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Working Party on Intermodal Transport and Logistics

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Item 3 of the provisional agenda
2010 Theme: Opportunities and challenges for intermodal transport by inland waterways

Opportunities and challenges for intermodal transport by inland waterways

Note by an ad hoc informal expert group

I. Mandate

1. At its fifty-second session, the Working Party decided on the theme "Opportunities and challenges for intermodal transport by inland waterways and coastal shipping" as the topic for substantive discussions at its next session …" (ECE/TRANS/WP.24/125, para. 40). As provided in the road map on future work and operation of the Working Party, the discussions under each theme are to be prepared and moderated by a lead country or organization…" (ECE/TRANS/WP.24/2009/5, ECE/TRANS/208, para. 87).

2. In line with these decisions, an ad hoc informal expert group met on 29 June 2010 and prepared the present document as a basis for discussions.

II. Global supply chains and intermodal transport

3. Supply chains and logistics will become of paramount importance for the competitiveness of our economies. They will increasingly shape the way goods are supplied, produced, delivered and returned. Driven by consumer demand and the globalization of production and trade, supply and distribution chains are lenthening. Just-in-time (JIT) and just-in-sequence (JIS) supply, production, distribution and recycling systems require efficient, reliable, flexible and fast transport systems and have a crucial importance for modal choices made by the industry.

4. It seems obvious that the predicted increase in European freight transport (30 per cent or more in the next decade) cannot be matched by a corresponding increase in transport infrastructure due to financial, environmental and social reasons. Thus, all inland transport modes, i.e. roads, railways and inland waterways will need to be better used and their capacities must be fully exploited.[1]

5. Certainly, more sophisticated logistics and supply chains will allow goods to move in the future more rationally and smoothly than in the past. Also road, rail and inland water transport infrastructures and vehicles will enhance their efficiency with new technologies and intelligent transport systems (ITS). But this will not be enough.

6. Transport policies also have to safeguard the mobility needs of our citizens and ensure safety and security as well as the sustainability of our transport systems (reduction of non-renewable resources as well as noise, air and greenhouse gas emissions).

7. For these reasons, the inherent relative strengths of all land transport modes need to be combined and integrated into seamless door-to-door transport chains that reap synergies and respond to the divergent needs of our economies. Intermodal transport constitutes an essential element of such an integrated and sustainable transport system.

8. European intermodal transport, apart from coastal shipping and feeder services, is mainly confined to road-rail services. Unfortunately, many road and rail networks are saturated and are often already overloaded and congested, particularly on European North-South transport corridors. The results are unreliable services, delays and costs that reduce the competitiveness of our economies.

9. Also, on roads and railway lines, freight transport competes more and more with the mobility needs of our population. This will be of increasing importance, particularly in Eastern and South-Eastern Europe with the predicted increase in private car ownership.

10. Thus, intermodal transport must be extended more vigorously to cover more effectively Europe's extensive inland waterways, particularly its large and year-round navigable rivers and canal systems that offer still untapped capacities and potential for growth.

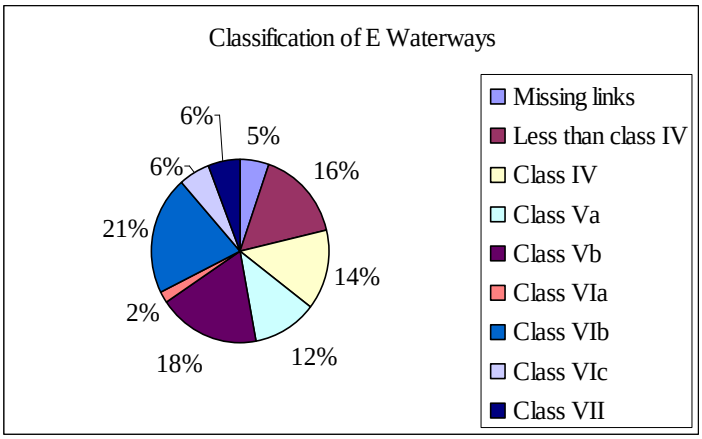
III. Potential of inland waterways

11. Today, only 7 per cent of goods in the European Union are carried on inland waterways (road and rail transport carry 79 per cent and 15 per cent respectively). In the Russian Federation, under difficult meteorological conditions, inland waterways account for 4 per cent of total goods transport and in the Ukraine it is a mere 1.3 per cent. On the other hand, countries with efficient and year-round navigable waterways show considerably higher shares of freight transport by inland waterways, such as the Netherlands (44 per cent), Belgium (14 per cent) and Germany (13 per cent).

12. Half of the European population live close to the coast or to European inland waterways and most industrial centers can be reached this way. However, while the European road and rail networks cover and link virtually every country and region, European inland waterways are considerably less dense and amount only to around 28,000 km. In addition, 5 per cent of this network consists of missing links and another 16 per cent has very limited infrastructures (see map in Annex I).

[1] For more details, refer to a report prepared in 2008 by the Working Party on intermodal transport within transport chains and the role of Governments (ECE/TRANS/WP.24/2008/4).

