European Commission

DECEMBER 2016

Rhine Danube

Second Work Plan of the European Coordinator

Karla Peijs

Mobility and Transport

DECEMBER 2016

This report represents the opinion of the European Coordinator and does not prejudice the official position of the European Commission.

Table of Contents

Table of Contents 3

Figures 4

Tables 4

1. Towards the Rhine-Danube corridor updated Work Plan 5

1.1. Introduction 5

1.2. Road Map to setting up the Corridor Work Plan 6

2. Characteristics of the Rhine-Danube Corridor 7

2.1. Corridor alignment 7

2.2 Compliance with the technical infrastructure parameters of the TEN-T guidelines (incl. KPI analysis results) 9

2.3 Supply related Corridor performance 13

3. Results of the transport market study 17

4. Capacity issues 20

5. The identified planned projects (Infrastructure and studies based on the project list) 22

6. Infrastructure funding and innovative financial instruments 24

7. Critical issues on the Rhine-Danube Corridor 26

8. Recommendations and outlook by the European Coordinator 37

Figures

Figure 1: Alignment of the Rhine-Danube Corridor (all modes) 8

Figure 2: Rail compliance by 2015 – criteria 'Electrification', 'Line speed ≥ 100 km/h' and 'Axle load ≥ 22.5 tonnes' 13

Figure 3: IWW compliance (2015) 14

Figure 4: Modal Split 2010 17

Figure 5: International passenger trips and freight volume 2010 17

Figure 6: Evolution of passenger- and tonne-kms 18

Figure 7: Total number of corridor projects by category 22

Figure 8: Total number of corridor projects by country 23

Figure 9: Total number of corridor projects by completion time class 23

Figure 10: Rail compliance by 2030 27

Figure 11: IWW compliance by 2030 29

Figure 12: Road compliance by 2030 34

Tables

Table 1: Background Information on the Rhine-Danube Corridor 9

Table 2: Generic supply-side KPI 10

Table 3: Generic supply-side KPI 15

Table 4: Demand side KPI 18

Table 5: Rail – KPI development and prospects (2030) 28

Table 6: IWW – KPI development and prospects (2030) 30

Table 7: Ports – KPI development and prospects (2030) 32

Table 8: Road – KPI development and prospects (2030) 34

1. Towards the Rhine-Danube corridor updated Work Plan

1.1. Introduction

When the Guidelines of the new Trans-European Transport Network were shaped into what became the (EU) Regulation 1315/2013, a major effort was produced to identify missing links and sections of the corridor where reduced capacity were causing bottlenecks hampering the flow of passengers and freights.

These bottlenecks have been the focus of discussion during many meetings with national, regional and local authorities as well as with stakeholders to identify the most urgent interventions and the possible projects taking into account the available finances form the side of the national authorities as well as on the side of European contribution.

It is interesting to notice that the first Call of the European Commission Programme "Connecting Europe Facility" (CEF), issued in November 2014, has seen the submission of a large amount of projects from all Member States that, before the technical validity screening, were amounting to three times the available budget and even after the technical validity screening there was a request of funding which was more than double compared to the available European Commission contribution.

It is not a surprise that many project proposers are asking for subvention and that countries are recognising the importance of developing a good corridor connection having difficult times to identify which intervention is more urgent.

Projects submitted along the Rhine-Danube corridor have resulted in a high level of presentation and have received a high budget for their implementation. Still a lot has to be done and a coherent and well substantiated plan is necessary, in the entirety of the corridor across borders to achieve the ambitious transport network that has been drafted for the region.

It is in this sense were my contribution can help the National authorities to focus their limited funds to what are the most stringent needs and the most mature actions towards the implementation of the Corridor in its all mode of transport components, making best use of all the financial options that are available and that have to be tailored according to the actual situations and needs.

A very important aspect to be taken into account when designing a corridor, both for the interested authorities and the Commission services, is to create a network capable to connect local traffic flows between themselves and to the international flows, ensuring at the same time a reliable and flexible solution capable to support the economic sustainable growth of the regions crossed by the Corridor and driven by the growth itself.

