect achieving a modal shift is a separate goal within the second group: by 2030 a share of 30% of road freight over 300 km should be shifted to other modes (waterborne and rail) and by 2050 a share of 50% in this market should be transported by alternative modes.

In this respect it should be noted that IWT can also be competitive over shorter distances. Furthermore the core inland waterway networks will be incorporated and integrated within the networks of other transport modes. This core network integration is also one of the goals and should be achieved by 2050. The third theme is also relevant to the IWT sector. In particular the goals regarding modernisation of traffic management (for example through River Information Services), improving safety and security of transport and the further application of the 'polluter pays' principle could be mentioned in this respect. The White Paper announces that the European Commission shall examine mandatory application of internalisation charges on all inland waterways within EU territory. An approach shall be developed by 2020 for the internalisation of external costs in IWT. Last but not least the White paper has an explicit message regarding IWT '*Inland waterways, where unused potential exists, have to play an increasing role in particular in moving goods to the hinterland and in linking the European seas*.'

General characteristics and position of inland waterway transport

Inland waterway transport can contribute significantly to the White Paper objectives because IWT is characterised by the following intrinsic merits:

- very low direct movement costs,
- low energy consumption and low carbon footprint,
- low air pollution and noise levels,
- safe and secure services,
- spare capacity on the network, negligible congestion on the waterways, and
- high transport capacity and reliability.

It is clear that IWT already plays a very important role where high quality ports and waterway connections are available in combination with high transport demand and industrial activities (for example the Rhine delta). IWT is indispensable in the transport to and from major seaports in the Hamburg-Le Havre range and the Danube delta region, as IWT services are a key factor in the competitive position of these seaports and in the supply chains of users of those ports.

IWT has a very strong position in the transport of bulk commodities and containers on certain corridors linking the seaports to the hinterland over medium and long distances (above 50 km). The modal share of IWT in the EU27 is 25% to 30% for bulk commodities such as solid mineral fuels (coals), petroleum products (oil) and ores and metal waste. On some corridors and distance classes the modal share however exceeds 95%. Expressed in terms of volume in tonnes, the size of container transport by barge is still relatively small on a European scale. However, for the seaports Rotterdam and Antwerp, the contribution of container barge transport is quite substantial, with a modal share of 35% for IWT in the container hinterland transport.

The modal share of IWT in the EU27, compared with road and rail transport was 5.7% in 2010 with a transport performance of 129 billion tonne kilometres. On the Rhine however the share was 14.3%, North-South corridor 9.7%, Danube corridor 7.2% and on the East-West corridor it was 1.2%. It can therefore be concluded that the specific position and opportunities for IWT depend on whether the waterway network exists, and its quality as well as the level of industrial activity, welfare and population along these waterways, resulting in substantial transport demand. These circumstances however, vary quite a lot across Europe and have to be taken into consideration when defining the policies.

The following map shows the major waterways in Europe. The Rhine River, in particular the section between Rotterdam and Duisburg, is the most important part of the network in terms of cargo carried.

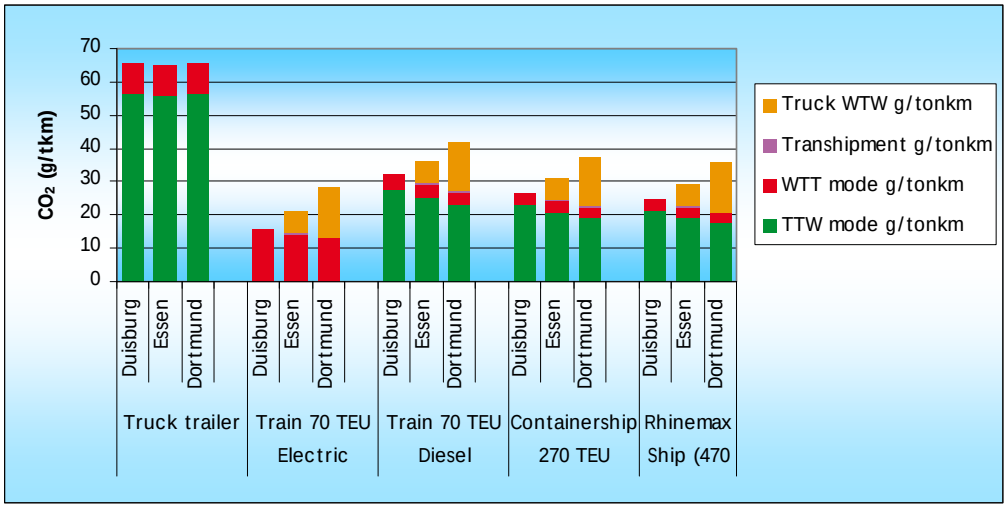
Figure 1 Transport volumes and waterways in Europe (2007)

Source: NEA, via donau, VNF, 2009 (Design streamlined by PLATINA)

Source: PLATINA Deliverable 5.5, 2010

Improving energy efficiency and reducing the emission of CO_2 are major items in the European (Transport) Policy. The higher energy efficiency of IWT compared to road haulage contributes to less fossil fuel consumption and therefore to less emission of CO_2. In cases where IWT can provide alternatives for road haulage operations it can contribute to a reduction of CO_2. The following figure presents the CO_2 emission for a typical main market in container transport where there is substantial competition between road haulage and IWT.

Figure 2 CO_2 emission per tonnekms for container transport; case: Rotterdam-Duisburg (2009)



Source: CE DELFT, 2011

This example shows that IWT can contribute to savings in CO_2 emission of 43% to 63% per tonne kilometre for a door-to-door chain, based on IWT for the main haul.

Currently, there are approximately 12,800 vessels and 9,325 companies active in the Inland Waterway transport market in the EU27. Transport carriers, brokers, trade associations, and transport logistic providers can be distinguished as type of companies active in the market parties. In total the companies have an annual turnover of 6 billion Euros and a direct annual contribution to the GDP of Europe of about 3 billion Euros. The added value and employment is mainly provided in Germany and the Netherlands.

The supply side of transport is rather fragmented in terms of the vessel owners, in Western Europe. On the other hand the demand side is much more concentrated as there are a limited number of larger industrial companies (for instance steel production industries, energy companies, chemical companies) and logistic companies (e.g. intercontinental container carriers) that provide work for the vessel owners. The work is however, generally not distributed through direct contracts between shippers and transport providers but mainly via intermediary organisations such as brokers and trade associations. A significant share of the executive work is acquired by individual transport providers active on the 'spot-market' that make price agreements for individual journeys.

On the Danube, however, the situation is different as there are a few (formerly state-owned) companies that serve the market.

Assessment of the present industry performance and challenges from the supply side and demand side of the market

In order to further develop and exploit all the intrinsic strengths of the industry some of the weak points of the IWT industry have to be looked at and a solution must be found to reduce the impacts of these weak points. In the following tables, which were derived from interviews and desk research with market parties, a balanced assessment is made of the strengths and weaknesses, as well as the opportunities and threats which the industry faces both on the supply as well as the demand side.

Table 1 SWOT for IWT as seen from the supply side of transport

	Strengths	*Weaknesses*
Internal origin	– Sufficient fleet capacity, in particular large vessels – Much spare capacity on waterways to foster a growth of traffic – High amount of flexible entrepreneurs in the market	– Long life-time of inland vessels and engines, resulting in high air pollutant emissions – Ageing human resources, lack of influx, shortage of qualified staff – Fragmented and atomised SME structure resulting in low co-operation and lack of ability to integrate IWT in door-to-door chains – Overcapacity and small profit margins – Limited use of ICT systems – Missing infrastructure links, limited fairway conditions and lack of transhipment areas and multimodal connectivity – Poor safety culture resulting in significant safety risks for workers
	Opportunities	*Threats*
External origin	– Funding programmes for funding of infrastructure – Stimulating policies to strengthen supply side of IWT – Internalising external costs: pricing of competing modes: road transport and rail	– Growing pressure on spatial planning (e.g. housing projects conflicting transhipment functions for IWT) – Conflicts with ecology (nature reserve) – Internalisation of infrastructure costs for IWT – Possible impact of climate change on water levels on long term

Table 2 SWOT of IWT activities in general as seen from the demand side

	Strengths	*Weaknesses*
Internal origin	– Low freight rates – Reliable transport operation – Low carbon footprint – Available transport capacity (vessels) – Available infrastructure capacity; growth potential – High market share in traditional sectors (captive markets for IWT such as coal, ore, oil) – Comparatively high safety levels; in particular external safety (risks for population or the environment)	– Not all origins and destinations are located in the proximity and necessitating the use of transhipment and other modes – High volumes needed (consolidation), dependence on a limited number of large customers and consolidation – Low operational speeds – Lack of visibility and poor image at potential clients – Varying water levels on certain corridors causing a low predictability of service levels and changing freight rates – High or low a water levels and accidents can block critical parts of the waterway network – Low level of awareness in IWT of broader supply chain developments (door-to-door) and limited knowledge of marketing and supply chain management – Industry fragmentation and reaction to external shocks (e.g. recent economic crisis).
	Opportunities	*Threats*
External origin	– Infrastructure expansion (e.g. Seine-Schelde, Rhine-Rhone) – Commercial co-operation and increase of scale in (multimodal) logistics – Growth of world trade resulting in steep growth of maritime container market – Congestion on motorways and lack of capacity in rail transport – Growing demand for low carbon transport solutions – Attracting new markets such as waste transport, bio fuels, LNG, pallets, continental containers – Increased awareness of safety and security problems – Growing number and position of inland container terminals	– Limited political support and funding resulting in poor condition of many waterways and inland ports – Loss of markets due to energy policy (e.g. coal and fossil fuel transports) – Impact of high-oil prices on various industries that are customers of IWT – Further liberalisation, efficiency and interoperability of rail transport markets – Possible introduction of Long and Heavy Vehicles for road haulage (e.g. 3 TEU truck) – Increased restriction of banks for investment as a consequence of the crisis

Many issues, as presented in the SWOT tables are concerns for the industry and shall in the first place be action fields for the industry itself. An example is the poor level of organisation and cooperation in the sector (between carriers, with other modes, with shippers) and the high level of fragmentation of the carriers in the market. This is seen as one of the major weaknesses.