13. Around 22,000 km of these inland waterways meet the basic requirements of the UNECE AGN Agreement[2] and are considered inland waterways of international importance, i.e. they are E-waterways of class IV and higher (see sketch below).



Source: AGN Agreement.

14. Such E-waterways can be navigated by vessels with dimensions of 80 m x 9.5 m. Restrictions of draught (less than 2.50 m) and of minimum height under bridges (less than 5.25 m) are accepted only for existing waterways and as an exception (for details, see Annex II).

15. Most of inland water transport in Europe is confined to a few UNECE member countries only, such as the Netherlands, Germany, Russian Federation, Belgium, France, Romania, Austria and Ukraine (listed in the order of transport volumes). The most important pan-European inland navigation systems are the river Rhine and its tributaries, the inland waterways in the Russian Federation, the Danube, the Rhone and the Mosel (for details, see Annex III).

16. Inland water transport in Europe is facing problems and challenges given limited speed and sometimes low and irregular frequency of services. Also certain shortcomings in reliability due to weather and hydrological conditions occur, depending on geographical location. Infrastructure development and maintenance is not always at a level that allows for efficient transport operations.

17. The table below provides, in a concise form, a general list of the main advantages and challenges for freight transport on European inland waterways. It is well recognized that not all of these issues apply to all Europeans rivers and canals as well as to all types of freight transport on European inland waterways.

[2] European Agreement on Main Inland Waterways of International Importance (AGN) (19 January 1996).

Advantages of European inland waterways	
Superior safety	Operates away from populations and traffic: More than 50 times safer than road, more than 5 times safer than rail (in persons killed per tonne-km)
High versatility	Tailor-made services suitable for dry/ liquid bulky, heavy and dangerous goods, containers and roll on/roll off services
Good reliability	Few unpredictable traffic constraints due to accidents, ice, floods and low waters in Western and South-Eastern Europe
Low costs	Considerably cheaper than road and rail main haul services (by 30% to 60%, depending on cargo and distance)
High energy-efficiency	For most bulk transport operations, 3–6 times less fuel consumption than road and up to 2 times less than rail
Good carbon footprint	For most bulk transport operations, 3–6 times less CO^2 emissions than road and up to 2 times less than rail
Low noise levels	Little noise emissions, mostly away from major populations
Low infrastructure costs	Low investment and maintenance costs
Supply chains and logistics	Low cost buffer stock and storage capability
Good transport supervision	Effective tracking and tracing of vessels and cargo (RIS)
Few traffic restrictions	Few, if any, night, weekend and holiday traffic restrictions
Dedicated transport network	Little interference with passenger traffic.
Untapped spare capacity	20–100% short-term spare capacity on major corridors.

Challenges for European inland water transport	
Insufficient network	Persistence of inland waterway bottlenecks and missing links at pan-European level. Investment backlogs
Deficient maintenance	Inadequate maintenance of infrastructure and inland water fleet
Seasonality of operation	Traffic shut-down during winter in Northern and Eastern Europe
Complex decision-making	Difficult application of a holistic approach in construction of smart and sustainable infrastructure (in search of "triple-win" solutions for transport, health and environment)
Diminishing + ageing fleet	Diminishing and ageing inland fleet of cargo vessels with difficulties to comply with modern market and regulatory requirements
Segmented industry	Large number of small inland water enterprises (70 to 90 per cent single-vessel operators)
Supply chains + logistics	Deficiencies in integrating inland water transport in global and regional supply chains and logistics processes
Hurdles in intermodal transport	Lack of efficient intermodal road or rail/inland water transport facilities. Lack of specialized operators/cooperatives for intermodal transport services. Costs for transhipment and last mile may offset gains on long haul
Port-hinterland traffic	Still untapped potential, but perceived "discrimination" of inland water transport in maritime ports
Diffused professional image	Lack of knowledge/expertize on inland water transport by shippers, freight forwarders and logistics providers
Shortage of skilled personnel	Declining attractiveness of inland water labour markets and shortage of skilled personnel, mainly in Western Europe
Complex regulatory architecture	Segmented administrative and regulatory rules and regulations as well as implementation procedures (compared to road and rail)
Institutional framework	Multi-layered Governmental authorities and organs at local, national, regional and pan-European levels

18. In 1996, the first UNECE White Paper on Inland Navigation highlighted the potential and the advantages of inland navigation in comparison with other land transport modes in a pan-European context.[3] More recent analyses confirm these conclusions and describe inland water transport as a safe, versatile, reliable, economical and environmentally friendly mode of transport with very considerable untapped capacities and

[3] White Paper on Trends in and Development of Inland Navigation and its Infrastructure (UNECE Principal Working Party on Inland Water Transport (SC.3) (TRANS/SC.3/138).