Each mode of transport plays its role and represents an asset for the region. It is in this optics that I have drafted the Work Plan in its first emission two years ago and it is with the experience gained since then that I am drafting this new issue of the Work Plan.

The Rhine-Danube Core Network Corridor is the transport backbone of the region from the Black Sea towards the very heart of the European Union, connecting the entry ports at the Black Sea, Constanţa and the ports in the Danube Delta, to southern Germany and to the ports of the Rhine along the river Danube, while the other branch

links the Ukrainian-Slovakian border to the same Rhine ports and central European regions.

It is quite a vast region and all modes of transport are important for its internal and external connection including France, Germany, Austria, Czech Republic, Slovakia, Hungary, Croatia, Bulgaria and Romania. The corridor also crosses four non-EU States, Serbia, Bosnia-Herzegovina, Moldova and Ukraine. In these countries my responsibility is focused to the development of navigation on the rivers Danube and Sava. When considering the transport aspect of rivers like Danube and Sava it is also mandatory to keep in mind that they are not only a transport axis, but they are important as a natural habitat, as a recreation area, as a source of energy, as water for irrigation and for drinking, etc.

Special attention is therefore put when drafting infrastructure projects because this need to be planned in an integrated manner, considering the interests of all users and in particular the impact that might result on the living habitat.

Close cooperation with environmental experts is required from the beginning of all infrastructural projects that will be foreseen to improve navigability conditions on the rivers.

In this sense and taking stock from the "Joint Statement on Guiding Principles on the Development of Inland Navigation and Environmental Protection in the Danube River Basin" signed by Members States of the International Committee for the Protection of the Danube River (ICPDR), by the Member States of Danube Commission and by those Members of the International Sava River Basin Committee (ISRBC), I have promoted actions to coordinate activities between Directorate General for Transport and Mobility (DG-MOVE), Directorate General for Environment (DG-ENV) and Directorate General for Regional and Urban Policy (DG-REGIO).

1.2. Road Map to setting up the Corridor Work Plan

I presented the First Corridor Work Plan to the Member States at the end of 2014 based on the results of the Corridor study performed by a Team of consultants and a series of meetings with authorities and stakeholders. After consultation process with the Member States this First Work Plan was adopted and issued in May 2015. Subsequently the work on the updating and refinement of the First Work Plan started in September 2015 with the support of the same external consultants for the second phase of the Corridor study aiming to achieve further development of the study. Three further consultation Fora were held between September 2015 and March 2016 presenting and discussing the next steps in the updating of the study and the Work Plan.

The following sections include the main findings of the activities performed to the updated Rhine-Danube Corridor Work Plan for 2016. In the closing section I will provide a set of recommendations taking stock of the experiences matured and from the result of the study.

Not only technical considerations, it is necessary to drive political conclusions taking into account where priorities have to be set and which type of approach has to be taken according to the various political, technical, economic, environmental and social aspects that have emerged during the exploitation of the study and through the implementation of actions.

2. Characteristics of the Rhine-Danube Corridor

2.1.Corridor alignment

The Rhine-Danube Corridor is the main east-west link between continental European countries connecting France, Germany, Austria, Czech Republic, Slovakia, Hungary, Croatia, Romania and Bulgaria all along the Main and Danube rivers to the Black Sea by improving (high speed) rail and inland waterway interconnections. It includes sections of former Priority Projects 7, 17, 18 and 22. The parts in the Czech Republic and Slovakia are also covered by the Rail Freight corridor 9.[1]

Bulgaria and Croatia are only included in the Corridor as regards waterborne transport. This concerns ports and inland waterways of the Danube and Sava Rivers. Also, non-EU neighbouring countries are included in the analysis of the waterway corridor[2]. In detail this means the sections below are included in the analysis:

- Serbia: related to inland waterways (Danube, Sava) and two ports (Belgrade, Novi Sad)
- Bosnia and Herzegovina: related to inland waterways (Sava)
- Moldova: related to one port (Giurgiulesti)
- Ukraine: related to inland waterways (Danube).