For several reasons it is desirable that a further consolidation on the supply side of the market takes place. This could be in the form of expanding the size of companies or trade associations, resulting in better operational performance, more marketing power, more purchasing power and an increase in the quality of door-to-door services. Also logistic integrators should more extensively include the transport services of IWT and link IWT to other modes of transport in order to provide more intermodal door-to-door solutions using IWT to the market.

However, besides a strong need for action by the industry itself, IWT needs good infrastructure, as well as a good labour market and clear rules and regulations in order to use its full potential. There are several missing links in the waterway network, for example limited fairway depth and dimensions and problems with the reliability of fairways. Good maintenance of waterways, in particular dredging, is a key issue to ensure efficiency and reliability in this respect.

In general it can be concluded that there is a slow development and lack of attention for the required work on infrastructure. Poor maintenance of waterways by several Member States is a problem, in particular on the East-West and Danube corridors. In Western Europe the existing ports and terminal network is under pressure while along other corridors the density is insufficient (e.g. Danube). In particular for the container transport sector a high quality and efficient international container terminal network is required that is closely linked to factories and logistic areas and other modes of transport. Finally, more co-ordination is needed in the regulatory field on certain subjects such as the implementation of River Information Services.

Key problems and challenges for IWT

Basically there are two main longer term structural problems related to the present European policy framework (White Paper) with regard to the performance of inland waterway transport that need to be addressed:

- The modal share of IWT is decreasing as opportunities are not exploited in new markets and the integration of IWT in door-to-door logistics.
- The environmental performance, opportunities for reducing air pollutant and GHG emissions from transport operations are currently not being exploited.

In addition, there are various more short and medium term problem areas, like *recovery from the impacts of the financial and economic crisis* and the present and medium-term *problems related to the phasing-out of mono hull tankers*. The study carried out by NEA in July 2010 for the European Commission on the impact of the financial economic crisis on the IWT industry concluded that these problems are expected to be solved, or largely solved, before 2020. The initial recovery seemed to be strong and on the upper boundary of the expected recovery path. Tax refunds from tax payments in previous years (2006, 2007 and 2008) did compensate, to a certain extent, the loss of revenues due to the

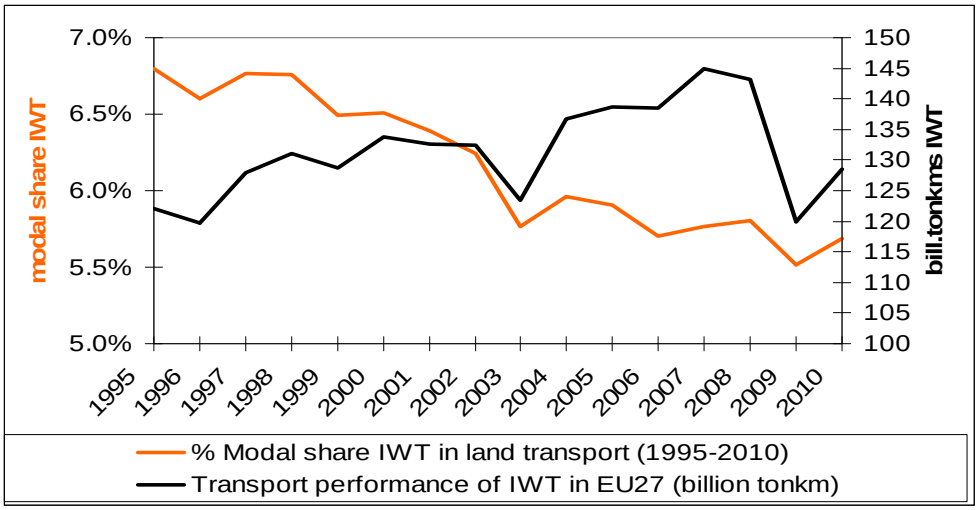
crisis. Furthermore the long periods of low water levels on the Rhine (in the spring and autumn of 2011) resulted in low water surcharges and more trips were needed to carry the goods. The additional income for carriers brought some temporarily relief for the financial situation of carriers. However, the weakening European economy during the 2nd half of 2011 raises concerns again about the recovery of the sector and the financial stability for the next years. The expectations regarding transport demand in IWT for 2012 and 2013 have been lowered significantly.

It should also be highlighted that there are a few structural, industry specific problem areas, which are equally important. One of those concerns is *the structural shortage of staff in almost all segments of the market.* This problem, which was noticed years ago, has still not been solved and might become even more serious in the medium term due to the ageing workforce and lack of influx of new workers.

Declining modal share

An alarming observation is the decrease of the modal share of IWT compared to road and rail transport in the EU27.

Figure 3 Modal share and transport performance of IWT (btkm)



Source: NEA

It can be concluded that the overall performance in tonne kilometres increased in the decade before 2009 and in particular during the years with high economic growth (2004 – 2008). The road freight transport industry in the EU27 was able to grow much faster due to various reasons (dense road network, smaller consignments, more time critical goods, uncomplicated organisation). Besides transport price, a key aspect in the competition with road haulage is the quality of the service that is offered. The longer transit time of barge transport, compared to road haulage can be a barrier despite the cost savings that can be achieved. Another issue is reliability of price and quality. Events such as low water or blocked waterways are problematic for shippers. Moreover freight forwarders and shippers are more interested in a one-stop-shop 'door-to-door' solution and do not want to be involved in the organisation of complex

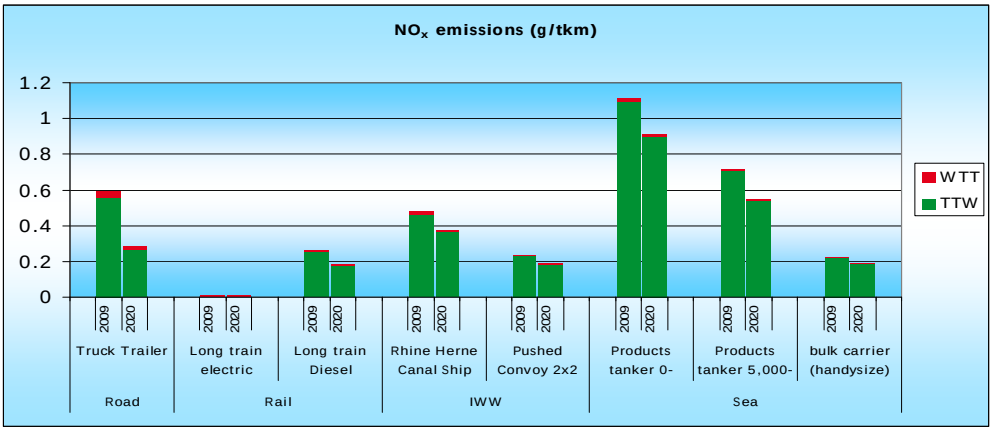
intermodal transport chains with multiple players and the necessity to bundle cargo with other parties.

Environmental performance

The CO_2 emission of IWT is still significantly lower than road transport. For example in door-to-door container transport between Rotterdam and Duisburg the estimates of the difference in CO_2 emission is approximately 50% in favour of an intermodal chain using a barge. Further efforts can be made to reduce CO_2 emissions in order to increase the advantage of IWT over road and to strengthen the contribution to this policy objective of the White Paper.

A major concern is the poor progress made on reducing the emission of air pollutants and in particular the emission of nitrogen oxides (NO_x) and particulate matter ($PM_{2.5}$). The trend towards 2020 shows an increasing gap between emission performance of engines in barges and trucks. Road freight transport already uses more modern and therefore cleaner engines. It is currently only due to the scale advantage of IWT versus road, that in many cases the emission per tonnekms does not exceed that of road transport. However, due to the quick modernisation of the fleet of trucks in Europe the emission per tonnekms will in many cases also be better for road haulage compared to IWT, particularly for smaller vessels and in suboptimal logistical circumstances for IWT. The following figure shows the development.

Figure 4 Emission of NO_x in 2009 and 2020



Source: CE Delft, 2011

The emission of NO_x in road haulage will reduce by 50% in the 2009-2020 period while IWT (Rhine Herne Canal Ship) is expected to show a reduction of 20% to 30% (in a business as usual scenario). Only very large vessels, such as 5,000 tonne push convoys will still have a better emission profile in 2020 compared to road haulage.

Lack of staff, in particular boat masters

Although for some countries there is a lack of reliable data, the current estimate of the amount of workers in inland waterway transport (including passenger transport) in the EU27 is 43,300 workers. This figure includes the owner-operators and part-time and temporary employment. The majority (65%) of the workers is active in the Rhine corridor. A significant share of employment is in passenger transport.

In Germany the situation is alarming, with more than 40% of the employed aged 50 or above. This means that on average 200 workers have to be replaced annually and many of them are boat masters. However, only 120 graduates currently finish schools in Germany which leaves a net loss of 80 workers per year. The prospects in Belgium are similar with a net loss of about 15 workers per year. In France the situation is comparable with Belgium. In the Danube area the qualified nautical staff (captains, boat masters) is over aged (50+). It is expected that a large share of boat masters will leave the sector within the next 10 years which will leave a gap in the future. However, the Netherlands with a comparatively younger workforce is has not yet been adversely affected.