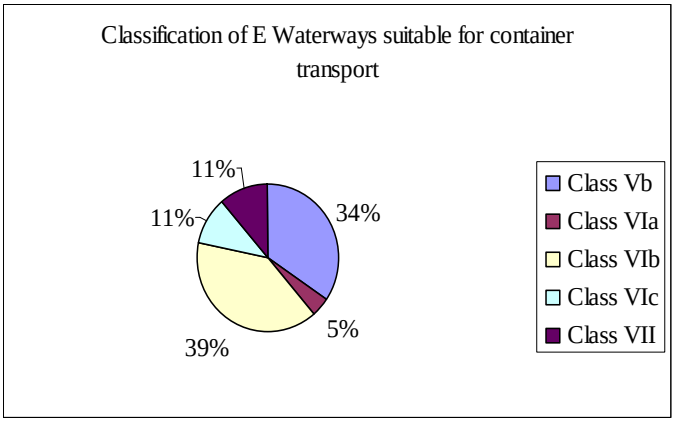
potential for growth, while major pan-European road and rail transport and port-hinterlands corridors are increasingly overloaded and congested.

IV. Intermodal transport by inland waterways

19. Intermodal transport using European inland waterways is, to a large extent, the transport of maritime (ISO) containers on board of specially equipped inland navigation vessels. Most of these vessels have a length of 63 to 135 m, a width of 7 to 17 m and a draught of 2.5 to 3 m. They can transport between 32 and 500 TEU depending on the inland water infrastructure. Standard container vessels on the Rhine have a length of 110 m, a width of 11.4 m and a draught of 3 m and could carry 200 TEU.

20. Ro-ro transport on inland waterways is used to a lesser extent, also on the Danube. A typical Ro-ro inland water vessel has a length of 110 m, a width of 11.4 m and a draught of 2.5 m. It could carry around 70 trucks or road trains.

21. Two-thirds of European E-waterways (14,700 km) fulfil the necessary minimum requirements for efficient international container transport as required under the AGTC Protocol on Inland Waterways (AGTC Protocol)[4] and belong to inland waterway Class Vb or higher (see sketch below). For details on classes, see Annex VI.



Source: AGTC Protocol.

22. These E-waterways should allow vessels with a length of 110 m and a width of 11.4 m to carry containers in three or more layers. In case only two layers of containers are possible, a permissible length of pushed convoys of 185 m should be ensured (for an overview of the provisions of the AGTC Protocol and technical details, see Annex IV).

A. Transport of containers has increased considerably on inland waterways

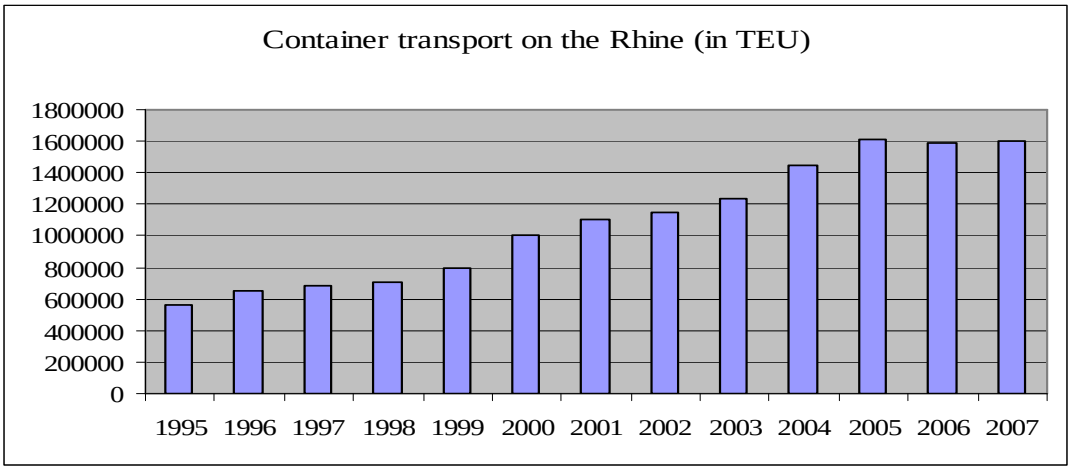
23. European intermodal transport is to a large extent characterized by road-rail transport operations.[5] In 2007, around 18 million twenty-foot equivalent units (TEU) were

[4] Protocol on Combined Transport on Inland Waterways to the European Agreement on Important International Combined Transport Lines and Related Installations (AGTC) of 1991 (17 January 1997).

[5] In this paper, the transport of containers by coastal shipping and feeder services between sea ports is not taken into consideration, as intermodal transport requires the successive use of two or more (land)

transported by road-rail, using mainly containers, swap-bodies and semi-trailers. Accompanied transport, i.e. the transport of complete road trains on railway wagons (RoLa) constitutes only around 5 per cent of such traffic.

24. Compared to road-rail transport, intermodal transport by inland waterways is significantly smaller and mainly confined to hinterland traffic of maritime containers to and from European seaports. Most of traffic takes place on the Rhine and has increased nearly threefold since 1995. In 2007 around 1.6 million TEU were moved (see table below).