The alignment of the corridor consists of the following main connections, as reported in the maps of the core and comprehensive network of the TEN-T Guidelines (Regulation 1315/2013) and according to Annex 1 of the CEF (Regulation 1316/2013) and has not been changed:

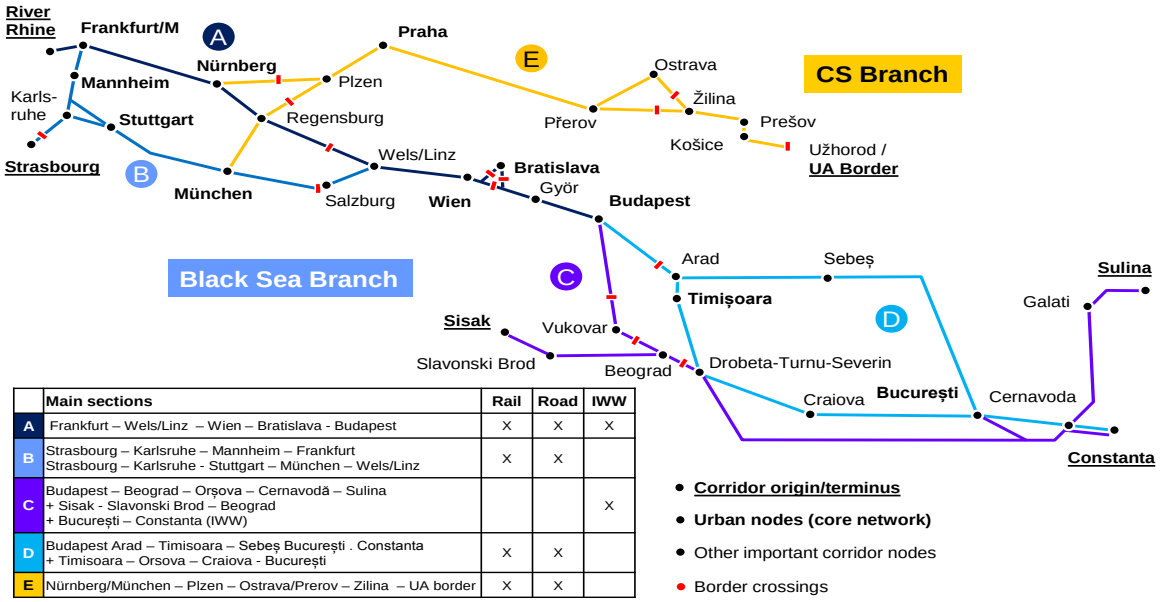
- Strasbourg – Stuttgart – München – Wels/Linz ;
- Strasbourg – Mannheim – Frankfurt – Würzburg – Nürnberg – Regensburg – Passau – Wels/Linz ;
- München/Nürnberg – Praha – Ostrava/Přerov – Žilina – Košice – UA border
- Wels/Linz – Wien – Bratislava – Budapest – Vukovar;
- Wien/Bratislava – Budapest – Arad – Brasov/Craiova – București – Constanţa – Sulina.

Figure 1 shows the full alignment of the Corridor. In total, the Corridor consists of 5,715 km rail network, 4,870 km roads and 3,656 rkm inland waterways that cross nine EU-Member States and four Non-Member States. The 19 inland ports outnumber the 2 seaports. 11 airports form part of the Corridor. The Corridor counts 14 trimodal freight terminals and 27 terminals dedicated to rail and road only.

