8

Inland Waterway, Short-Sea, and Coastal Shipping

Transport by inland waterway, short-sea, and coastal shipping is taking on an increasingly important role in the development of Euro-wide intermodal freighting operations. Many individual European Union (EU) Member State governments and the European Commission (EC) itself see these modes as offering great potential for transferring freight traffic away from Europe's grossly overcrowded road networks, especially as the waterways are currently so significantly under utilized and because they offer a truly environmentally beneficial alternative to the bane of congested roads and polluting heavy lorries. According to information about inland waterways on the EU's Europa web site (www.europa.eu.int):

> Compared to other modes which are often confronted with congestion and capacity problems, inland waterway transport is characterized by its reliability and has a major unexploited capacity. Inland waterway transport has major assets. It is particularly effective and energy-efficient; its energy consumption per tonne-kilometre of transported goods corresponds to one-sixth of the consumption [of road transport] and to half of that of rail transport. Its noise and gaseous emissions are modest. According to recent studies, the total external costs of inland navigation (in terms of accidents, congestion, noise emissions, air pollution and other environmental impacts) are seven times lower in than those of road transport. Inland waterway transport ensures a high degree of safety, in particular when it comes to the transport of dangerous goods. Finally it contributes to the decongestion of the overloaded road network in densely populated regions.

The important role of waterways is clearly demonstrated on a world scale, by such famous man-made constructions as the 80 kilometres Panama Canal linking the Atlantic and Pacific oceans, the 173 kilometres Suez Canal joining the Mediterranean Sea and the Red Sea, and the St Lawrence Seaway in Canada which combines both river and man-made canal sections through the Great Lakes linking the Canadian City of Quebec, at the mouth of the St Lawrence estuary, with Duluth, Minnesota in the USA, some 3760-kilometre inland from the Atlantic Ocean. Others, are grand on a European scale, such as the 250-kilometre-long Canal du Midi through France which links the Atlantic Ocean and the Mediterranean; and the 100-kilometre-long Kiel Canal, opened in 1895 and said to be the world's busiest artificial waterway, which effectively divides Denmark from Germany, linking the North Sea with the Baltic, and saves shipping a detour of some 250 nautical miles around the northern tip of Denmark. And in the context of inland waterway freighting, good examples are the Rhine–Rhone canal connecting with the Mediterranean Sea and the Rhine–Main–Danube link between the North Sea and the Black Sea providing, by a combination of river and man-made canal, a 3500-kilometre-long trans-Europe freight link (Figure 8.1) shows

the routes of Europe's principal freight waterways. There are of course many other examples, but these few illustrate how significant waterways have become in the freighting scenario.

Waterway shipping can be divided into four main categories as follows:

1. Deep-Sea Shipping which relates mainly to international inter-continental shipping.
2. Short-Sea Shipping which relates to transport between the United Kingdom (UK) and continental Europe.
3. Coastal Shipping which is coast-to-coast national shipping.
4. Inland Shipping which uses the inland waterways for transport.

8.1 Waterway statistics

It is unfortunate that inland shipping on the British Waterways (BW) network was in steady decline between the years of 1987 and 1997. In fact, according to the *Transport Statistics Bulletin – Waterborne Freight in the UK 2003*, published by the National Statistics office of the Department for Transport in November 2004, domestic freight traffic on the inland waterways declined by 20 per cent over the decade in terms of both goods lifted and goods moved (the latter taking account of the distance travelled in kilometres). Freight volumes on coastwise traffic have also declined. The statistics show that of all modes of transport in the UK, waterborne transport carried 6 per cent of all goods lifted and 24 per cent of goods moved in 2003. The inland waterways moved a mere 1 per cent of all freight carried in the UK, but this was 3.5 million tonnes and sufficient to remove some 200 000 lorry journeys from the roads. Conversely, from an EU perspective, freight carrying by short-sea shipping during the decade of the 1990s grew by 29.6 per cent and, according to the EC, 40 per cent of all trade within the EU is now carried by sea, a total surpassed only by road transport. In 2003, 125 billion tonne-kilometres of freight were transported by inland waterways in Europe. In the European Northwest region, in the hinterland of the EU's largest seaports (e.g. such as Rotterdam and Hamburg), it is estimated that the modal share of inland waterway transport (IWT) can reach up to 43 per cent.

8.2 Inland waterways

The EC, in a leaflet published by its Energy and Transport Directorate General (DG) in 2003, – *Inland Waterway Transport: a transport solution that works* (available on the Europa web site), says:

> the inland waterways carry some 12 per cent of the EU Member States' freight, and this is an industry that is constantly growing – in fact by some 17 per cent in the 1990s – and expected to grow even more since the enlargement of the EU by 10 additional Member States in 2004. There are more than 35 000 kilometres of waterways connecting hundreds of cities and industrial regions in the 18 out of the EU's 25 Member States that have inland waterways, 10 of which have an interconnected waterway network. The modal share of river transport accounts for 7 per cent of the total inland transport in the European Union.

Inland waterway freighting is claimed to be a reliable and congestion-free mode that is cheap to use, economical to operate, environmental friendly, socially acceptable, and modern; over the past 10 years, the fleet has been continuously modernized and these days offers high safety standards and up-to-date navigational equipment, and, importantly in the intermodal context, the waterways are significantly under utilized so there is capacity to spare for expansion from a switch of freight from road haulage. With many European firms now looking to boost their 'green' credentials, switching their freight to inland waterways offers them positive results in terms of improved public and customer perception of how they conduct their business activities. In fact, an EC study into the cash spent on the socio-economic costs of various