Source: Central Commission for the Navigation of the Rhine (CCNR).

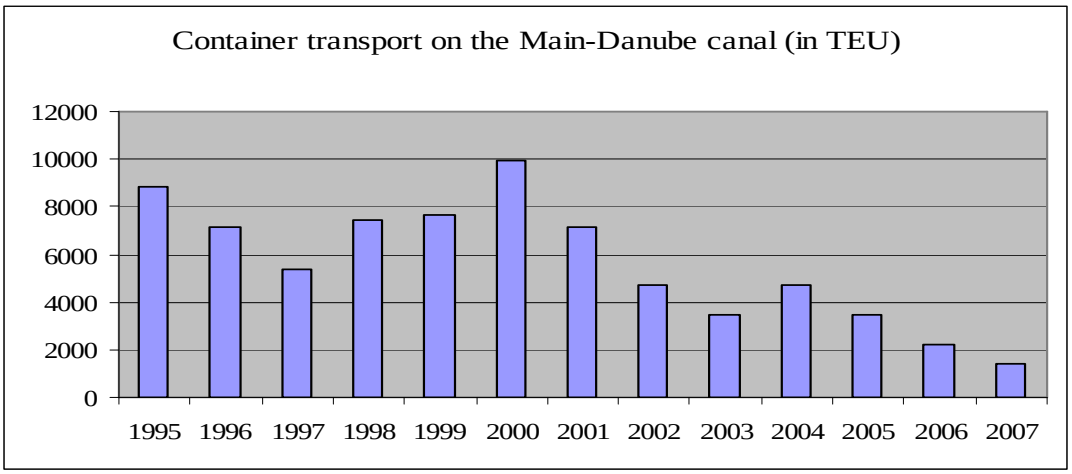
25. While road and rail transport infrastructures, particularly along major European North-South corridors are increasingly congested, inland water transport still offers untapped capacities in the order of 20 to 100 per cent in many UNECE countries, 24 hours a day, 7 days a week. However, adequate capacity on inland waterways is not sufficient to increase its market share and modal split vis-à-vis road and rail transport.

26. In order to capture future growth markets, such as the transport of containers, the inland water transport industry needs to comply with the increasingly sophisticated needs and requirements of supply chain and distribution managers and must integrate better into seamless door–to–door transport chains. This includes efficient transshipment operations and terminal hauls as the benchmark in terms of cost and service quality is door-to-door road transport.

27. The boom in container traffic on the Rhine has shown that, given favorable inland water conditions and infrastructures, intermodal transport using inland waterways could be competitive. Since 1995 container transport on the Rhine has nearly tripled, mainly driven by maritime port hinterland traffic.

28. In contrast to this rapid development on the Rhine, container transport on the Main-Danube canal, linking the Rhine with the Danube, has never attained more than 10.000 TEU per year and has declined steadily since its peak in 2000 (see table below). This could indicate the limitations of inland water transport over long distances where numerous locks need to be used that lead to long transport times and costs compared to viable alternatives, such as rail and road transport.

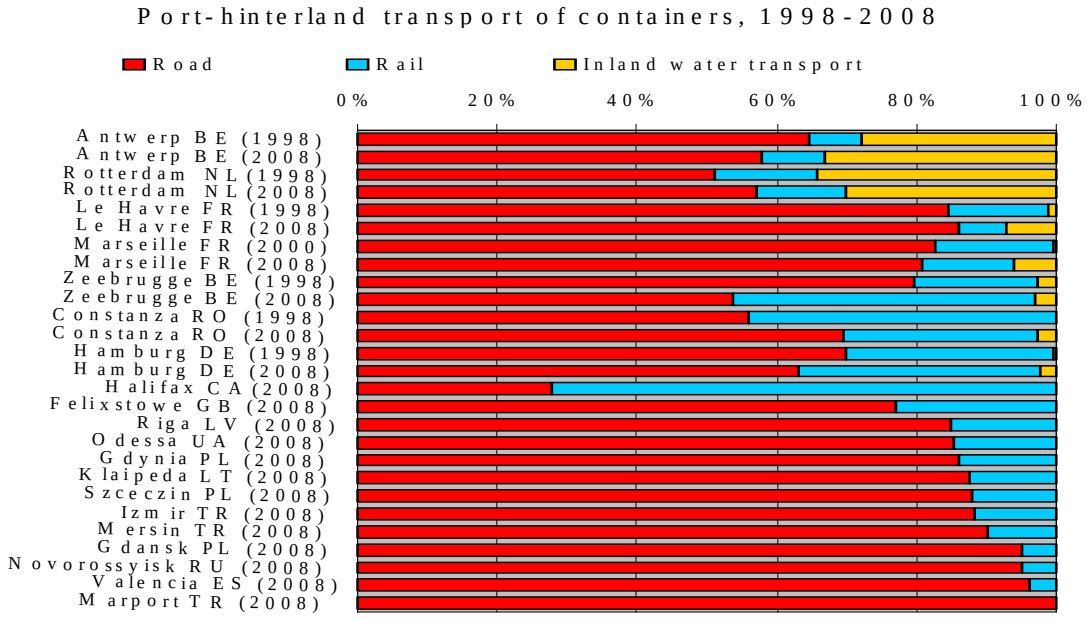
modes of transport. However, these transport operations are very significant, particularly in Northern Europe and amount to more than 13 million TEU annually, of which nearly half take place in the Baltic Sea (Source: European River-Sea-Transport Union (ERSTU).