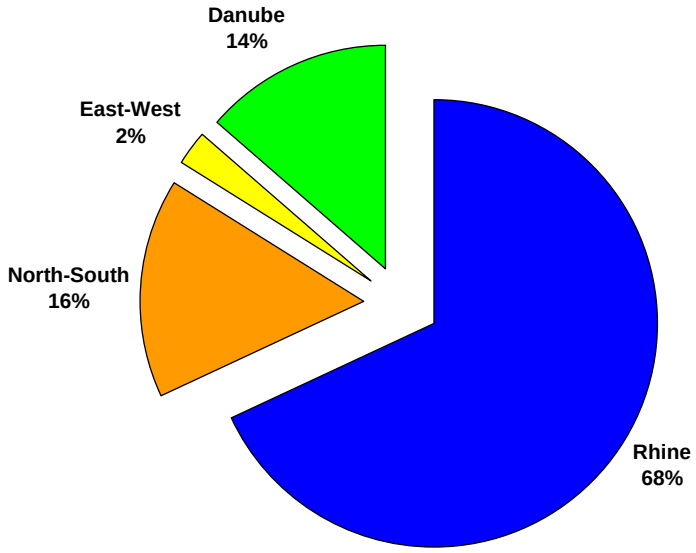
In addition to these troubling demographical issues, the transport demand is expected to increase. This results in more vessels needed to carry goods and passengers and therefore more staff needed to operate the fleet.

Model calculations were made to make an estimate for the EU27 area based on the expected freight transport demand in a low and high transport demand scenario. This analysis showed that at least 8% more staff (2020 low scenario) to 22% more staff (2020 high scenario) will be needed. This would result in an increase of approximately 3,800 to 10,500 more jobs in the IWT sector between 2007 and 2020. These figures mean that an annual increase of workers would be needed of between 300 to 800 people to cope with the growth of transport demand. Furthermore, the continuing trend towards larger vessels and a growing share of vessels in multi-shift operations will lead to an increase in the number of required workers. As a result in particular shortages occur with regard to highly qualified personnel such as boat masters. The figures reported by PLATINA in 2009 indicate a total number of approximately 5,500 students in Europe. Approximately one third of those students successfully finish their training each year, resulting in approximately 1,800 new workers per year. Given the ageing population and the transport demand growth, this supply of new workers will not be sufficient to cope with the demand.

Unbalanced development between corridors

Another familiar and long-term problem area concerns *the unbalanced development between the most important markets, i.e. Danube, North-South and East-West markets versus the Rhine market.* The Rhine market is still by far the most dominant market, as can be seen in the following diagram.

Figure 5 Share in total transport performance in EU27 in year 2007



Source: NEA

While a strong growth of transport volumes is expected as result of substantial infrastructural improvements on the North-South corridor (Seine-Schelde), on the Danube and East-West corridor (network: Mittellandkanal-Elbe-Odra) the shipping intensities are expected to remain modest in the foreseeable future.

Moreover the unbalanced development is also the result of different market situations between corridors. For example the Rhine and Danube waterways differ in terms of length, the population living close to the waterway as well as the size of the production industry and consumption by people along the waterway.

As a result of these differences, booming market segments on the Rhine, such as container transport, are still fairly underdeveloped on the Danube. Various attempts to stimulate these activities on the Danube have failed so far due to the lack of transport demand volume (critical mass), strong competition from road haulage as well as problems with the reliability of navigation conditions on the Danube waterway.

Prospects for 2020 and 2040 in a baseline scenario

In order to further investigate and substantiate the observations on trends in the market and market segments and to better appreciate the opportunities and threats identified in the SWOT tables, forecasts were made of the future IWT transport performance for the years 2020 (medium-term) and 2040 (long-term).

The baseline scenario incorporates all general White Paper (2011) policies and the most recent developments in supply chains. For example, modal split agreements in sea ports and changes in German energy policy were taken into

account. However, it does not take into account additional specific policies and measures targeted towards the IWT industry. The starting point for developing the baseline forecast was transport demand data from the TEN CONNECT 2 study which was based on the iTREN 2030 integrated scenario. Subsequently specific growth factors were adjusted and corrected for inland waterway transport, based on specific IWT supply chain developments, information on which was collected by desk research as well as interviews with large shippers, port authorities and large IWT operators. These parties were, amongst other things, asked to evaluate the medium-term growth perspectives in their markets segments. Using this approach, bandwidths bound by low and high growth for 2020 and subsequently also for 2040 were determined for various supply chains. The results of this exercise are presented in the following table for the EU27.

Table 3 EU27 average transport outlook baseline scenario, development of tonne kilometre performance, index 2007 = 100

Key business industry	*2007*	*2020 (min)*	*2040 (min)*	*2020 (max)*	*2040 (max)*
Containerised goods	100	142	262	175	442
Coal fired power plants	100	117	137	138	166
Steel industry	100	99	114	120	156
Petroleum and chemical	100	101	104	115	156
Agribulk	100	104	123	113	146
Construction industry	100	100	109	105	122
TOTAL	*100*	*107*	*132*	*123*	*181*

At first glance it can be concluded that the baseline market outlook for inland waterway transport seems positive. The outlook presents a growing market for IWT. There will be an increasing demand for IWT services in particular in container transport. Also due to rising concerns regarding nuclear power more demand is expected in coal transport for power plants.

However, it must also be taken into account that other modes of transport will also show an increase of their transport performance. Therefore, in order to reach a significant growth of modal share of IWT, additional efforts are needed to realise an increase of modal share compared to road and rail.

As the next table shows, the development of the IWT industry should be on the high growth boundary (the ‘max columns’ in the table above) to prevent a further decrease of the market share.

Table 4 Modal share development per corridor compared to road and rail, low and high baseline scenario for 2020 and 2040

Corridor	*Year 2007*	*Year 2020 (low, high)*	*Year 2040 (low, high)*
Rhine	14.3%	12.8%, 14.8%	14.1%, 16.4%
North-South	9.7%	8.9%, 9.9%	10.6%, 11.9%
Danube[1]	7.2%	6.8%	6.0%
East-west	1.2%	0.9%, 1.1%	0.8%, 0.9%

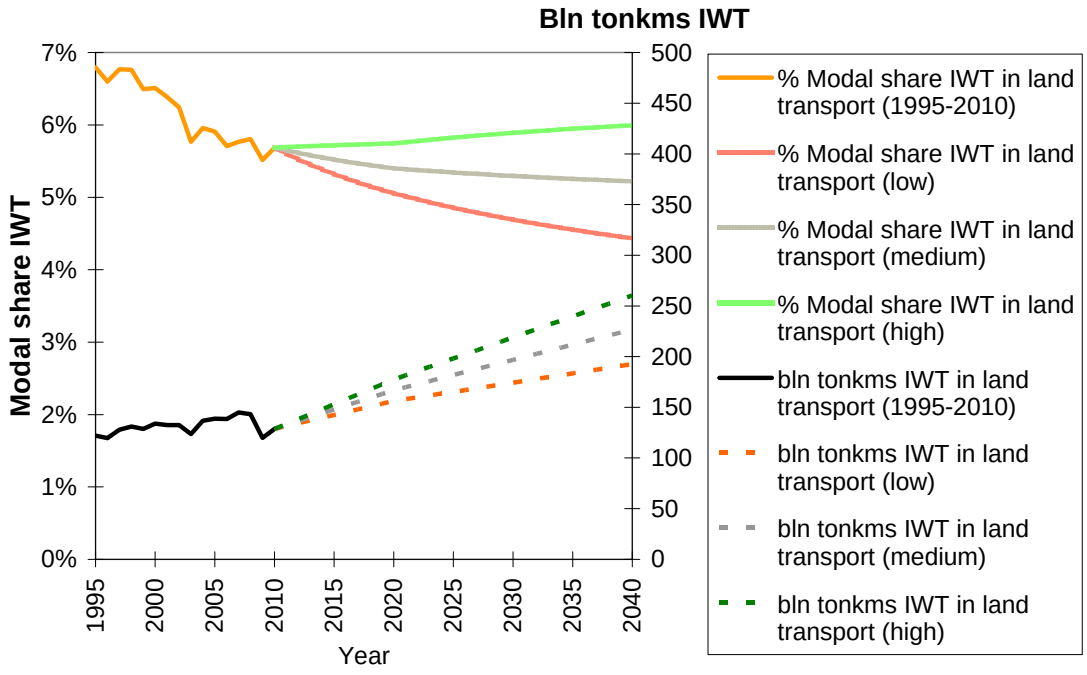
In table 4 the expected future IWT market shares are listed per corridor. The table shows that in the longer term, an unambiguous increase of the IWT market share is expected only in the North-South market. This is due to the substantial investment in the Seine-Schelde connection. In all other corridors the bandwidth (low versus high estimates) does not rule out the possibility of a decrease in market share.

In particular in the Danube market and East-West markets it is not expected that the modal share will increase under the baseline scenario. This is due to the limited port and fairway conditions, in combination with restructuring of supply chains and industries as well as high growth rates in the transport of final (consumer) products, a market segment dominated by road haulage.

[1] For the Danube instead of low and high scenario, an average forecast was provided. The forecast for the Danube is inline with the objectives of the Danube Region Strategy

The following figure presents the overall outlook on EU27 level.