[1] *See Annex 1 of the Regulation (EU) 1316/2013 establishing the Connecting Europe Facility (CEF).*

[2] *The cooperation with third countries is described in Article 8 of the TEN-T Guidelines. Projects of common interest in order to connect the TEN-T network with networks of neighbouring countries may be supported, including financially, by the Union. The TEN-T Guidelines include maps of the indicative extension of the TEN-T to the neighbouring countries; IWW map is included for the Western Balkan countries.*

Figure 1: Alignment of the Rhine-Danube Corridor (all modes)



	Main sections	Rail	Road	IWW
A	Frankfurt – Wels/Linz – Wien – Bratislava - Budapest	X	X	X
B	Strasbourg – Karlsruhe – Mannheim – Frankfurt Strasbourg – Karlsruhe - Stuttgart – München – Wels/Linz	X	X	
C	Budapest – Beograd – Orșova – Cernavodă – Sulina + Sisak - Slavonski Brod – Beograd + București – Constanta (IWW)			X
D	Budapest Arad – Timisoara – Sebeș București . Constanta + Timisoara – Orsova – Craiova - București	X	X	
E	Nürnberg/München – Plzen – Ostrava/Prerov – Zilina – UA border	X	X	

Source: HaCon

The Corridor can be roughly split into two branches: the "Black Sea" branch and the Czech-Slovak "CS" branch in the north.

The Black Sea branch has two different routes in Germany and Romania. For Germany and partly for Austria there is a northern route via Frankfurt/Nürnberg/Passau - Wels and a southern route via Stuttgart/München/Salzburg - Wels. In Romania, the Corridor routes via Sebes, as well as via Craiova. The section C of the Black Sea branch is exclusively dedicated to inland waterways (i.e. Danube and Sava).

The alignment of inland waterways includes the Main River starting with the confluence with the Rhine, which is connected to the Danube by the Main-Danube Canal at Kelheim. The CEF Regulation includes a pre-identified project on Sava up to the port of Sisak (HR), which is defined as a comprehensive port. The CS Branch has two starting points (München and Nürnberg) and runs via Plzeň and Praha towards Přerov in the Czech Republic. Beyond Přerov at Hranice na Morave the Corridor splits into the line via Ostrava, which is mainly dedicated for passenger traffic, and the direct line via Púchov and Žiliná in Slovakia is manly used by freight traffic.

Table 1 provides the background characteristics on network characteristics and socio-economic statistics of the catchment area for the Rhine-Danube Corridor.

Table 1: Background Information on the Rhine-Danube Corridor

Indicator	Remarks / 2010	2013	2014
GDP in €*)	1.835 billion	1.957 billion (estimated)	2.009 billion (estimated)
Employment *)	42.30 million	42.64 million	43.21 million
Population *)	96.09 million	94.87 million	94.43 million
Rail network	-	5715 km	5715 km
Road network	-	4470 km	4470 km
Inland waterway network EU	Without the planned Danube–București Canal (104 km)	3656 rkm	3656 rkm
Seaports	IWW/Maritime (mixed) ports	2	2
Inland ports	Total no of ports	19	19
Airports		11	11
RRTs	Only RR/RR and trimodal	27/41	27/41
Number of missing links - IWW	Danube - București Canal (2014 study)	1	1
Number of missing links - rail	Romania: new high-speed line București – Constanta	1	1
Kms of Missing Infrastructure	Danube - Bucuresti Canal (2014 study)	112	112
Kms of Missing Infrastructure - rail	Romania: new high-speed line București – Constanta	About 220	About 220

**) according to catchment area*
Source: Panteia Status 05/2016

2.2 Compliance with the technical infrastructure parameters of the TEN-T guidelines (incl. KPI analysis results)

Article 4 of the Regulation (EU) 1315/2013 describes the objectives of the trans-European transport network, which shall strengthen the social, economic and territorial cohesion of the European Union. The aim is to create a single European transport area, which is efficient and sustainable, to increase the benefits for its users and to support inclusive growth. The Member States agreed to the list of specific objectives, which have to be met by the Rhine-Danube Corridor by 2030, the latest.

On the basis of these objectives a compliance analysis was performed. The compliance analysis compares the current (infrastructure) parameters with the target values set for the year 2030. The analysis uncovered the respective deficits on single corridor sections and nodes. To assist monitoring the achievement of the objectives, Key Performance Indicators (KPI) have been defined across all corridors that apply to all core network corridors and measure the extent to which target values are realized. The results of the compliance analysis in 2014 provide the baseline value for the KPI of 2013.