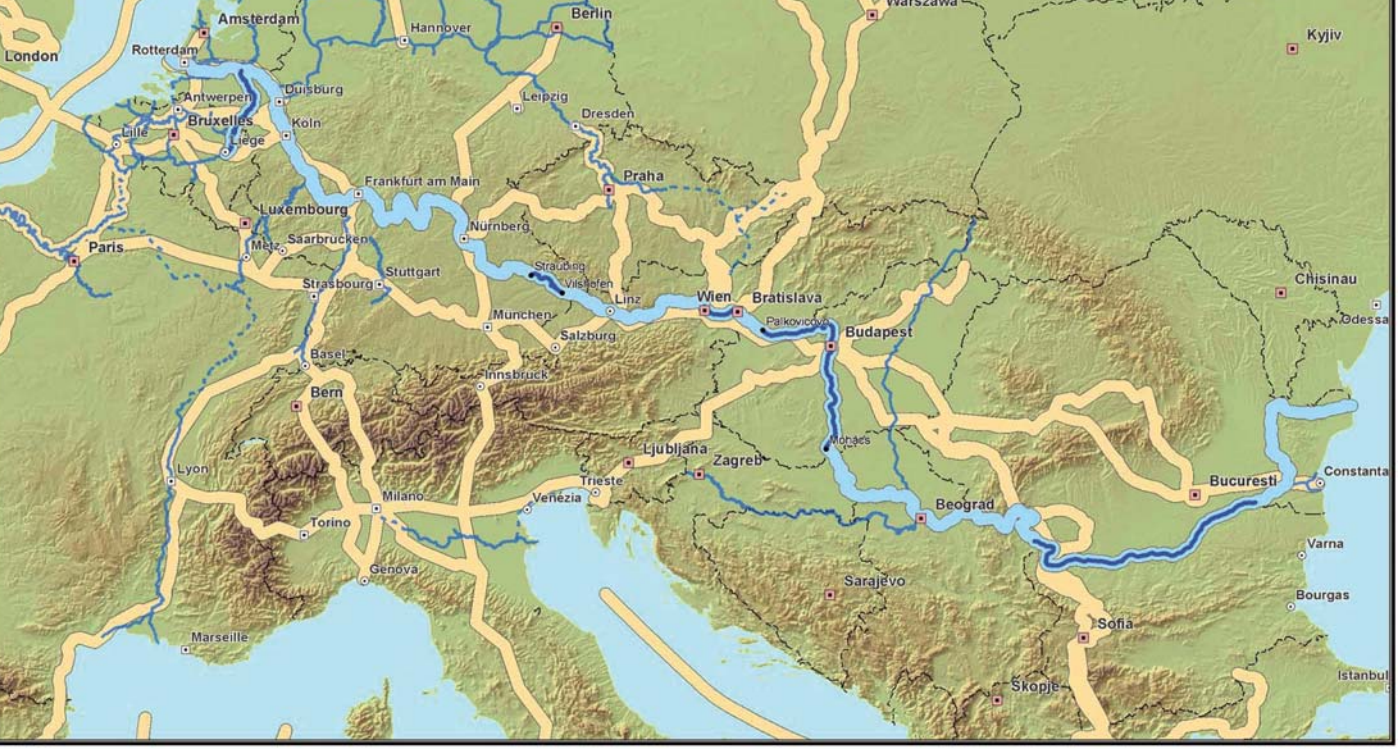

Fig. 8.1 Europe map showing the Rhine/Meuse-Main-Danube waterway axis (*Source*: EC Trans-European Transport Network from Europa website).

types of transport, (such as accidents, air pollution, climatic change, noise pollution, congestion, effects on the countryside and the urban environment) revealed that while road transport accounted for 91.5 per cent of the costs, air transport accounted for only 6 per cent and rail transport only 2 per cent, the result for inland navigation showed the tiniest of figures, namely, a mere half of 1 per cent. This together with its low fuel consumption clearly makes IWT one of the most sustainable forms of transport. Emissions in particular, in fact, are falling even further as newer vessels with more efficient engines are introduced into inland waterway fleets, resulting, again according to the EC, in emission levels on the inland waterways falling by as much as 25 per cent during the 1980s and 1990s.

Inland waterways comprise both navigable rivers and man-made canals. In both Britain and Europe many of the largest rivers have become traffic routes for goods-carrying vessels. In Great Britain, for example, the rivers Thames, Humber, Clyde, Avon, Trent, Mersey, and Ouse carry varying amounts of freight traffic on canal barges, while in Europe the inland waterways have long been major freight arteries right across the Continent, especially when one considers such rivers as the Rhine, Main, Danube, Elbe, Meuse, Seine, and Rhone and their connecting canal systems. For example, by using the Rhine-Main-Danube waterway link freight barges can travel from Rotterdam on the river Maas, down the Rhine, into the river Main and via the Main–Danube canal into the river Danube and thence to the Romanian Black Sea port of Sulina, a distance of some 3500 kilometres through 15 countries. This is a freight route of major importance and one that significantly encourages road–waterway and rail–waterway intermodalism on a very large scale and which clearly demonstrates the effectiveness of using such a system of combined transport modes. It is an unfortunate fact that, to date, freight volumes on the Danube waterway have reached only about 10 per cent of its potential capacity.

8.3 UK inland waterways

Canal building started in Britain with the 1¾-mile-long Exeter Canal built between 1564 and 1566. But it was not until the so-called ‘canal age’ between 1760 and 1850 that canal building really forged ahead on a large scale with industry and agriculture depending on them as the main source of transporting their raw materials and products. In fact, as Charles Hadfield points out in his well-known book, *The Canal Age*, they were more than just a means of transport; they developed towns and altered trade patterns and they were responsible for a new breed of labourer, the ‘navvy’, and for revolutionizing the engineering profession. By 1850, Britain’s canal network, in its heyday, extended to some 4023 miles. Today, the network comprises 3200 kilometres (about 2000 miles) of river-based commercial navigations and canals providing an arterial system that reaches deep into the heart of many towns and cities, most of the rest now being largely disused. The majority of these waterways are today owned and operated by a public corporation, BW, formerly the British Waterways Board (BWB), and are mostly given over to recreational activities such as leisure boating, fishing, towpath walking, jogging, and cycling, nature conservation and water supply; just 620 kilometres of the network are maintained as commercial waterways on which BW currently carries some 3.5 million tonnes of freight annually, about one per cent of all freight carried in the UK. Other waterways are mainly privately owned and operated by members of the Association of Inland Navigation Authorities (AINA), including, for example, the Broads Authority and the Environment Agency, the Manchester Ship Canal Company as well as many small canal companies. No single organization has responsibility for the UK waterways network as a whole, BW manages about half of it and the Environment Agency a further quarter of the total.