Source: Water and Inland Navigation Authority, Nürnberg (Germany).

B. Port hinterland transport plays a major role

29. In 2008, the two largest European container sea ports, Rotterdam and Antwerp, handled 10.8 and 8.7 million TEU respectively and around one third of total hinterland traffic of containers was carried out by inland waterways. Among other major European container ports, only Le Havre, Marseille, Zeebrugge, Constanta and Hamburg report sizeable container movements by inland waterways in the order of 7 to 2 per cent. Except for Rotterdam, port hinterland traffic of containers increased considerably over the past 10 years and there still seems to be a potential for further growth.



Sources: T. Notteboom (OECD/ITF Discussion Paper 2008–10). Available from <http://www.internationaltransportforum.org/jtrc/DiscussionPapers/DP200810.pdf>. Schiffahrt, Hafen, Bahn (8/2009), UNECE.

30. Most of such traffic takes place between the North Range maritime ports and inland transport terminals on the Rhine where containers are often transshipped for onward transport by rail and road to final destinations. The port of Duisburg, the largest inland water port in the world, handles annually around 1.8 million TEU (2007) of which around 21 per cent are transported on inland waterways.

31. Similarly, 40 per cent of the 145.000 TEU handled in the port of Lyon on the Rhone was carried by inland waterways; and in the port of Basel all of the 104.000 TEU transshipped arrived or departed by inland navigation vessels.

32. Given the limited space in most European container ports and the growing congestion around the port areas and on important European North-South road and rail corridors, inland waterways may be able to gain further market shares in port hinterland traffic, particularly along the Rhine and Rhone rivers and its major tributaries.

33. Out of some 330 inland navigation ports that can be considered to be of international importance, 150 are located along the Rhine and only 45 along the Danube. However, only around 100 of these ports operate terminals for intermodal transport. This dense network of terminals close to major European economic centers along the Rhine and its canals will certainly favor a further increase in container traffic.

34. A list of terminals in inland waterway ports that are considered to be important for international intermodal transport as contained in the Protocol to the AGTC is contained in Annex II to the Protocol to the AGTC Agreement.

V. What needs to be done?

A. Provision of adequate inland water and port infrastructures

35. Europe's maritime ports and its network of inland waterways link virtually all of its economic centers. European Governments could play an important role in providing for or facilitating the provision of the necessary inland water and port infrastructures as well as adequate maintenance to ensure reliability of services as a prerequisite for competitive operation.

36. However, apart from the Rhine, Danube and the Rhone rivers, many inland waterways that could potentially be used for port hinterland traffic do not yet fulfill the basic infrastructure and operational conditions for efficient container transport by inland waterways as stipulated in the AGTC Protocol.

37. Issues for consideration:

- What needs to be done to improve inland water transport infrastructure?
- What mechanisms and incentives are needed?
- Who should do what?

B. Regulations and incentives: Establishing a level playing field

38. A level playing field between maritime and inland navigation interests needs to be established at major European sea ports to ensure that inland water vessels could operate more efficiently.

39. A supportive framework and mechanisms to facilitate consolidation of cargo in port hinterland traffic to inland terminals and cargo hubs needs to be established.

40. Mechanisms to ensure standard and harmonized pan-European rules and regulations would facilitate the development of inland navigation and could streamline administrative procedures.

41. Issues for consideration:

- What are the experiences made and best practice in these areas?
- What are the roles of Governments and the private sector?
- Is there a need for "neutral" negotiators (research institutes, universities)?

C. Development of river-sea navigation

42. Coastal shipping or short-sea shipping is a concept favored by many countries and by the European Commission to reduce the burden on the European road and rail networks. However, such transport is a present mostly confined along European coasts and between major sea ports.

43 A link between sea and inland water transport would offer a seamless connection between the land and the sea leg of international transport chains and would avoid transshipment of containers in often congested European sea ports. This could result in substantial time and cost savings, even more so if such savings could be obtained at both ends of the transport chain.

44. At present, international river-sea transport is very difficult and costly due to the lack of internationally accepted rules and regulations and is only possible for sea worthy maritime vessels. The quality of the inland waterway networks is a decisive factor for the development of river–sea transport. Even on the well-developed Western European waterways, draught restrictions constitute a major impediment for river–sea vessels to operate under competitive conditions. A river–sea transport concept intended to meet these conditions is the river–sea push barge (or RSPB) system.

45. Issues for consideration:

- What are the technical and legal provisions governing international river-sea navigation?
- Should these provisions be revised?
- What could be done at the pan-European level?