Table 2: Generic supply-side KPI

Mode	KPI	Baseline value 2013
Rail network	Electrification	91%
	Track gauge 1435mm	100%
	ERTMS implementation	7%
	Line speed >=100km/h	95%
	Axle load >=22.5t	67%
	Train length (740m)	47%
Inland waterway network[1]	CEMT requirements for class IV IWW	85%
	Permissible Draught (min 2.5m)	77%
	Permissible Height under bridges (min. 5.25m)	86% (5)
	RIS implementation (minimum requirements set out by the RIS directive are met)	100%
	Targeted depth according to waterway manager reached[2]	45%
Seaport	Connection to rail	100%
	Connection to IWW CEMT IV	100%
	Availability of clean fuels	0%
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	100%
	Facilities for ship generated waste	100%
Inland ports	Class IV waterway connection	100%
	Connection to rail	90%
	Availability of clean fuels	0%
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	95%
Road network	Express road/ motorway	77%
	Availability of clean fuels	available
Airport	Connection to rail[3]	67%
	Availability of at least one terminal open to all operators in a non-discriminatory way and application of transparent, relevant and fair charges	100%
	Capacity to make clean fuels available to airplanes[2]	Intentionally available
	Availability of clean fuels (ground services)	67%
Rail Road Terminals (RRT)	Capability for Intermodal (unitised) transhipment	44%
	740m train terminal accessibility	2%
	Electrified train terminal accessibility	16%
	Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	100%

[1] *Member States and Western Balkan*
[2] *Corridor specific indicator*
[3] *considers only airports, which are to be connected to rail by 2050*

In summary the infrastructure of the Rhine-Danube Corridor already started from a high level of compliance with Regulation 1315/2013 in 2013.

91% of the rail lines are electrified and gaps only relate to some sections in Germany (München-Mühldorf-Salzburg), the cross-border sections between Germany and the Czech Republic and in the Czech Republic. The entire rail infrastructure of the Corridor provides for standard gauge (1,435 mm). An operating speed of at least 100 km/h is enabled at over 90% of the rail lines. Only insufficient operating speed is available at sections in Romania and Hungary (speed drops at the node of Budapest). Lowest compliance rates for rail relate to axle load, train length and ERTMS. 67% of the rail network allow for an axle load of 22.5 tonnes. Line sections not fulfilling the requested standards are mostly located in Hungary and Romania. If speed limitations are accepted, the required axle load may be reached in Hungary. A maximum train length of 740 m is permitted at 47% of the rail infrastructure. Sections which only provide for shorter trains are located in Austria, Romania and Hungary. Operational ERTMS are exceptional at the Rhine-Danube Corridor and are restricted to some line sections in Austria and Hungary.

85% of the inland waterway network, including the Western Balkan countries, is classified as a class IV waterway or higher, only the Sava River is assigned to a lower class. A draught of 2.50m is permissible at 77% of the inland waterways. Shortfalls relate not only to the above mentioned sections of the Sava but also to the Upper Main and the Danube between Straubing and Vilshofen (1.6m at 94% of days per year). Five bridges offered a clearance below 5.25m; 86% of the sections length does comply with the requirement. Some German bridges can represent a particular challenge for the navigation of ships. River Information Services are available along the entire Corridor (100%) but to a different extent and quality. International and national data exchange is not always ensured. The specific indicator showing the percentage of section kilometres on which the targeted fairway depth was met, reveals the particular challenges of the Rhine-Danube Corridor. Achievement of targeted depths varies dynamically as it depends not only on the waterway infrastructure conditions but also on the hydrologic circumstances. Above all at free flowing river sections, they are challenging to be met. In 2013 the targets were met at 48% of the inland waterways sections length, in 2013 at 45%, in 2014 at 58% and in 2015 at 42%.