Figure 6 IWT modal share and transport performance outlook (EU27)



Note: in the figure above the right hand Y-axis presents the overall performance in billion tonne kilometre while the left hand Y-axis presents the modal share of IWT versus road and rail transport.

Source: NEA

To facilitate an increase of modal share, new markets need to be unlocked, for example in geographical terms by means of developing waterway connections (for instance Rhine-Rhone) but also through integration of IWT in door-to-door chains and by accommodating new types of cargo (e.g. palletised goods, perishable goods, bio fuels).

In general inland waterway transport needs to be able to provide intermodal alternatives to road haulage over shorter distances. In this respect spatial planning is a key issue for authorities to make sure that points of origin and destination of goods are consolidated, in close range of waterways and accessible through a dense network of terminals. This, however, requires a long-term approach.

Finally, through internalising external costs for inland waterways (planned after 2020) additional financial incentives will be provided to the market to exploit the most environmentally friendly modes of transport. In this respect it is important to reduce external costs of IWT significantly in this decade until 2020, in order to prepare IWT for this step. In particular, a drastic reduction of air pollutant emissions is needed. Moreover, infrastructure costs are only partly charged. As inland waterway transport is only one function of waterways and basins, it is necessary and fair to make clear what share of infrastructure costs are to be

earmarked to IWT operations and what a fair and efficient pricing scheme for IWT should look like (user pays principle).

Policy objectives

From the results of the analyses it can be concluded that significant changes are required in order to meet the policy objectives of the Europe 2020 Strategy and the 2011 White Paper on Transport. Within this context, active support of inland waterway transport is required. For IWT two major policy objectives should be pursued, focused on the performance (output) of the sector:

1 **Raise the modal share of inland waterway transport, in particular through expanding the intermodal transport segment.**

2 **Reduce accidents, air pollutants and climate change impact of inland waterway operations.**

Both policy objectives are interrelated. Striving for an increase in modal share of IWT is justified by the societal benefits of inland waterway transport compared to other modes of transport. A further reduction of air pollutants, accidents and green house gas emissions is needed to safeguard and further strengthen and expand these social benefits. This will result in continued and growing public support to strive for an increase of modal share of IWT in transport policy. It is therefore of strategic importance to tackle the emissions of air pollutants, in particular as this is the main external cost factor for IWT, as other external cost factors are already quite low or insignificant. Moreover, the IWT sector should anticipate a possible internalisation of external costs in the future (after 2020) and therefore pay more attention to the reduction of air pollutant emissions.

Apart from factors that have a direct impact on the modal share or emission performance of IWT, factors also need to be addressed that indirectly determine the performance of IWT on these two policy objectives. These market conditions consist of:

- legal and administrative framework conditions,
- River Information Services (a major ICT platform for IWT and operational tool),
- labour markets, capital markets, equipment suppliers and shipyards,
- market information to support decision making,
- knowledge and know-how among users and stakeholders, and
- research and development on innovations for the future transport market.

These conditions are very important. Not resolving them would seriously limit the effectiveness of the two main policy objectives. Therefore, improving the market conditions supports and amplifies the two policy objectives that focus on the key performance indicators of the sector (modal share and external costs). The third policy objective therefore is:

3. Improve market conditions for operators and users of IWT

During the study problems were identified that belong to the market conditions. The limiting factors that were identified need to be addressed in order to ensure a smooth further development of IWT in Europe. For example a shortage of human resources would result in higher salaries resulting in higher transport prices and subsequently less market share. A shortage of qualified personnel could also result in longer working times which may cause safety risks. In the definition of 'market conditions' most of the required innovation efforts are also included. In general it can be concluded that research and development is needed in the following fields:

- *Technical innovations* in transhipment systems, cargo conditioning and load units, navigation aids, hull design, traffic management, infrastructure development and maintenance.
- *Organisational and management innovations* in cooperation models and cooperative transport planning, supply chain management, marketing, ship finance and exploitation models.

The next section explains the main determining factors behind modal share and external costs and also the interdependencies of the three specific policy objectives.

Policy package 1: Measures to raise modal share of inland waterway transport

The first policy package is geared directly towards the generation of a higher modal share for inland waterway transport in Europe. Over the past decades, IWT has been losing market share on all corridors. The analysis revealed a number of different reasons for this structural development: among others, in industrial restructuring, intermodal IWT does not offer competitive door-to-door transport costs, IWT is not sufficiently known among potential customers, the limited geographic coverage of the waterway network and infrastructure bottlenecks, IWT is not integrated enough in multimodal supply chains. The trend in the declining modal share shall be turned in the period to come.

Main determinants of modal share

The modal share of a transport mode is basically determined through simple market mechanisms, that is, a mix of cost/price and quality indicators, such as transport speed, on-time reliability, frequency of services and ease of use. Whereas some transport markets put a higher value on the transport price (for example construction materials), others have a relatively higher value of time (e.g. consumer products). Inland waterway transport is active on these different markets and therefore should be competitive in a variety of market circumstances.

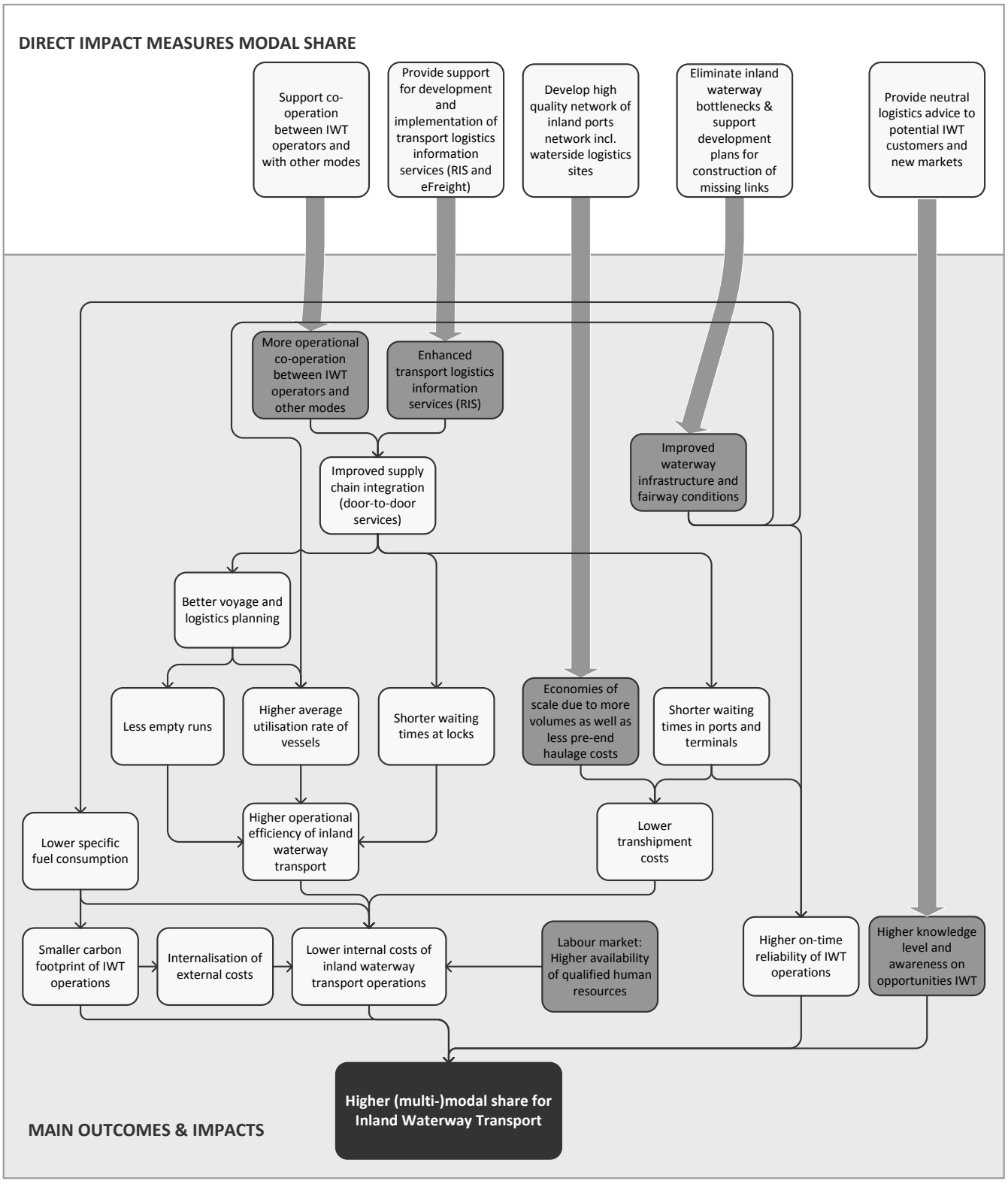
The main cost drivers in inland waterway transport consist of standby costs — personnel, depreciation/interest payments, insurance, and repair & maintenance costs and operational costs - mainly fuel costs. Most of these costs cannot be influenced by policy actions as they are largely determined by the market. Average fuel consumption per vessel type basically depends on three factors:

utilisation rates of vessels (due to loading restrictions), the parity of traffic (empty voyages) and the prevailing fairway depths (shallow water resistance). Moreover, in intermodal chains the costs of transhipment and pre- end haulage are very decisive for the competitiveness of intermodal IWT solutions. Finally, the utilisation of vessels (payload versus loading capacity and the share of empty sailing) influences the transport price per tonne.