D. The inland navigation industry must improve its operation

46. The inland navigation industry has considerable potential for growth. However, the very fragmented industry must streamline its operations and align its vessel fleet with modern safety and environmental requirements. In order to capture and stay in future growth markets and market niches, such as for containers and ro-ro transport, for bulky and heavy goods or for waste and recycling materials, the inland navigation industry needs to comply with the increasingly sophisticated needs and requirements of global and regional supply chains and distribution managers and needs to be better integrated into door-to-door transport chains.

47. Issues for consideration:

- What can be done by Governments to assist the industry?

- How to promote cooperative arrangements between shippers, terminal operators, forwarders, barge companies, railways and road transport operators?
- How can national and international cooperation arrangements be facilitated and by whom?

VI. Possible activities of the Working Party on Intermodal Transport and Logistics

48. The Working Party may wish to consider whether it could play a constructive role in promoting intermodal transport by inland waterways in the UNECE region.

49. In addition to a regular exchange of views and best practices in concerned UNECE member countries as well as the preparation of studies in this field, the Working Party could:

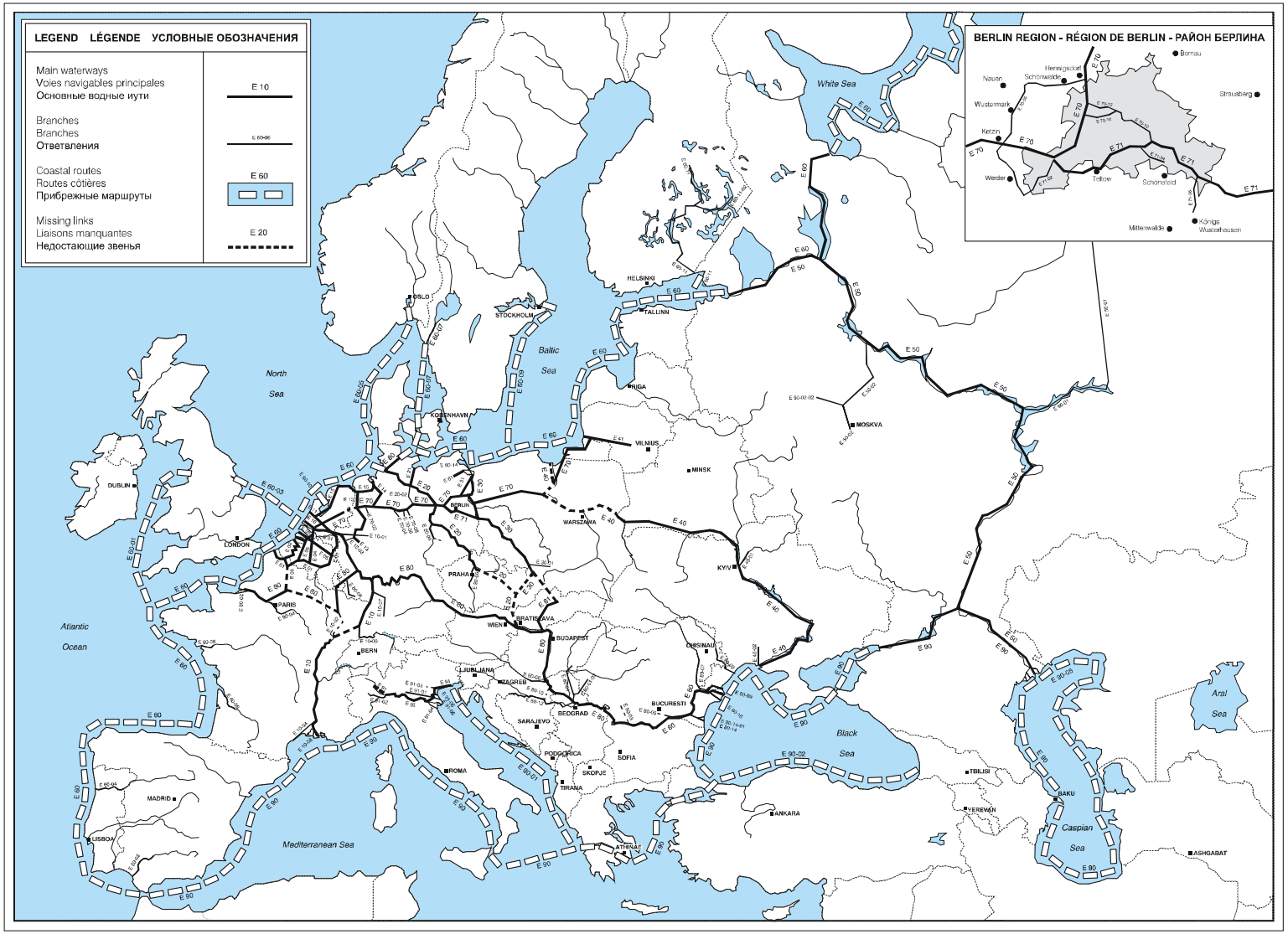
(a) Update of the Protocol to the AGTC Agreement, particularly with regard to the list of inland waterways and terminals in ports; and

(b) Review of technical and operational minimum requirements contained in the Protocol to the AGTC Agreement.