The majority of the Corridor core ports comply with the requirements set by Regulation 1315/2013. Only two ports, Vidin (BG) and Cernavodă (RO), do not meet the minimum depth and therefore require dredging activities. All core ports[3] have a road connection but of varying quality in terms of number of lanes and capacities. The situation is similar in view of railway connection, as only two ports, Komarom (HU) and Cernavodă (RO), have no fully functional rail connection to the hinterland and the rest of the network. The level of intermodal facilities in ports is varying and, generally, declines further downstream, with a noticeable need for additional provision of such facilities in determined ports. There are five ports with reported incompliances in terms of lacking intermodal facilities: Komarom (HU), Slavonski Brod (HR), Drobeta Turnu Severin (RO), Calafat (RO) and Cernavodă (RO). Plans for alternative clean fuel facilities have been reported by the Port of Constanţa, while some of the remaining core ports on the Corridor took part in the LNG Master Plan on the Rhine-Main-Danube axis. Out of this project, the Port of Ruse took the opportunity and constructed a LNG terminal with fuelling facilities for future LNG vessels. As regards the shore-side

[3] *Rhine ports are tackled in the study on Rhine-Alpine Corridor, while the Czech ports are tackled in the Orient-East Med Corridor study.*

(external) supply of electricity to vessels in ports, most of the ports reported the existence of shore-side electricity supply facilities for vessels, except for the ports of Wien (AT) and Galați (RO).

For intermodal terminals, the 2014 study considered different criteria, but one can guess that the situation two years ago was not pretty much different form the KPI analysed for 2015/16 so that the same values were included: none of the present 43 terminals of the Rhine-Danube Corridor, which were incorporated in the analysis, fully comply with the three types of KPIs as listed in table 2. Only 44% are able to handle all three types of loading units. While the focus on singles types of loading units might be explained by the past/current market orientation, the electrified rail access which is fulfilled by only 16% of the sites and the limited length of the handling tracks where only one site fulfils the Regulation target, create a real burden for an efficient supply of intermodal transport services. The largest challenge for the present sites is their historically grown access to the rail infrastructure (single sided, non-electrified, annex to shunting yard or port railway line) and the limitation of the (wagon) train length by either the reception/departure siding or the transhipment track(s). Only Budapest BILK is proving transhipment tracks of ≥740 m length, while four sites are covering the present industry standard of 700 m. It is recommended that rail infrastructure managers and terminal managers cooperate towards realizing the tracks-side and terminal side improvement of that parameters in a coordinated way. With respect to the last criteria one can state that all terminals are basically fulfilling this requirement since at least no court decisions are known where a terminal was judged to discriminate its users.

About 77% of the total length of roads is classified as motorways (express ways) and 23% are conventional roads. The majority of conventional roads are still in the eastern part of the corridor, in Slovakia and in Romania. The availability of alternative clean fuels along the road corridor is given; possibilities for liquefied natural gas (CNG) and liquefied petroleum gas (LPG) are available in all Member States at different levels.

The number of infrastructure systems of publically accessible charging stations and battery swap stations to recharge electric vehicles is steadily increasing. Such facilities are generally available in the cities in Germany, Czech Republic and Austria. In Slovakia, Hungary and Romania the number of stations is low and concentrated in several urban areas.