The main non-market factors determining the cost and quality level of IWT operations, and which could be influenced via direct or indirect policy actions, are:

- **Waterway infrastructure quality**: The specific situation for inland waterway transport is that both cost and quality factors are strongly determined by the state of the infrastructure and fairway conditions. Fairway conditions and bottlenecks directly determine cost levels per unit (vessel utilisation, load factors), as well as level of service (transport speed, on-time reliability). Maintenance, such as dredging, is very important because the available depth determines the possible load rate as well as the reliability of transport and stability of freight prices.
- **Develop network quality of inland terminals and waterside logistics sites**: The competitiveness of multimodal supply chains often depends on the efficiency of port operations, as the costs for transhipment, pre- end haulage typically add up to more than 50% of the door-to-door transport costs. If the shipper or customer is located directly near the river or canal, pre- end haulage can be avoided, resulting in much lower door-to-door costs.
- **Level of supply chain integration and co-operation**: Apart from technical integration (e.g. harmonised transport or loading equipment); the application of intelligent information systems is a precondition for seamless multimodal logistics chains. More operational cooperation and seamless modal interfaces lead to higher operational efficiency (high utilisation and less empty trips), higher reliability of transport and consequently to more attractive transport and logistics services.
- **Level of awareness among potential customers**: Inland navigation is currently not sufficiently visible for third party logistics service providers and potential customers. IWT generally lacks the human resources and know-how to develop one-stop-shop multimodal logistic solutions. This is particularly the case for more complex and demanding door-to-door transport needs of those customers that are used to the flexibility and simplicity of road haulage. Although there are in fact larger organisations active in the market (e.g. large brokers, shipping lines in liquid cargo and container transport) these larger organisations mainly focus on serving the traditional markets. Only a few pioneers are investing in time-consuming modal shift projects.

Figure 7 Causal chains to directly intervene on modal share of IWT



Most effective policy measures to raise (multi-)modal share of IWT

Current EU policies (NAIADES) have mainly concentrated on raising the awareness and image of IWT. Although these are important determinants of the IWT modal share, they are not the only ones. In order to have a more significant and direct impact on the market, IWT policy should also influence operational factors such as transport price and quality of service. The paradox of such policy is however that those policy measures that would be most effective would entail directly influencing market forces, which often interferes with the basic principles of the internal market. While respecting the principles of the EU Treaty, effective policy measures to promote inland waterway transport need to move closer to the market.

For transport policies to have an impact on the market performance, the illustrated causal chain scheme offers different possible points of policy intervention. A policy package addressing the modal share of IWT should therefore consist of a mix of interconnected and complementary policy elements. Policies aiming at raising the modal share would primarily focus on reducing operational costs and raising quality aspects of IWT (i.e. reliability), thereby influencing modal choice behaviour. Considering the most important direct determinants of the modal share of inland waterway transport, the following policy actions are expected to have an effective and direct impact on modal share:

- **Eliminate inland waterway bottlenecks and support development plans and construction of missing links in European waterway network (e.g. Seine – Schelde, Rhine-Rhone, Sava River, Straubing-Vilshofen, other critical sections on the Danube, Elbe)**
- **Develop high quality network of inland ports including waterside logistics sites: funding for ports and transhipment sites**
- **Provide support for development and implementation transport logistics information services (RIS and its integration into eFreight; moving towards paperless transport and integration with eMaritime Single Window concept)**
- **Provide neutral logistics advice to potential IWT customers to raise knowledge level and awareness on opportunities of IWT**
- **Support cooperation between IWT operators and cooperation of IWT operators with operators using other modes**

Expected outcomes of modal share policy actions in IWT

- Better fairway conditions and a higher quality core waterway network leading **to scale advantages (larger vessels), improved vessel utilisation and lower specific fuel consumption** and consequently to **lower transport costs** per unit. A better state of the waterway infrastructure also leads to less delays and waiting times at locks and during operation as well as improved fairway depth throughout the year (less disruptions of navigation and loss of payload due to low water). On-time reliability of IWT operations will be improved. Both the reduction of transport costs and the **increase of reliability** make IWT more attractive within the transport market.
- A higher quality of the network of inland terminals and quays raising the level of service and intermediate transhipment opportunities. More efficient transhipment operations close to the client would **reduce the share of transhipment and operational costs in door-to-door chains** and would consequently allow for IWT to become more competitive also over shorter distances. In cases where pre- end haulage can be avoided, IWT can already be competitive on shorter distances (from 20 to 40 kilometres onwards). **Innovative spatial planning efforts** resulting in industries and logistic sites directly located along waterways could therefore be very successful to boost the modal share of IWT. In particular for new industries that have plants and distribution points to be located in the next years (e.g. production of bio fuels) such an approach would be highly effective.
- Further development of River Information Services and eFreight leading to an unbroken multimodal information chain, which is a prerequisite for the exchange of cargo between modes. This innovation will lead to more visibility and a **higher level of supply chain integration**. By reducing the frictions and increasing the interoperability between modes, IWT can play a larger role in multimodal transport chains.
- A network of neutral logistics advisors helping to raise **awareness on specific opportunities of IWT** in **new market segments** (e.g. biomass, bio fuels, waste transport, continental containers) and **identify new cargo flows for IWT and concrete modal shift potential and support implementation**. Equipped with a specific set of knowledge tools, a network of neutral logistics advisors should execute concrete and corridor-based modal shift projects. A policy initiative to set up a **pro-active neutral interface** between supply and demand would help overcome the reluctance and lack of awareness of market parties. Moreover it provides an answer to the lack of human resources and know-how in the IWT sector needed for such modal shift projects and it would **raise visibility of the sector** as well**.** By means of best practices and dissemination, the general know-how on logistics within the IWT sector would be raised resulting in growing interest and activity in door-to-door projects.
- Active support for innovative co-operation models within the IWT sector and between other transport modes will help overcome the negative side effects of the atomised supply side of the market. More operational co-operation will result in **better voyage and logistics planning** and consequently in **less empty runs** and **higher utilisation rates of vessels and more efficient transhipment and pre-end haulage operations**. This in turn translates into lower operational door-to-door costs and more competitive transport services (as well as into lower external costs).

Table 5 Summary of Policy package 1: Raise (multi-)modal share of IWT

Current situation
The modal share of IWT has decreased in the last decade; road transport shows higher absolute figures in growth compared to IWT. The IWT sector is mainly active in traditional bulk sectors. Besides maritime container flows in Western Europe, IWT still has a very limited role in multimodal supply chains for consumer goods. Possible new markets for IWT are palletised goods, biomass, bio-fuels, LNG and continental 'full truck loads' in containers. Moreover the quality of the existing waterway and inland port network is limited, in particular on the Danube, and IWT can only play its role on certain corridors in Europe. The Rhine corridor is the most important and mature but this corridor can also be characterised by some missed opportunities and weaknesses of the sector such as a lack of co-operation between operators and with other modes, limited awareness among potential customers as well as among responsible (regional) authorities.

Summary of problems related to performance on modal share	
Markets & Awareness	Lack of consolidation and cooperation within the sector, lack of one-stop-shop approach for door-to-door logistics, limited overview of available services and opportunities to use IWT, lack of visibility of IWT for shippers, limited co-operation with other modes, limited reinvestment and innovation capacity.
Fleet	Lack of funding for innovations, long lifetime of vessels, small research and innovation in vessel technology and transhipment techniques, shortage of smaller vessels, decreasing environmental performance versus other modes making IWT unattractive for shippers.
Employment & Education	Lack of qualified human resources, resulting in higher labour costs, IWT knowledge in transport logistics education, lack of logistics education in IWT courses, lack of 'door-to-door' thinking and awareness among IWT operators and skills to provide 'one-stop-shop' solutions
Infrastructure	Limited transhipment facilities, missing links in the network, poor fairway conditions and lack of appropriate maintenance, large impacts due to calamities, NIMBY problems at local level regarding transhipment facilities and industries along waterways (inland ports).
River Information Services	No integration with logistics, very limited RIS deployment resulting in sub-optimal efficiency of transport (higher costs)

Policy objectives 2020	Raise (multi-)modal share of inland waterway transport: Increase modal share of IWT contributing to lower transport costs for society, ensuring accessibility of Europe, reduction of congestion and increase of competitiveness and welfare in Europe.

Proposed policy measures IWT 2020 with a direct impact on modal share	
Description of priority measures	• Eliminate inland waterway bottlenecks and support development plans and construction of missing links in European waterway network
	• Develop high quality of inland ports network including waterside logistics sites: funding for ports and transhipment sites.
	• Provide support for development and implementation transport logistics information services (RIS and its integration with other modes through eFreight; moving towards paperless transport for inland waterways consistent with the eMaritime Single Window concept)
	• Provide neutral logistics advice to potential IWT customers to raise knowledge level and awareness on opportunities of IWT.
	• Support co-operation between IWT operators and with other modes.
Provisional time planning	**2014- 2020**

Vision 2040	Inland waterway transport plays a major role in more geographic areas, alternative energy markets and multimodal supply chains, including continental cargo such as palletised goods over shorter distances. IWT is fully integrated in the transport system with fruitful cooperation, professional management and seamless links to other modes, fully integrated transport planning systems, an efficient network of transhipment locations and consolidated industrial/logistic centres directly located at strategic positions along nodes of waterways. Successful business models are in place providing sustainable financial performance and a strong innovative mindset focussed on providing competitive door-to-door solutions.