50. In addition, the Working Party could assist in the organization of technical visits or study tours to European ports, terminals and inland waterways to discuss with experts and policy makers possible mechanisms and requirements for the promotion of intermodal transport by inland waterways.

Annex I

Network of inland waterways of international importance (E waterways)
(Annex I of the AGN Agreement)



Annex II

Technical characteristics of the C-E waterways (AGTC Protocol)*

Classification of European inland waterways of international importance for combined transport**

		Motor vessels and barges					*Pushed convoys*					*Minimum height under bridge*[6]	*Graphical symbols on maps*
		Type of vessel: General characteristics					*Type of convoy: General characteristics*						
Type of inland waterway	*Classes of navigable waterways*	*Desi-gnation*	*Maxi-mum length*	*Maxi-mum beam*	*Draught*[7]	*Tonnage*		*Length*	*Beam*	*Draught*[5]	*Tonnage*		
			L(m)	*B(m)*	*d(m)*	*T(t)*		*L(m)*	*B(m)*	*d(m)*	*T(t)*	*H(m)*	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
	Vb	Large Rhine vessels	95–110	11.4	2.50–2.80	1,500–3,000		172–185[8]	11.4	2.50–4.50	3,200–6,000	5.25 or 7.00 or 9.10[9]	
	VIa							95–110[8]		2.50–4.50	3,200–6,000	7.00 or 9.10[9]	
of international importance	VIb	[10]	140	15.0	3.90			185–195[8]		2.50–4.50	6,400–12,000	7.00 or 9.10[9]	
	VIc							270–280[8]	22.8	2.50–4.50	9,600–18,000	9.10[9]	

* This classification is in line with the classification given in Annex III of the European Agreement on Main Inland Waterways of International Importance (AGN) of 19 January 1996.

** Classes I-Va are not mentioned, being of regional importance or of no relevance for combined transport.

6 Allows for a safety clearance of about 0.30 m between the uppermost point of the vessel's structure or its load and a bridge.

7 The draught value for a particular inland waterway to be determined according to the local conditions.

8 The first figure takes into account the existing situations, whereas the second one represents both future developments and, in some cases, existing situations.

9 Checked for container transport: 5.25 m for vessels transporting 2 layers of containers; 7.00 m for vessels transporting 3 layers of containers; 9.10 m for vessels transporting 4 layers of containers. 50 per cent of the containers may be empty or ballast should be used.

10 Allows for expected future developments in ro-ro, container and river-sea navigation.

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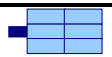
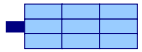
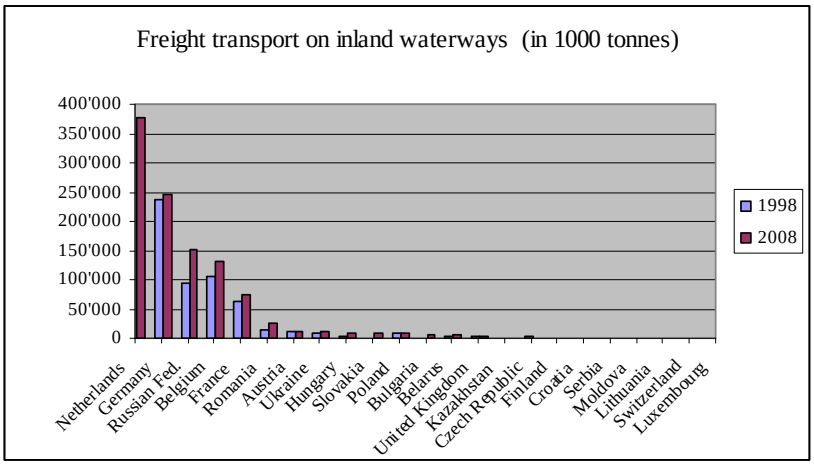
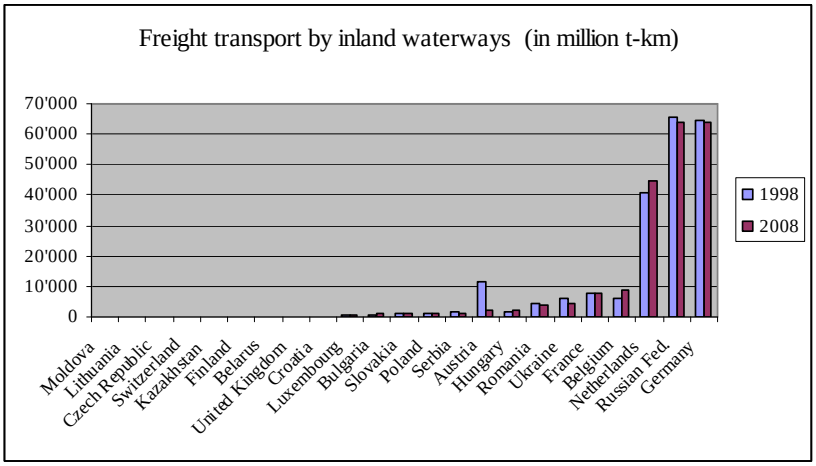
		Motor vessels and barges					*Pushed convoys*					*Minimum height under bridge*[6]	*Graphical symbols on maps*
		Type of vessel: General characteristics					*Type of convoy: General characteristics*						
Type of inland waterway	*Classes of navigable waterways*	*Desi-gnation*	*Maxi-mum length*	*Maxi-mum beam*	*Draught*[7]	*Tonnage*		*Length*	*Beam*	*Draught*[5]	*Tonnage*		
			L(m)	*B(m)*	*d(m)*	*T(t)*		*L(m)*	*B(m)*	*d(m)*	*T(t)*	*H(m)*	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*
								195–200[8]	33.0–34.2[8]	2.50–4.50	9,600–18,000		
	VII						 [11]	275–285	33.0–34.2[8]	2.50–4.50	14,500–27,000	9.10[9]	