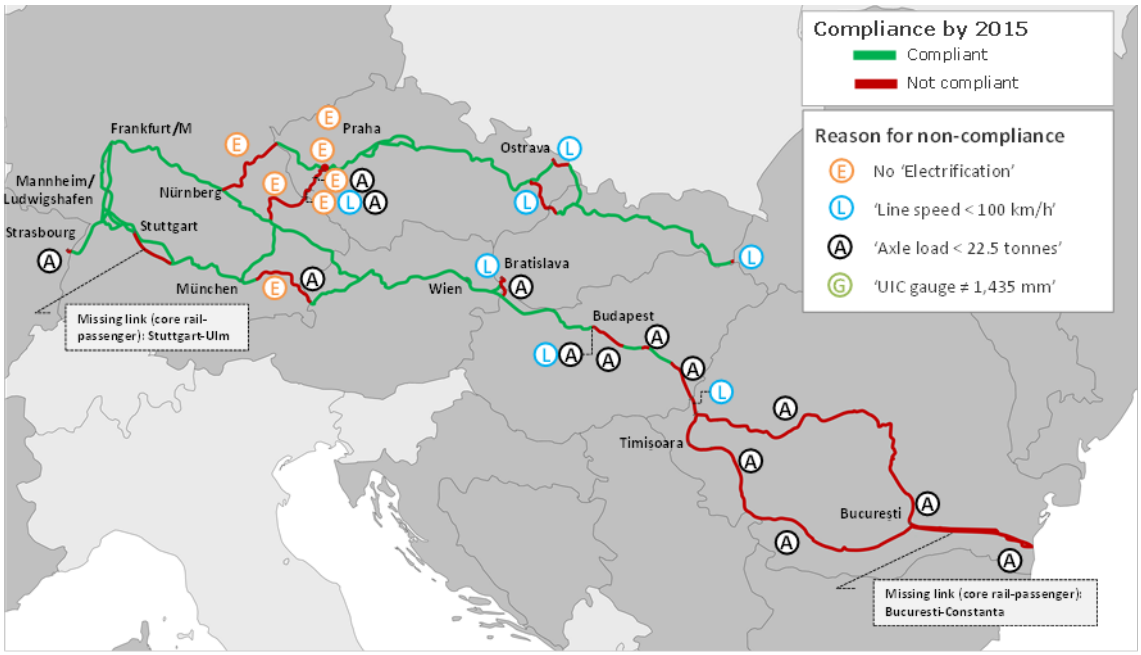
The airports of Frankfurt, Stuttgart, München, and Wien have a direct rail connection; Bucuresti and Ostrava have now also a rail connection. Nürnberg, Praha, Bratislava, Budapest and Timişoara do not dispose of a rail connection. Thus, the Airport of Praha (Václav Havel International) and Budapest Airport (Ferenc Liszt International) are to be connected to rail by 2050. Relevant studies are under preparation. Frankfurt, Stuttgart, München and Wien started to make provisions for the use of alternative clean fuels for ground services. Charging stations for e-cars are under implementation. All airports dispose of cargo terminals, which are open to all operators in a non-discriminatory way.

2.3 Supply related Corridor performance

Since the adoption of the TEN-T Regulation by the end of 2013 values of Key Performance Indicators changed only slightly. Nevertheless, Member States have implemented and prepared a number of measures in order to provide an operational trans-European transport network in line with the provisions of Regulation 1315/2013 by 2030.

All recently concluded rail projects are located in Austria and in the Czech Republic. In both countries they rather aim at enhancing capacity and increasing the permitted speed for passenger trains at sections that are already compliant with Regulation 1315/2013. Three Czech projects dealt with the improvement of the section between the DE/CZ border and Plzeň. One of these projects – located on the line between Cheb and the state border to Germany actually did improve the compliance figures regarding electrification and speed on the cross-border section between Germany and the Czech Republic.