The Manchester Ship Canal (opened by Queen Victoria in 1894) is the UK’s principal inland waterway which brings deep-sea shipping 56 kilometres inland to Manchester at a current rate of 3000 ships annually carrying some 18 million tonnes of cargo. Other major canals catering for sea-going craft are the Crinan and Caledonian canals in Scotland; the former is just 14.4-kilometres-long and provides a short-cut for shipping from the West Coast of Scotland and the Western Isles (Crinan on the Sound of

Jura) to the Clyde estuary (Ardrishaig on Loch Fyne) saving the long and difficult sea route around the Mull of Kintyre. The Caledonian Canal which is partially a natural waterway (61.4 kilometres) and partially man-made construction (35.4 kilometres), stretches across the Scottish Highlands from Inverness on the Moray Firth to Fort William. It is said to be one of the world's most scenic waterways and it provides a short-cut link for both commercial and private vessels sailing from Northern European and Scandinavian ports to the West coast ports of England and to Ireland.

Besides these particular waterways, Britain also has a wealth of narrow inland canals used mostly used for leisure boating and other recreational activities. However, it is the network of broad canals that carries the majority freight traffic, most of it being bulk commodities not directly linked to road or rail carriage at one or other end of the transit, but some of it is of an intermodal nature which does involve transfer to and/or from either road vehicle or rail wagon at one end or other of the waterborne transit. The narrow canals (up to about 7-feet wide) have limitations so far as freight carrying is concerned, with a maximum gross weight capacity of only some 20/25 tonnes which, these days, is less than a single large lorry load, and a maximum speed of only 4–6 miles/hour so they are clearly not competitive with road haulage in anything except niche operations and for carrying, for example, aggregates and waste into and out of city and urban areas. But they are highly popular with leisure boaters, fishermen, and towpath walkers and joggers. The broad canals, on the other hand, are ideally suited for freight traffic being some 14 feet wide and capable of allowing passage for barges of gross weights of 40–80 tonnes.

Britain's principal commercial waterways include the River Thames ('Old Father Thames' in the famous song), the main waterway in Southern England albeit not under BW control. It rises in the Cotswold Hills and passing such historic towns as Henley on Thames and Windsor (i.e. the Royal Borough of Windsor) flows down through the City of London to the London Tideway carrying both inland waterway and an amount of short-sea shipping. On Britain's West coast, England's longest river, the Severn, provides shipping access to the industrial midlands via the 16-mile-long Sharpness Canal to Gloucester Docks and then up the river to Worcester, although the volume of freight traffic shipped by this route is limited in terms of ship capacity and volume; much of it is timber. The River Nene, which runs from the Northampton area, where it is linked to the Grand Union Canal, to the Wash on England's East Coast, carries a small volume of short-sea shipping as far upstream as the port at Sutton Bridge which can accommodate vessels of up to 5000 tonnes at its 750-metre-long quay. Much of this traffic is agricultural produce into and out of the adjacent Fenland area, but by way of example of short-sea shipping's usefulness and flexibility in a more general sphere, recently the port and river proved to be the most accessible point for receiving a number of very heavy gas turbine units for the nearby newly-built power station at Sutton Bridge. These units were transported the short distance from the port to their final destination by road.

Northwest England is where the canal revolution was born more than two and a half centuries ago and where today canals are still the focus of a great deal of waterway activity, albeit primarily by leisure boaters and fishermen among others. However, the Manchester Ship Canal (mentioned above) is a major freight waterway carrying vessels of up to 40 000 tonnes deadweight. The canal is 56-kilometre-long and has docks and berths along most of its length. It handles some 3000 ships annually and in 2002 almost 7 million tonnes of freight passed through the port. On the other side of the Pennines, the Yorkshire and North East region is home to some of Britain's most important freight waterways where the navigable rivers Humber, Trent, and Ouse link with the Aire and Calder Canal, and the Sheffield and South Yorkshire Navigation. The Humber, which provides access to the North Sea for the rivers Trent and Ouse, has deep-water docks at Immingham, Grimsby, and Hull where freight traffic is transferred to barge for onward shipment via the inland waterways. Of particular interest here is the use of the port of Immingham for berthing and discharging lighters from a Lighter Aboard SHip (LASH) mother ship on arrival from the Continent (as shown at various stages of the loading/unloading operation in Figures 8.2 and 8.3). The River Trent links with the Humber above Scunthorpe and is a busy river for freight traffic from such centres as Gainsborough, Newark, and Nottingham. The river carries coastal vessels and Rhine barges

Fig. 8.2 The LASH system in operation showing the barges inside the sunken hull of the mother ship prior to unloading (*Source*: Herfurth Shipping (UK) Ltd).

Fig. 8.3 LASH barges being towed from the mother ship (*Source*: Herfurth Shipping (UK) Ltd).

mainly from European Ports. Much of the barge traffic comprises aggregates from Trent Valley quarries being shipped to Hull and Leeds, for example. Maximum cargo weights vary between 300 tonnes to or from Nottingham and up to 1000 tonnes in the case of Gainsborough.

The Aire and Calder Navigation starts at Goole on the Humber and extends through major industrial conurbations to Leeds and Wakefield via Knottingley, Ferrybridge, and Castleford. Much of this traffic again comprises bulk cargoes such as oil and sand (and formerly coal) in barge loads of up to 700 tonnes weight as far as Leeds. The Sheffield and South Yorkshire Navigation joins the Aire and Calder Navigation west of Goole, which it links to Rotherham via Doncaster, Mexborough, and Swinton again through heavily industrialized conurbations. The River Ouse links the inland port of Goole to the Humber and is a busy waterway with barge traffic en route from the Humber up river to such destinations as Selby and York where, respectively, barges of up to 1000 tonnes and 400 tonnes capacity can be accommodated.

We have, in the UK, a valuable transport asset in our waterways system and one that could be used to relieve the mind-numbing, frustrating, costly, and time-wasting congestion that we the public, as road users, and more importantly, the lorries delivering our goods, suffer on a daily basis. It is gratifying to note that after years of decline, new life is being breathed into the system by the efforts of commercial organizations plying their trade and by Government with, at long last, its forward-looking policies for infrastructure regeneration and for encouraging modal switch from road to rail. Two of these policy initiatives are described briefly below.