Outlook policy measures after 2020 with a direct impact on modal share	
Description of measures	• Implementation and realisation of new TEN-T projects (e.g. Rhine-Rhone connection).
	• Internalisation of external costs on an equal basis, pricing measures as a 'push factor' for improved modal share of IWT.
	• Expansion of port facilities and spatial planning policies aiming at creating clusters of industrial and logistic sites directly along waterways and well connected to other modes of transport

Policy Package 2: Measures aiming at reducing environmental, climate change and safety impacts

Without policy intervention in the year 2020 the average emission level of air pollutants of inland navigation ships will in many cases be higher than that of trucks. Without significant improvement, the gap will become even bigger in the period 2020-2040. A policy package providing push and pull measures to reduce the air pollutant emissions up to 2020 is needed to anticipate on the projected autonomous development. Reducing the external effects will guarantee public support for promoting and investing in IWT due to the social benefits and also to avoid a possible loss of market share in case of internalisation of external costs after 2020.

Main determinants

The main factors determining the declining environmental and safety situation in the IWT sector are:

- **Innovative power of IWT sector**: the state of the fleet and the level of innovation determine key factors such as specific fuel consumption, safety levels and emissions of air pollutants. The slow innovation rate is in turn largely caused by:
  - **Number of new engines in this market (approx. 200 per year).** The small size of the market as well as the fragmented structure of ship-owners hinders research due to lack of scale as risks increase and if research is done, the consequence is that the costs of innovations will be high.
  - **Economic and legislative incentives to modernise**: Whereas the size of the motorised fleet is approximately 8,500 vessels, according to the IVR database, only about 14% of these vessels (with engines younger than 2003) is compliant with stricter emission requirements (CCR phase 1 and 2 regulation). The large majority of vessels have older engines without regulations on the emission levels. Apart from legislative incentives, economic incentives to innovate are often also lacking. For instance, end-of-pipe treatment technologies which significantly reduce pollutant emissions are, even if subsidies are available, often not implemented as they add operational costs instead of adding value to the individual entrepreneur. Additional incentives are needed and will make it easier for the engine, equipment and shipbuilding industry to develop innovative solutions to reduce air pollutant and GHG emissions.
  - **Awareness of available innovations in the sector**: High fragmentation among vessel-owners within the IWT sector currently forms a barrier towards market entry of new technologies, including those which would help reduce fuel consumption and emission levels. Innovations are not disseminated and transferred as fast as would be possible.
  - **Access to capital and re-investment capacity**: another side effect of the SME character of the IWT sector is the low reinvestment capacity. Many companies are currently not in a position to provide convincing business cases for innovative investments to banks or financiers due to the scale of their operations and the generally low profit margins as a

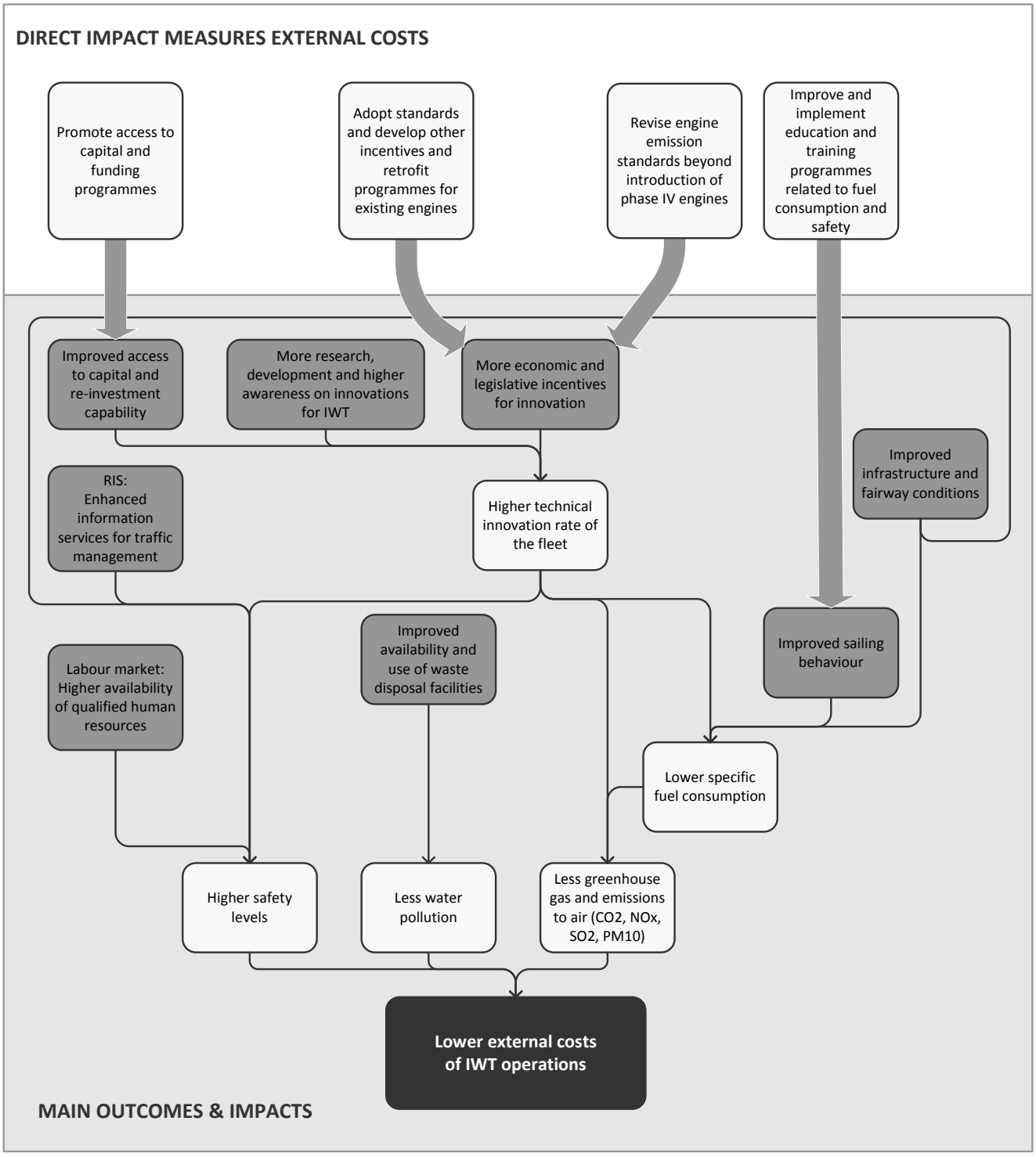
result of overcapacity and fierce competition between IWT operators and/or vessel-owners.

- **Continuous and dedicated research and development for IWT**: Continuous research and investment processes are important in order to provide the market with efficient, clean and safe technical solutions, practices and approaches. This is also needed to retain a competitive advantage in terms of GHG emissions and safety levels. Dedicated research and development is limited as a result of the relatively small home market for IWT applications.

- **Qualified human resources**: the optimal cruising speed of an inland vessel depends on a number of factors, such as engine capacity, stream velocity, to name a few. The marginal costs and additional fuel consumption of 1km/h speed increase are often disproportionately high. Demonstrations and experiences in the Netherlands have shown that significant reductions of fuel consumption and emission levels could be achieved by a combination of training, awareness measures and a technical decision support system. The human factor and the level of qualification is also a decisive factor in terms of safety.

- **Infrastructure conditions and availability of traffic management systems**: the state of waterway infrastructure has safety aspects as well impacting on transport efficiency (possible payload) and fuel consumption. Low water periods, possibly aggravated by lack of maintenance and the subsequent narrowing of the fairway can lead to more dangerous navigation situations and result in loss of transport efficiency due to loss of payload. The availability of supporting RIS services for traffic management can significantly raise safety levels.

Figure 8 Causal chains to directly intervene on external costs of IWT



Most effective policy measures to reduce external costs

For the transport sector in general, a higher modal share of IWT through providing a competitive alternative for road haulage would result in a reduction of external costs. However, also within the IWT sector the external costs need to be reduced, in particular the emissions to air of CO_2 and NO_x. Such policies aimed at reducing external costs could either be aimed at direct mitigation (directly reducing fuel consumption per tonne kilometre through technological or behavioural changes) or at the emission factors (reducing the emissions by using clean fuels or emission abatement technologies).

As a result of the long lifetime of vessels and engines and aggravated by the overcapacity, the amount of new engines to be installed will be quite limited and relatively small compared to the total number of engines in the European fleet. For a significant drop of the average air pollutant emission level of inland barge engines, not only measures to reduce the emissions of new engines are needed, but **also measures aimed at the reduction of the pollutant emissions from existing ships and engines.** Several measures could be implemented to lower the emission level of the existing fleet. The subsidy regimes applied in different countries over the last years, for example in the Netherlands and Germany, have shown limited effect, as the financial incentive for ship-owners was not sufficient to balance the additional investment and operational costs. Therefore, additional incentives would be needed to reduce the emissions of the existing fleet. Options for additional incentives to be considered could be the following:

- Mandatory standardisation,
- Environmental zoning,
- Emission taxation (cf. Norwegian NO_x tax and NO_x fund)
- Differentiation of port dues, clean vessels pay less, dirty vessels pay more,
- Voluntary standardisation and shipper incentives (e.g. current Green Award).

A mandatory standard will be most effective, although the overall costs of adapting the existing fleet may be very high if a stringent standard were to be imposed with short deadlines. A subsidy system is legally simple, but as a single instrument not effective and subsidies do not perform well in terms of cost effectiveness as a result of 'free rider behaviour'. Economic incentives, such as differentiation of port dues and taxing emissions are cost effective measures, as the market will find the most efficient solution to the incentive. However, the overall effectiveness depends upon the level of differentiation/taxation and the scale with which differentiation/taxation is applied. The deployment of a voluntary instrument (e.g. Green Award) is unlikely to result in significant further emission reductions. However, such an instrument is cost effective and does not face any legal constraints.