[11] Convoys consisting of a larger number of barges can also be used on some sections of waterways of class VII. In this case, the horizontal dimensions may exceed the values shown in the table.

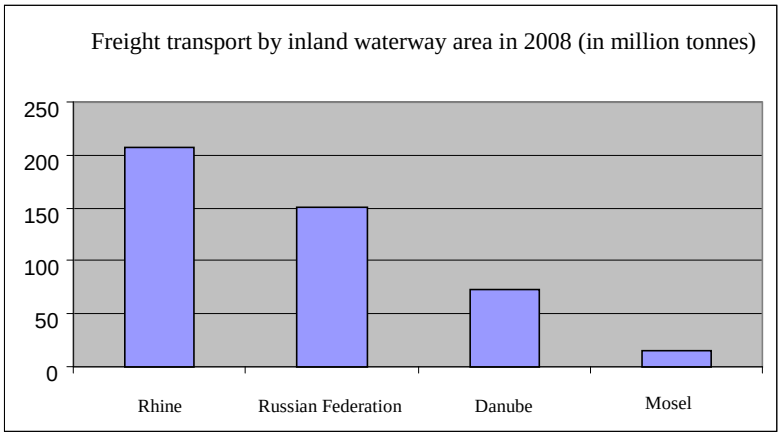
Annex III

Inland water transport indicators





Sources: UNECE Transport Database, International Transport Forum, National Statistical Offices.



Source: National data, Danube Commission, CCNR and Mosel Commission.

Annex IV

Protocol on Combined Transport on Inland Waterways to the AGTC Agreement of 1991 (17 January 1997)

Outline

1. The AGTC Protocol entered into force on 29 October 2009 and has at present 15 signatories and 9 Contracting Parties.

General provisions

2. The Protocol stipulates that its Contracting States adopt its provisions as a coordinated international plan for the development and operation of an international inland waterway network for combined transport which they intend to undertake within the framework of national programmes (Article 2). Contracting States shall undertake appropriate measures in order to achieve the technical and operational minimum requirements as contained in the Protocol (Article 3).

Technical characteristics of C-E waterways

3. The technical characteristics of such waterways are provided in Annex III (a) of the Protocol. In particular, the minimum requirements for efficient container transport are only fulfilled by inland waterways of class Vb and higher that allow vessels with a width of 11.4 m and a length of 110 m to operate with three or more layers of containers (alternatively 185 m long pushed convoys that operate with two layers of containers). This requires, in principle, bridge clearance levels of at least 7 m (3 layers of containers) whereby half of these containers may be empty. It also requires a minimum draught of 2.5 m which to be ensured for at least 60 per cent of the navigation period. In order to allow efficient river-sea transport the minimum bridge clearance level should be 9.1 m with a draught of at least 4.5 m.

4. Further details on these technical characteristics are contained in Annex VI of this document.

Operational minimum requirements for C-E waterways

5. Operational minimum requirements for such waterways are provided in Annex III (b) of the Protocol. It stipulates the length of the minimum navigation period, the maximum duration of breaks in the navigation period and operating hours of locks, movable bridges and other infrastructures.

Technical and operational minimum requirements for terminals in ports

6. Technical and operational minimum requirements for terminals in ports are provided in Annex III (c) to the Protocol. It contains technical minimum requirements for terminals in ports, such as good connections to road and railway lines of international importance

(AGR, AGC and AGTC lines), a minimum cargo handling capacity in the order of 30–40.000 TEU per year, efficient transshipment equipment (15–20 units per hour) as well as suitable berths for inland water vessels used in combined transport.

7. Annex III (c) also contains a list of operational minimum requirements for inland waterways that are identical to those contained in the AGN Agreement. The operational minimum requirements for terminals in ports cover minimum waiting times, such as for road vehicles delivering or collecting loading units that should not exceed 20 minutes.