8.3.1 'Waterways for Tomorrow'

In June 2000 the UK Department for Environment, Food, and Rural Affairs published a document, *Waterways for Tomorrow*, which follows on from the Government's 1998 'New Deal' White Paper in setting out proposals for the future of the inland waterways. Much of the document is concerned with the waterways' role in providing leisure, recreation, tourism, and sport facilities as well as stressing its heritage, environmental and educational benefits. Little is proposed in regard to freighting apart from describing how the system has been in decline for many years – accounting, in tonne-kilometre terms, for less than 1 per cent of domestic freight moved, other than on the larger river navigations and canals; and how the planning system (described within the document) can help the waterways fulfil their potential by facilitating the transfer of freight to water. The Government reiterates its commitment to this objective, where, it says, 'this is practical, economic, and environmentally desirable.' This document was followed in 2002 with a report, *Freight on Water: A New Perspective*, from the Freight Study Group set up by the Government to examine the scope for increasing freight traffic on the inland waterways of England and Wales (see below).

8.3.2 Short Sea and Waterways Forum: 'Sea and Water'

The Short Sea and Waterways Forum (SSWF), originally launched in July 2003 and funded by the Department for Transport to act as a central co-ordinating point for water freight interests in the UK, was re-named 'Sea and Water' in 2004. Its aims are to increase the number of freight loads carried by water in and around the UK by raising awareness of the advantages of water freight as a transport mode and by providing a direct line of communication between industry and Government. It also runs the Short-Sea Shipping Promotion Centre, which operates along similar lines to its European counterparts in promoting the benefits of water freight transport across the UK and within the EU. The Forum is chaired by Professor James McConville of London Metropolitan University and has both Inland Waterway and Short-Sea Shipping Committees.

Freight on Water, the 2002 Government report (mentioned above) which examined the scope for increasing waterborne freight in the UK recommended that the development of the water freight industry was hampered by a lack of cohesive representation and that a strong representative body for water be

created. 'Sea and Water' (S&W) was established, in part, to address that deficiency by bringing the industry together and by providing a common voice for all interested parties including carriers, customers and infrastructure providers. It aims to promote the movement of freight by water as part of an integrated transport policy, which includes inland, coastal and short-sea shipping interests. S&W's central objective is to facilitate the further integration of water freight into the wider logistics chain through a combination of co-ordination and promotion. In summary, it:

- acts as the focus for all short sea, coastal and waterways interests in the UK;
- provides support to the industry in their efforts to develop the movement of freight by water;
- provides a direct link between the water freight industry and government;
- works to eliminate the obstacles to using water to move freight;
- work to integrate water freight with other modes of transport;
- raises awareness of the potential of short sea, coastal, and inland waterways freight transport with prospective customers, politicians, planners, and the public;
- provides support for prospective customers and the industry generally;
- serves as a think tank for the development of a national short-sea, coastal, and inland water transport strategy and the preparation of a rolling programme for infrastructure improvement.

8.3.3 Traffic and Terminals

While it is acknowledged that the loading and unloading of waterway vessels for some cargoes is time-consuming and consequently expensive, the application of modern handling systems and the significant moves towards the containerization of suitable traffics are changing this. Similarly, it is also acknowledged that waterways do not have a widespread role in local distribution: How could they have? But, conversely, this transport mode has proven its credentials as being ideal for the carriage of bulk materials, non-urgent and non-perishable cargoes, unitised loads and, as we have seen in a relatively new departure elsewhere in this Chapter, for the carriage of abnormal indivisible loads (AILs). Actually, the list of suitable cargoes for inland waterway shipping is quite extensive if one identifies the individual bulk cargoes that constitute much of the waterway-carrying scenario; for example, grain and other agricultural produce and products, a variety of aggregates, bagged cement, and of course coal which has always been traditional waterway traffic, but obviously much less so with the demise of the UK coal mining industry. Petroleum and chemical products, hazardous goods cargoes, feature largely on the inland waterway menu as does, increasingly, the carriage of domestic and industrial waste to disposal depots. Steel and other metals are carried, as is timber, frequently referred to these days as forest products. Plus, there is the growing container traffic carried on the waterways, much more so in Europe than in the UK, but an increasing and welcome trend here.

8.3.4 Abnormal loads by waterway

An interesting development in inland waterway shipping is utilizing its potential for carrying very large (i.e. 'abnormal') loads (AILs) such as generators and transformers, thus removing them from the road network where they cause hold-ups to other traffic, create accident risks and the risk of damage to road surfaces, under-road services and to street furniture and roadside buildings. Specialist AIL carrier, Robert Wynn & Sons, has developed an innovative transportation system involving a Multi-Purpose Pontoon (MPP) vessel, the Inland Navigator, designed to carry loads up to 1200 tonnes and a converted inland waterway barge which can carry single piece loads of up to 300 tonnes in weight. The Inland Navigator was purchased and converted at a cost of £500 000, 99 per cent of which was met by a Department for Transport 'Freight Facilities' grant that was awarded to the company in 2002. The grant for the vessel underscores the Government's policy of maximizing the use of water for the movement of these disruptive 'abnormal loads'. In order to reach the National Grid Transco substation at Staythorpe, Nottinghamshire substation

from the Humber Estuary, where the first two loads of 280 tonnes each were destined in January 2004, such loads would normally have been transported approximately 70 miles along the region's road network, travelling at between 5 and 12 miles/hour and causing significant disruption to other road users over a three day period. In this instance, the use of IWT via the river Trent meant that all road movement was avoided and consequently there was no congestion or inconvenience to vehicle drivers.

In yet another example of the potential for carrying abnormal loads by inland waterway rather than by road, Wynns used another of their special vessels, the *Terra Marique*, in April 2004 to move a Concorde aircraft fuselage from Heathrow airport, near London, to a new museum home near Edinburgh. After a short road haul from Heathrow to the largely unused Thames river port of Isleworth, the aircraft was loaded on the 80-metre-long barge for its journey down the Thames and around the English East coast to its destination on the Firth of Forth.