There is also a risk that there will be a scattered development of different environmental schemes (for example environmental access zones in ports, different type of port dues calculation). This is due to the fact that decision-making on that legislation is at the regional level. In order to ensure interoperability and uniformity, coordination and guidance by the European Commission would be valuable to prevent a broad range of different schemes causing problems for operators to navigate across Europe.

To achieve a level of pollutant emissions comparable to that of road transport for new engines, a strengthening of emission limit values beyond phase-IV is needed. To foster technology development and cost reduction, a stimulus could be provided for the manufacturing industry through R&D and networking projects to speed up the development of clean and efficient techniques to reduce IWT emissions. They could be partially financed by governmental subsidies.

Greenhouse gas reduction in inland shipping can be guaranteed if a kind of standardisation or economic instrument (fuel tax) is implemented. The IMO has proposed ship efficiency indicators for seagoing ships in a complex international environment. Although this principle could also be used in inland shipping, less complex solutions may be more straightforward.

Because of the relatively small size, and the fragmented structure of fleet owners, active support from public bodies is desirable to provide coordination and to bring actors together in order to consolidate and create scale advantages and critical mass. The European Commission can offer support in this area by supporting networking and R&D projects. Knowledge of innovations in the field of inland navigation need to be disseminated and applied broadly with the support of innovation transfer clusters, enabling the fleet to be more competitive and sustainable. Also an intensive dialogue is needed between engine manufacturers, shipyards, equipment suppliers and fleet operators.

Even though mobile bilge water services have a successful history of more than 40 years in the Rhine region, implementation in the Upper Danube region faces obstacles. Certain differences — notably lower traffic frequencies, different administrative framework conditions — restrict the transferability to the Danube region. In the long run however, targeted development activities should also lead to the implementation of a harmonised system for the collection and treatment of oily and greasy ship waste. The establishment and maintenance of the necessary network of reception facilities is expensive. Therefore, a financing model will be necessary that should incorporate the ‘polluter pays’ principle, thus encouraging waste prevention, as well as the principle of indirect payment, thus discouraging an evasion of the deposit of waste on the Danube.

Fairway conditions are also a main determining factor of safety levels, for example narrower fairways will lead to higher risks, and fuel consumption (shallow water resistance), and consequently have an impact on the external costs of IWT operations. Measures in the field of fairway conditions have already been included in the first policy package (modal share) and will therefore not be duplicated.

Considering the most important determinants of the external costs of inland waterway transport operations, the following measures are expected to have an effective and direct impact on external costs:

- **Investigate and invest in the appropriate incentives and retrofit programmes to reduce pollutant emissions of existing engines.**
- **Revise engine emission standards beyond introduction of phase IV engines.**
- **Promote access to capital and funding programmes, and**
- **Improve and implement education and training programmes related to fuel-saving sailing behaviour and safety.**

Expected outcomes of external cost policies in IWT

- Innovative schemes providing economic incentives, serious investment support and retrofit investment programmes help to **overcome market barriers towards a greener fleet**. Bundling of expertise, knowledge and market parties resulting in a large scale innovation and investment programme helps to reduce required investment budgets. Given the long economic lifetime of typical main propulsion engines, more than half of the engines can gradually be replaced or technically adapted in the next decade if such a measure would be combined with other incentives.
- More stringent emission standards, also for existing engines shall be a trigger for the IWT sector to make a big step forwards towards a cleaner fleet. The long economic lifetime of vessels and their equipment currently however prevents a higher innovation rate. Policy measures that **create a more favourable investment climate** on the one hand and that set higher emission standards on the other will eventually lead to **shorter innovation cycles in the sector** and consequently to **lower emission levels**.
- **Improved maturity of phase-IV solutions** and reduction of the costs. Analysis has shown that achieving a phase-IV level for the whole fleet, the total investment costs (public and private) amounting roughly to €1 billion at current prices, and taking current cost estimates for SCR and DPF into account (CE Delft, 2011). An innovation atelier shall be constituted for the manufacturing industry that stimulates the development of clean and efficient techniques to reduce IWT emissions, accompanied by structural roll-out planning and subsidies covering parts of the investment costs. This would help to **raise the re-investment capacity** as well as facilitate a **faster implementation of innovations**.
- Further support for the harmonised development and implementation of River Information Services (especially traffic management systems) will significantly contribute to **more efficient transport and less fuel consumption** (optimal speed due to traffic management on corridors) **as well as higher safety levels in inland waterway transport operations**. Sophisticated and innovative RIS services, which offer up-to-date tactical traffic images and topical depth information will raise the safety of navigation (less vessel-vessel collisions, less groundings) and therefore have

an important preventative impact. In terms of calamity abatement and rescue management, traffic-related RIS services have an important function as individual ship movements can be traced almost unlimitedly (reconstruction of incidents and accidents; learning cases) and crucial cargo data can be exchanged more quickly between rescue forces in emergencies. This will have **significant positive effects on the number of casualties and water pollution levels**.

- The performance on GHG emissions not only depends on technological solutions, but also strongly on the human factor. As the safety and environmental performance of IWT depends to a large extent on sailing behaviour (and consequently on the availability of qualified personnel), measures to promote education standards and proper training will have a **positive effect on accident frequency, fuel consumption and GHG emissions**. Experiences from the Netherlands have for instance shown that proper training and use of innovative decision support systems have already led to a reduction of fuel consumption by 7% (€27 million fuel costs savings) since the start of the 'Smart Steaming' programme in 2007. A combination of training and technology support will therefore be effective in terms of carbon reduction targets.

Table 6 Summary of policy package to reduce environmental, climate change and safety impacts

Current situation
Inland Waterway Transport has lower external costs compared to road haulage as IWT has little or no costs for congestion, noise and accidents. As a result IWT is promoted in transport policies for instance through programmes aiming at modal shift, such as Marco Polo. The outlook for 2020 however, shows a growing gap in the air pollution performance between the average engine in road haulage and IWT if no action is undertaken. The performance on air pollutant emissions (PM, NO_x) of road vehicles is quickly improving due to the relatively short lifecycle of trucks and more strict emission standards and many more incentives (for example road pricing, environmental zones in urban areas) compared to the incentives in IWT. The current overcapacity on the IWT supply side is also slowing down innovation in this field, as there is a reduced need for new vessels in the short term. Moreover the market is small and the demand for new engines and technologies is fragmented. Other external cost factors show that there is a relatively high safety risk for IWT workers as well as water pollution (waste).

Summary of problems addressed	
Markets & Awareness	Small scale and highly fragmented supply side of the market results in poor buying power and low interest for manufacturers to invest in the development of clean techniques for inland vessels. The financial crisis has caused a decline in the financial strength of the sector and a reduced ability to invest in environmentally friendly solutions.
Fleet	The long lifetime of vessels and engines results in the slow implementation of innovations. There are limited push and pull factors for ship-owners and/or IWT operators in order to provide a sense of urgency to improve the environmental performance of existing vessels.
Employment & Education	Limited awareness among IWT workers regarding fuel consumption in relation to sailing behaviour. There is a poor safety culture for workers.
Infrastructure	Poor fairway conditions cause suboptimal load factors and therefore more fuel consumption and emissions per tonne and sometimes complicate the safety of navigation and reduce reliability. A limited inland ports network and sub-optimal spatial planning of logistic and industrial sites causes the need for

	pre- and end haulage by truck, causing higher external costs.
River Information Services	RIS is not fully implemented yet, while the full use of RIS would result in optimised route planning, resulting in less fuel consumption and fewer emissions. Transport logistics applications are however still in their infancy.

Policy objective 2020	Further reduce the external costs of inland waterway operations with a focus on air pollutant emissions. Create a significant improvement of the emission to air and fuel consumption (CO_2 emission) of inland waterway transport through push and pull measures. This results in a break of the trend of the increasing gap between the air pollution performance of road and inland waterways. Moreover, safety for workers is improved due to improved safety culture and awareness measures.

Proposed policy measures IWT 2020 with a direct impact on reduction of external effects	
Description of priority measures	• Investigate and invest in replacement and retrofit programmes to reduce pollutant emissions of existing engines.
	• Promote access to capital and funding programmes/create a business and investment friendly climate.
	• Revise engine emission standards beyond the introduction of phase IV engines.
	• Improve and implement education and training programmes related to fuel-saving sailing behaviour and safety.
Provisional time planning	**2014- 2020**
Vision 2040	Inland waterway transport makes use of the state-of-the-art techniques and is beyond doubt the most environmentally friendly mode of land transport. There are clear incentives and regulations in place to trigger continually shorter innovation cycles, such as direct financial incentives through internalised external costs. Co-ordinated research and technology development is continuing to further reduce external costs and develop new and updated techniques.

Outlook policy measures after 2020	
Description of measures	• Internalisation of external costs for all modes under equal conditions.
	• Strengthen policy instruments to reduce specific fuel consumption (e.g. fuel tax or design standard) and to promote the use of alternative fuels.

Policy Package 3: Measures aiming at improving market conditions for operators and users of IWT

In Policy Packages 1 and 2 only the measures that have a direct impact on the modal share or external costs have been included. There are however, also measures with an indirect impact on modal share and/or external effects which need to be implemented. Not resolving the problems which these measures address would seriously limit the effectiveness of the other two previous policy packages. Taking action would support and amplify the ultimate policy goals to increase the modal share of IWT and to reduce the external cost.

The following measures are proposed under Policy Package 3:

Sub-groups Policy Package 3

- **MARKET:**
  a) Improve general knowledge and information on IWT and the opportunities.
  b) Support the financial strength of the sector by preventing disruptions in the market due to overcapacity.