8.4 Inland waterways in Europe

Europe's inland waterways are extensive as we have already seen and carry significant volumes of traffic over long distances and across, these days, 'invisible' national borders within the enlarged EU. The general trend is towards increased tonnages, but there are shortcomings. For instance, in 2003, which was a very hot summer in Europe, the water levels in the Rhine basin were exceptionally low resulting in a situation where many of the heaviest (i.e. deepest draft) vessels were inhibited in their operations or largely prevented from plying their trade at certain times; there were reports that barges carrying oil products, for example, were able to load to only 40–50 per cent of their maximum capacity. Germany's Federal Statistics Office, for example, reported that carrying on its waterways in the first 9 months of 2004 was up quite significantly by 5.5 per cent on the same period in 2003 which itself was down on the 2002 figure on account of the 'low water' problem. The trend towards increasing container, 'box', traffic on Europe's inland waterways was amply demonstrated by results for 2004 published in a communiqué from French authority Voies Navigables de France (VNF) which showed that box traffic on inland waterways in France increased by 37 per cent to 74 000 teu (20-foot equivalent units; that is, 20 foot ISO containers) during the first 9 months of 2004. It reported (in January 2005) particularly strong growth in the River Rhone basin and that traffic in the Rhone basin had increased by 53 per cent and that in the Rhine and Seine basins and the Nord-Pas de Calais region had exceeded 30 per cent. Overall, the communiqué stated that traffic on French waterways increased in 2004 by 5.9 per cent to 57.9 million tonnes and by 5.5 per cent when measured in tonne-kilometres. Figure 8.4 shows the class categories for European inland waterway vessels and their respective tonnage capacities as solo vessels and when operating in 'push' convoys. Figure 8.5 shows a freight barge loaded with containers on the River Elbe approaching the Port of Hamburg. Such is the growth of this type of traffic that it is expected that this river alone will carry some 200 000 teu containers in the year 2010.

8.4.1 The Prospects for Inland Navigation within the enlarged Europe (PINE) project

In 2003 the EC commissioned a study on the current and future situation in the inland waterway sector and on its future prospects in the enlarged EU (i.e. from May 2004). A consortium consisting of four experienced organizations; namely, Buck Consultants International (The Netherlands), ProgTrans (Switzerland), VBD European Development Centre for Inland and Coastal Navigation (Germany) and via Donau (Austria) carried out the project; *Prospects for Inland Navigation within the enlarged Europe* (PINE). The study dealt primarily with freight transport and particularly analysed and compared the situation in the four main IWT corridors comprising:

- the Rhine and its tributaries (The Netherlands, mid-western Germany, north of Belgium, Luxembourg, France, and Switzerland);

Class	Type motor vessel	Tonnage	Comp. push convoy	Tonnage
0	Leisuret	<250		
I	Spits	250 – 400		
II	Kempenaar	400 – 650		
III	Dortm-Eemsk Canal Ship	650 – 1,000		
IV	Rijn-Heme Canal Ship	1,000 – 1,500		1,250 – 1,450
Va	Big Rhine Ship	1,500 – 3,000		1,600 – 3,000
Vb	Push Convoy (2)			3,200 – 6,000
VIa	Push Convoy (2)			3,200 – 6,000
VIb	Push Convoy (4)			6,400 – 12,000
VIc	Push Convoy (6)			9,600 – 18,000
	Push Convoy (6)			9,600 – 18,000

Fig. 8.4 Class categories for European waterway vessels (*Source*: ECMT).

- the East–West corridor (northern and eastern Germany, Poland, and Czech Republic);
- the Danube corridor (southeastern Germany, Austria, Slovakia, Hungary, Romania, Bulgaria);
- the North–South corridor (parts of the Netherlands and Belgium, France).

Isolated waterway systems in the UK, Finland, Sweden, Lithuania, Italy, Spain, and Portugal were also analysed.

The study identified the main characteristics and performance of inland waterways, concluding that:

> In the European Union of 15 Member States (EU-15 – i.e. prior to enlargement to 25 States in May 2004), IWT ranks third in inland freight transport after road and rail with 440 million tonnes per year; representing a 3.5 per cent market share in volume and 125 billion tonne-kilometres (t/km) or a 6.5 per cent market share in transport performance. IWT (inland waterway transport) has been unable to keep pace with the rapidly expanding road sector and has therefore gradually lost its modal share since 1970. However, its transport performance in t/km has grown by 23 billion t/km or over 20 per cent during the 30-year period [i.e. 1970–2000]. The enlargement in 2004 has added about 3.5 per cent in t/km (of IWT); the [future] accession of Romania and Bulgaria would raise that figure to five per cent.
>
> The importance of IWT in the various countries and regions shows a great diversity. Its centre of gravity undoubtedly lies in the Rhine corridor and this is not expected to change. The Netherlands, Germany and Belgium on their own provide some 113 billion t/km or 90 per cent of the IWT performance in the EU-15; IWT's modal share amounts to 40 per cent, 14 per cent and 12 per cent respectively in these countries and is thus higher than the rail share in the Netherlands and some regions in Germany. A precondition for this high modal share of IWT is adequate demand and above all the availability of an efficient infrastructure in terms of waterways and ports.'

The PINE study report defines what its compilers see as the outlook for IWT and offers a series of recommendations for consideration and action by the relevant participants. Since these points are considered to be crucial to the future success and prosperity of the IWT sector the author has taken the liberty of

Fig. 8.5 A freight barge loaded with containers on the River Elbe approaching the Port of Hamburg (*Source*: Port of Hamburg Marketing).

quoting here (with due acknowledgement to the EC and the team of consultants who carried out the study) the 10 main measures recommended and the three key precondition themes, which it suggests are essential if the opportunities and potentials of IWT are to be fulfilled; namely, equal and fair competition between transport modes (i.e. intermodal competition) as well as within the sector throughout different countries (i.e. intramodal competition); harmonized framework conditions (especially fiscal and legal enforcement of the rules); and adequate infrastructure of Europe's waterways and ports to provide seamless transport with vessels of sufficient scale across the entire European transport route.

A summary of the consultant's recommendations is as follows:

1. *Legislation* improve and harmonize the legislative framework. This is particularly important in regard to technical regulations for vessels, manning requirements, social standards, boat master's licences, and fiscal aspects; in this respect, the report suggests that harmonization, updating, monitoring, and control of existing regulations and imposing penalties for violating them is more important than inventing new rules.

2. *Waterway infrastructure* improve and extend waterway infrastructure. The main objective is to improve the waterway infrastructure by proper maintenance, by removing bottlenecks and, where necessary and justifiable, by extending it.
3. *Ports* enhance performance of transhipment interfaces. The report suggests that industrial areas along waterways could be made more attractive, by adopting a co-ordinated spatial planning policy in favour of IWT. Hinterland connections of ports by rail and road should also be improved to offer new or improved logistic services.
4. *Information systems* increase safety and efficiency of IWT, by means of River Information Services (RIS), the report suggests, can significantly contribute to increasing the safety and efficiency of IWT by giving additional attention to technical framework conditions, interfaces with external systems, applications, and acceptance of user/system operators as well as implementation support.
5. *Human resources* provide sufficient supply of work force and improve skills and social standards.
6. *To overcome the shortage of skilled nautical personnel* in some European countries and the shortcomings regarding knowledge, investing in education and training programmes would be of crucial importance, it suggests.
7. *Fleet* modernize the fleets. The long lifetime of vessels hinders scale enlargement as well as the adoption of innovative technologies. To create the right preconditions, additional systematic R&D programmes are needed to develop innovative modernization measures. Vessel technologies also need to be boosted to reduce negative environment emissions by new propulsion technologies and more environmental friendly engines as well as further increasing transport safety through the implementation of double-hull technology.
8. *Market* integrate IWT into logistics chains. The consultants recognize that the success of the inland navigation system in new and more demanding markets depends on its integration into and adaptation to the requirements of the entire door-to-door logistics chain.
9. *Sector* improve co-operation between and innovation of enterprises. The major tasks to be taken up by the sector itself (i.e. both professional organizations and IWT enterprises) are concentrated around co-operation and innovation.
10. *Image* enhance awareness and acceptance of IWT. According to the report, 'strong and in some cases unfortunately rather negative perceptions exist in the minds of policy and logistics decision-makers about the performance and competitive strength of the inland waterway system.' It suggests that improving this picture through systematic and professionally processed information would contribute to a better competitive position of inland navigation.
11. *Facts and figures* create a knowledge base on IWT. Facts and figures provide vitally important information for all decision-makers the report concludes, be they (barge/ship) skippers, (freight) shippers or policy makers. 'However, in various areas of this project, a clear lack of up-to-date, compatible, and reliable data has been identified. This is not only valid at regional, country, and EU level but particularly for the four corridors and the new Member States. Clearly, better knowledge than presently available is necessary.'

8.5 Short-sea and coastal shipping

Along with the increasing interest in freighting by inland waterway, there is renewed interest too in the possibilities offered by short-sea and coastal shipping as yet another environmentally viable alternative to road freighting. There is nothing revolutionary or very new about this mode; after all, cargo shipping has a very long history. But the new wave of thinking, driven by the obvious conclusion that we must find a viable and sustainable alternative to road freighting, sees the possibilities that exist with this mode, given adequate encouragement by way of government grants to develop adequate terminal facilities, for example. Also, increasingly, a change of mind-set is surfacing among consignors that speed of transit is

not the be all and end all of freight movement, along with an awakening to the fact that a 'green' agenda has its own particular merits.

In the words of the EC's 2001 White Paper; *European Transport Policy for 2010: Time to Decide*:

> For centuries, sea and river dominated goods transport in Europe. Major towns were built on rivers or on estuaries and the large trade fairs in the Middle Ages were always held at river or seaports. Nowadays, despite a slight revival, water transport is the poor relation even though it is a mode which is not expensive and does less damage to the environment than road transport.

Short-sea and coastal shipping is far from being a new phenomenon. But what, perhaps, is relatively new is the concept that this form of shipping, as opposed to the deep-sea ocean trades, can be a vital congestion-buster for our overcrowded land-based transport systems, especially road freight transport. This mode of transport has, in fact, become so important for this reason that the EC made special mention of it in its White Paper. In a section of the paper headed 'Linking up the modes of transport'; it identified the so-called 'missing link' and at the same time made some important comments about shipping in general. It says:

> Shifting the balance between modes involves, looking beyond the rightful place of each particular mode and securing intermodality. The biggest missing link is the lack of a close connection between sea, inland waterways and rail.
>
> The European fleet has shrunk to the benefit of flags of convenience and fewer and fewer people want to become seafarers. There is a growing shortage of sailors in the European Union. Since the beginning of the 1980s, the European Union has lost 40 per cent of its seamen. There is a desperate need for merchant shipping officers. Between now and 2006 the Union will be some 36 000 sailors short, If properly trained and competent, sailors ensure the safety of shipping, efficient operation of vessels, proper maintenance, and reductions in the number of accidents and victims, and in sea pollution.
>
> Intra-Community maritime transport and inland waterway transport are two key components of intermodality which must provide a means of coping with the growing congestion of road and rail infrastructure and of tackling air pollution. Up until now these two modes have been underused, even though the Community has huge potential (35 000 km of coastline and hundreds of sea and river ports) and virtually unlimited transport capacity. The way to revive them is to build motorways of the sea …' (see below).

According to the EC:

> Short-sea transport grew by 29.6 per cent between 1990 and 1999. A total of 40 per cent of all trade within the European Union is now carried by sea, surpassed only by road transport. But its potential is much greater. Still needed are improved links to inland networks and the establishment of 'sea motorways' between key ports. Promoted in this way, short-sea shipping could take substantial volumes of goods traffic off Europe's congested roads and ease major road and rail bottlenecks.

In a briefing note on short-sea shipping in 2002, the Commission, as follows, identified its role, the challenges, the goals and the Community action needed to stimulate growth, which it defines as a priority.

- Short-sea shipping
  - an efficient and environmental friendly transport mode,
  - often, the most cost-effective means to shift long-distance traffic off Europe's roads,
  - an essential link to islands and outlying regions.

- The challenges
  - to promote short-sea shipping's reliability and frequency,
  - to ensure that its reliability, quality, and safety are recognized,
  - to remove unnecessary costs and delays at ports.
- The goals
  - to integrate shipping more fully in door-to-door freight transport services,
  - in conjunction with rail and inland waterways, to absorb predicted increases in EU goods transport.
- Community action
  - active promotion of short-sea shipping;
  - administrative simplification of shipping logistics;
  - targeted investment in infrastructure and support for R&D (i.e. research and development) where possible.

A strong proponent of the short-sea shipping concept is Geest North Sea Line BV, a mainstream intermodal operator that provides coastal shipping as well as road-borne services. Figure 8.6 shows one of the company's vessels 'Geest Trader' setting sail with a load of its own brand containers.