- **FLEET:**
  a) Support research, innovation & technology transfer as well as roll out planning.
  b) Support the development and use of waste collection systems.

- **EMPLOYMENT & EDUCATION:**
  a) Support solutions for lack of qualified staff.
  b) Improve and implement education and training programmes related to safety and logistics.

- **INFRASTRUCTURE:**
  a) Develop density and quality of inland ports network including waterside logistics sites.
  b) Provide support for improved waterway management and maintenance.
  c) Prepare for possible impacts of climate change.
  d) Prepare for discussion on internalisation of external costs.

- **RIS: Support and promote harmonised implementation of RIS**

The following figures show the relation of these measures through the causal chain with the objective to raise modal share as well as the objective to reduce the external costs of IWT.

Figure 9 Causal chains to intervene on modal share of IWT via market conditions

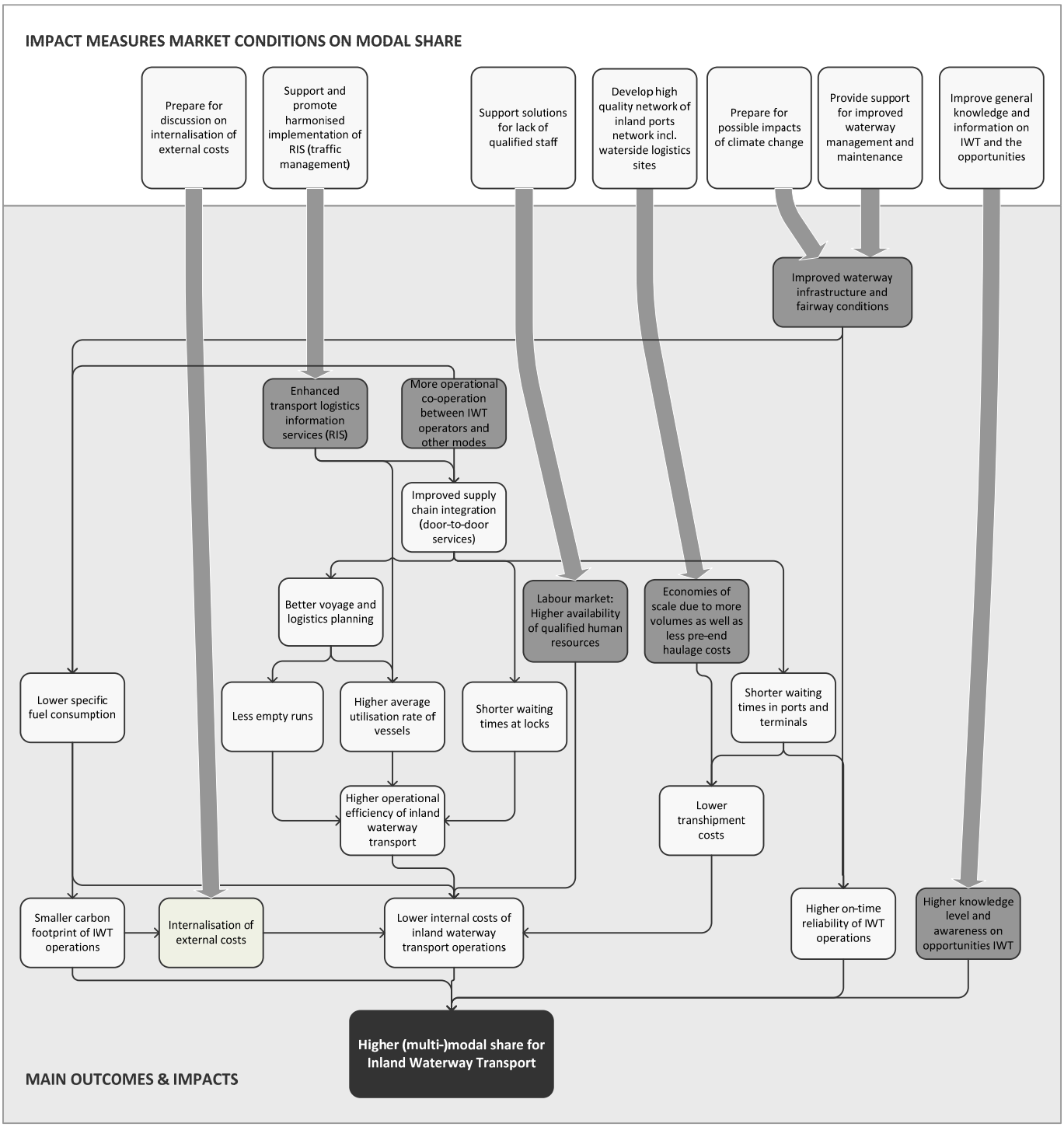
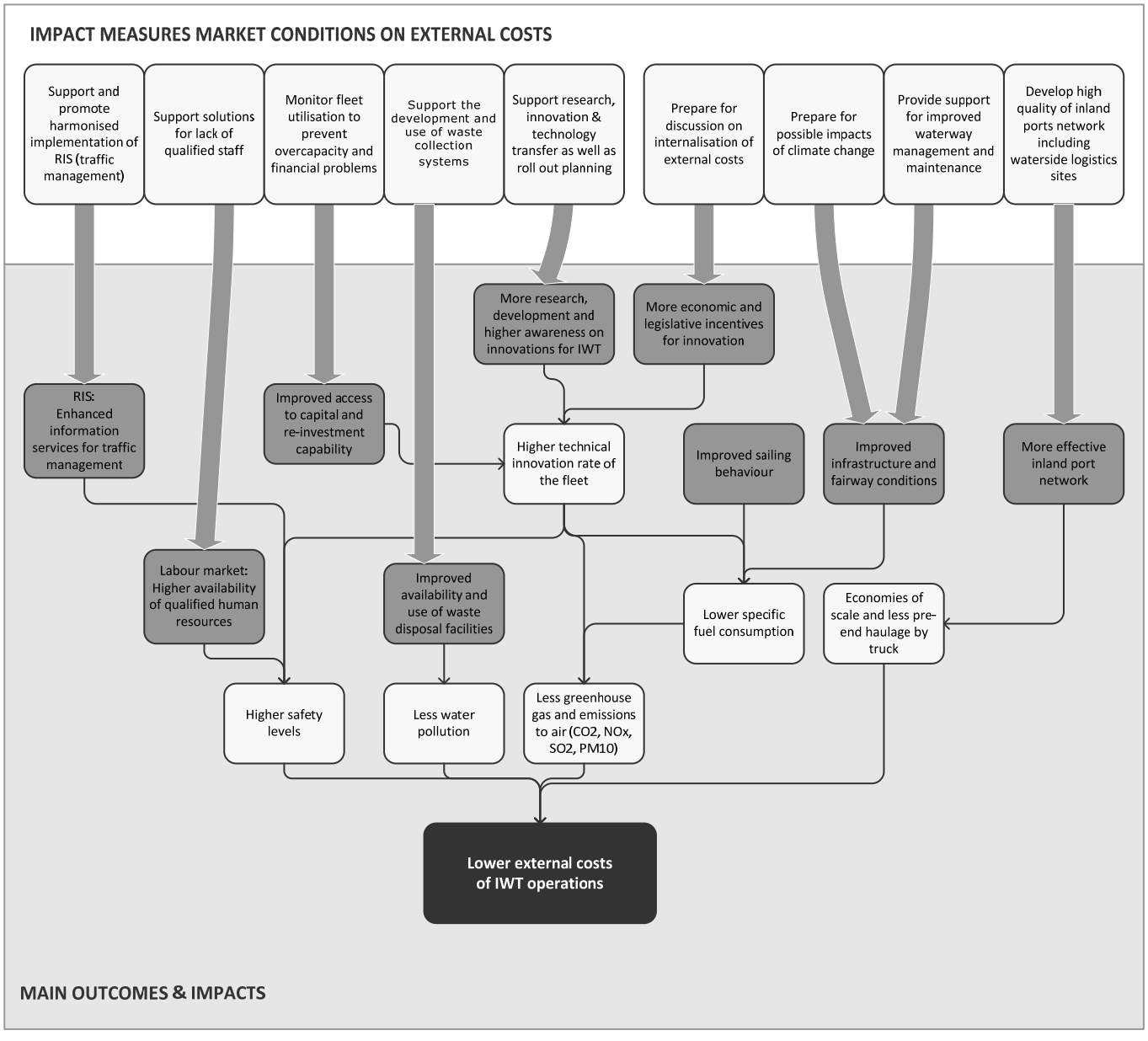


Figure 10 Causal chains to directly intervene on external costs of IWT via market conditions



Implementation and monitoring

The main financial resources for the period 2014-2020 should come from the European Horizon 2020 programme as well as the Connecting Europe Facility. For the further elaboration (e.g. Impact Assessments) and the implementation of policy measures it is recommended to obtain active cooperation and support from the main stakeholders. These stakeholders are the River Commissions, Member States as well as the representative organisations from the inland navigation sector and representatives from the demand side (shippers, large logistic service providers). Financial and human resources should be consolidated (if possible) in order to strengthen the implementation capacity and to have a maximum efficiency and effectiveness on IWT policy. In order to raise the modal share of IWT an active dialogue is recommended with the key users of European inland waterway transport services as they regularly experience what measures would be most urgently required to develop the sector and to provide/shift more cargo to inland waterway transport.

Finally, in order to know whether the policy measures reach their goals, the European Commission needs to monitor the progress made on the score of key indicators. The installation of a policy measurement dashboard that presents the information on the developments of key indicators and as well actual forecasts based on trends and expectations on a regular basis is recommended.