8.5.1 EU 'motorways of the sea' project

The EC's White Paper of 2001, *European Policy for 2010: Time to Decide*, proposed the development of 'motorways of the sea' under the general heading 'Linking up modes of transport' (i.e. in Part One of the White Paper). As the document states:

> Short-distance shipping has been around for a very long time: there are thousands of wrecked vessels around the Mediterranean dating back to Roman times. Short-sea shipping

Fig. 8.6 Geest North Sea Line vessel 'Geest Trader' setting sail with a load of the company's own brand containers.

> carries 41 per cent of goods traffic within the Community. It is the only mode of goods transport with a growth rate between 1990 and 1999 (plus 27 per cent) approaching that of road transport (plus 35 per cent). In millions of tonne-kilometres [t/km], the volume of trade carried between 1970 and 1998 increased by [a factor of] 2.5 representing 44 per cent of the total volume and 23 per cent of the total value of the goods transported within Europe. There are examples of efficient services between southern Sweden and Hamburg, between the ports of Antwerp and Rotterdam, and between south-east England and the inland port of Duisburg. But the current volume of traffic in Europe is well below potential capacity. Sea transport is not just a means of carrying goods from one continent to another; it is a real competitive alternative to land transport. For this reason, certain shipping links, particularly those providing a way around the bottlenecks in the Alps and Pyrenees, should be made part of the trans-European network, just like the motorways or railways. At national revel, shipping routes between European ports will have to be chosen to create networks, for example between France and Spain or between France and the United Kingdom. Similar routes will also have to be encouraged between Poland and Germany. However, these lines will not develop spontaneously. Based on proposals from the Member States, they will have to be 'sign-posted', notably by granting European funds (from the Marco Polo Programme and the Structural Funds) to encourage start-ups and give them an attractive commercial dimension.

Following the White Paper, the EC issued, in July 2004, a consultation document on the 'Motorways of the Sea' concept seeking views from interested parties. At the time of closure of the consultation period no less than 65 submissions had been received from national, regional, and local authorities, trade associations and single entities such as maritime and port operators and research institutes. Based on the comments received, and further consultation, the EC plans to prepare the actual implementation of the project and issue further documentation in 2005, the point reached as this book closed for press.

However, in the meantime it is useful to consider here the basics of the project to understand how it will be moved forward in the future. This is adequately explained in a document published by EUROPA on its web site in November 2004 as follows:

> In its Transport White Paper of September 2001, the Commission proposed the development of 'Motorways of the Sea' as a 'real competitive alternative to land transport.' To help these lines develop, the White Paper states that European funds should be made available. These 'motorways of the sea' should be part of the Trans-European network (TEN-T) – see Chapter 11 for a more detailed description of the various TENs projects. The 'motorways of the sea' concept aims at introducing new intermodal maritime-based logistics chains in Europe, which should bring about a structural change in our transport organisation within the next years to come. These chains will be more sustainable, and should be commercially more efficient, than road-only transport. Motorways of the sea will thus improve access to markets throughout Europe, and bring relief to our over-stretched European road system. For this purpose, fuller use will have to be made not only of our maritime transport resources, but also of our potential in rail and inland waterway, as part of an integrated transport chain. This is the Community added value of motorways of the sea. The adoption of Article 12a of the TEN-T Guidelines of 29 April 2004 gives a legal framework for funding the 'motorways of the sea' … and three main objectives for the projects (as follows):
>
> 1. freight flow concentration on sea-based logistical routes;
> 2. increasing cohesion;
> 3. reducing road congestion through modal shift.

Four corridors have been designated for the setting up of projects of European interest:

- Motorway of the Baltic Sea (linking the Baltic Sea Member States with Member States in Central and Western Europe, including the route through the North Sea/Baltic Sea canal) (by 2010).
- Motorway of the Sea of Western Europe (leading from Portugal and Spain via the Atlantic Arc to the North Sea and the Irish Sea) (by 2010).
- Motorway of the Sea of southeast Europe (connecting the Adriatic Sea to the Ionian Sea and the Eastern Mediterranean, including Cyprus) (by 2010).
- Motorway of the Sea of southwest Europe (western Mediterranean, connecting Spain, France, Italy, and including Malta and linking with the Motorway of the Sea of southeast Europe and including links to the Black Sea) (by 2010).

These corridors provide one essential part of the projects: the 'floating infrastructures' of our European seas. However, it is up to industry, Member States, and the Community to implement financially and operationally sound projects to use these maritime resources better for new intermodal maritime-based transport systems.

To make motorways of the sea a success, three conditions must be present for each project.

- First, in order to obtain the necessary concentration of freight flows, choices have to be made concerning ports and intermodal corridors and services.
- Second, all actors in the supply chain have to be committed to these projects.
- Third, motorways of the sea need to feature the best available quality throughout the chain in order to be attractive for users.

By 2010, a fully fledged network of motorways of the sea should be established throughout Europe on the corridors mentioned above.

8.5.2 Coastal highways

An imaginative concept designed to encourage further development of coastal shipping as a means of relieving the UK's heavily congested road network was launched in 2004 under the Coastlink brand name: Coastlink is an association of shipping companies, intermodal operators, ports, stevedores, logistics specialists, and shippers under the chairmanship of noted shipping expert David Cheslin. The idea (outlined in an article published in *International Freighting Weekly* (26 April 2004) under the heading; *UK Coastal Highways – An Impossible Dream*) was that a high-frequency integrated coastal shipping service linking key ports should be established. Particularly, UK east coast ports such as those on the river Forth, those on England's northeast coast, Humberside, Felixstowe, and those in the Thames/Medway area could ideally all be linked with high-frequency services, as could the west-coast ports on the rivers Clyde, Mersey, and the Bristol Channel, with cross-Irish Sea links to Belfast and Dublin. Large volumes of regular traffic would clearly be needed to sustain such services and there would be a need for much greater co-operation between port operators and between shipping lines and for a standard loading unit, essentially the shipping container.

But is this all a pipedream? It would seem to be so because by the end of 2004 there was a realization that the scheme was unlikely to work for two basic reasons; first that at present, both UK and European ports are stifled with container traffic causing severe bottlenecks and consequent delays to both shipping and to road and rail traffic delivering into and trying to clear containers out of the ports; and secondly that the costs and delays associated with all the handling, especially on short-distance traffic, kill off the economics of such a scheme. Basically, the conclusion must be that rather than keep lifting containers on and off road vehicles and enduring the delays associated with this, better to leave the container on the

lorry and let the driver press on to its final destination. Scotland to London, northeast England to southern England and vice versa can be achieved in relatively few hours and almost certainly within the same day; a performance not likely to be achieved if it is loaded on to a ship. In this connection, there is a view that the introduction of the German LKW Maut lorry toll scheme in Germany from 2005, and similar schemes due to be implemented in the UK by 2008, will drive up road haulage costs and remove some of the speed and flexibility associated with this mode of transport in favour of both inland waterways and short-sea shipping. But without improvements to port infrastructures and particularly turnaround performance, this is unlikely to occur.

Having largely deflated the idea that short-sea shipping is about to boom, it is important to note that all is not lost on this front. At the end of 2004, a classic example arose to illustrate how short-sea shipping across the North Sea can be successful. Shipping line Sea wheel, which specializes in providing full load, door-to-door and quay-to-quay freight services between the UK, Ireland, and Continental Europe, has launched a daily lift-on/lift-off (LO-LO) container service between Rotterdam and Goole (northeast England) using 150–200 teu ships. It has also launched a Duisburg (Germany) to Goole service using its 'unique' river-hulled sea-going vessels, which, with their relatively shallow draft (3.6 metres) and the capability to lower their bridge housings, can sail 250 kilometres up the River Rhine to Duisburg and 40 kilometres down the Humber to Goole. This shipping line's philosophy illustrates how clever thinking can open niche markets; its strategies include using smaller ports with good transport links which are close to important markets as is the case with Goole. Similarly, in Europe, Duisburg is well away from the congestion at Rotterdam and is an important rail centre with connections offering overnight services to all main German railheads as well as daily connections to Italy, Austria, Switzerland, Poland, Croatia, and Hungary.

8.5.3 Roll-on/roll-off ferry services

Roll-on/roll-off (RO-RO) ferry services have been with us for many years; in fact, the development of this system for transporting road vehicles on short-sea crossings, such as those across the English Channel, has been one of the most significant advances in modern transportation. It was following the Second World War that the concept adopted for military tank landing craft of the type used for the D-Day landings was applied in the construction of merchant ships in the late 1940s and early 1950s. Thus commercial application of the RO-RO principle was borne. It proved to be extremely popular on cross-Channel routes, encouraged by the increasing demand for international road transport journeys between the UK and the Continent. For both the shipper and the ship operator, RO-RO shipping offers a number of advantages over traditional LO-LO cargo shipping; most notably the speed at which the crossing can be accomplished with modern ships and the rapid turnaround in port.

This mode of road–cross–Channel shipping is a classic example of intermodalism at its most efficient. Freight is loaded on a lorry at an inland location, is then driven to the port where the vehicle rolls straight on board the ferry ship via a loading ramp/bridge and is secured in the hold for the crossing. The driver meantime, takes his break in the comfortable lounge or restaurant facilities provided. On arrival at the destination port, the vehicle is driven off the ship invariably within a few minutes of docking, thereby dramatically cutting loading and unloading times, and the driver continues his journey to the final destination. The significant advantage of this system is that the load travels undisturbed from the time of original loading and securing right through to the consignees' premises. Also, if the vehicle travels accompanied by its driver through to the final destination, as most do, the consignor can take confidence from the fact that the driver will take proper care to ensure that it arrives at the right place, hopefully at the right time, and with no, or only the minimum, of interference apart from any inspection by officialdom or in the event of unfortunate accident.

Modern RO-RO ferry ships are fast, travelling at up to 25 knots, and the largest can carry up 2000 passengers and literally hundreds of cars. Specialist freight-only services are operated by such companies as

Sea France, Stena Line, Norfolk Line, and P&O Ferries, the largest operator with some 30 per cent of the cross-Channel market (of which about 50 per cent of its net revenue comes from freight traffic, its only competitor from a UK perspective is Eurotunnel with 40 per cent of the cross-Channel market share). Many of the ferry ships on the cross-Channel routes can accommodate 80–120 heavy trucks, turning round in port in no more than 1 hour in many instances, and providing such amenities as; electrical plug-in for temperature controlled transport; hazardous cargo arrangements, including on-deck cargo space; special arrangements for wide loads, demountable, and unaccompanied traffic; as well as a range of comfortable driver facilities.

8.6 Container shipping

Deep-sea container shipping is largely outside the remit of this book, but nevertheless the author feels that it is important to recognize that ISO containers, shipped worldwide in their thousands, almost invariably start and end their global journeys on the back of a lorry maybe in China, Japan or Australia at one end of the route and to an inland destination in the UK at the other end; this is intermodalism. It is important too to recognize the enormity of this business. According to the Institute of Shipping Economics and Logistics (ISL) *Shipping Statistics and Market Review* (SSMR), container traffic amounting to some 219.5 million teu (13 per cent up on 2002) was recorded as being shipped in 2003 through the world's top 62 ports, of which 28 were Asian, 17 European and 15 were American, each having a throughput of more than one million teu. Remarkably, in 2003, approximately 63 per cent of world container traffic was attributable to Asian ports alone, Europe accounted for 20.2 per cent and America 15.4 per cent. Also in 2003, 172 new fully cellular container ships with a combined capacity of 570 000 teu were added to the world container-ship fleet. Most of these ships followed the trend towards ever-greater capacities, on average their capacity was 3320 teu, but 26 of them were of 6000 teu capacity or above – around 75 per cent of the world's merchant fleets comprise container vessels. The very largest of container ships in service at the beginning of 2004, according to SSMR, were four vessels operated by (Orient Overseas Container Line OOCL, registered in Hong Kong) with capacities in excess of 8000 teu.

On a smaller scale, both in the UK and in Europe, smaller ships plying short-sea and coastal trades and, increasingly, many river/canal barges are constructed or adapted for carrying ISO containers, many of them carrying no more than 100 or so units. In his excellent little book, *Short Sea Shipping: 2003/2004*, published by Ships in Focus, Preston, England, author Gilbert Mayes notes an increasing number of short-sea vessels engaged in the container liner trades with a corresponding increase in slot capacity. While their capacity is recorded in 20-foot equivalent units (i.e. teu) in the conventional shipping manner, many of these smaller ships, he notes, in fact now carry the bulk of their loading in 40-foot containers or even 45-foot units. He also comments that:

> Feeder container vessels have also shown a small increase though the main change has been in the additional ports that are now visited, often to pick up and set down a small number of containers, again reducing road traffic.