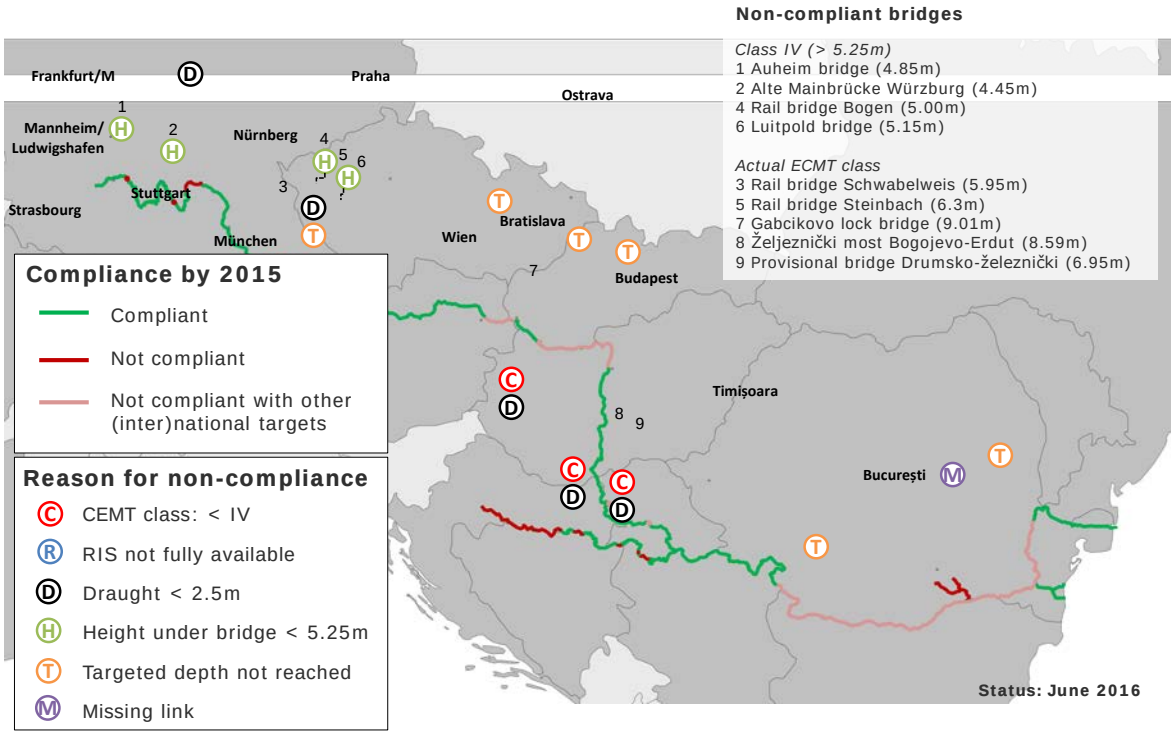
Figure 2: Rail compliance by 2015 – criteria 'Electrification', 'Line speed ≥ 100 km/h' and 'Axle load ≥ 22.5 tonnes'



Source: HaCon, May 2016

None of the implemented inland waterway projects had an influence on the static KPI. Only the dynamic indicator measuring the achievement of the targeted depth according to the waterway manager varies from year to year, depending on both, hydrological and infrastructure conditions. Nevertheless, important activities to improve inland waterway infrastructure have been implemented. Works at the Upper Main to increase the permissible depth are consistently progressing; building permissions for the realization of river training works between Straubing and Vilshofen are currently prepared; experiences from the "Integrated River Engineering Project East of Wien" are casted into the next implementation step and the tendering process for the realization of "River Training and Dredging Works between Backa Palanca and Beograd" (Serbia) is on-going. The preparatory study "FAIRway Danube" aims at an increased transparency on navigation conditions and is paving the way for well-founded improvement measures.

Figure 3: IWW compliance (2015)



Source: viadonau, status June 2016

Ports KPI have also been stable since 2013, with the positive exception of the availability of clean fuels. In 2015, the private company Bulmarket Ltd. completed an LNG terminal in an inland port in Ruse (Bulgaria). Although not related to the defined KPI, a number of projects contributed to the qualitative improvements of ports capacity, road and rail connections or intermodal capacities and thus added to the development of the Rhine-Danube Corridor. Examples for such projects are the increase of rail capacity of the Port of Constanţa (RO), the restoration of the quay wall in the Port of Regensburg (DE) and the rehabilitation and development of the waterside infrastructure in the Port of Budapest/Csepel (HU). The study phase for the flagship project "High-Performance Green Port Giurgiu" was finalized and is now implemented. Aiming at further integration of inland ports into the multimodal logistic chains the "Expansion of the tri-modal inland port of Wien by land recovery" was completed in 2015.

Facilities of the Rail-Road Terminals München-Riem Ubf, Linz Stadthafen, Ennshafen, Žilina – Teplička have been extended and improved. Preparatory steps to build an intermodal terminal in Ruse have been completed in 2015. Works at the hub terminals Wien-Inzersdorf (ÖBB) and Budapest (Metrans) for two additional large size Rail-Road Terminals started.

Between 2013 and 2015 road infrastructure on the Rhine-Danube Corridor was slightly improved by seven road and innovation projects related to ITS, located in three Member States – Austria, Hungary and Romania. In Slovakia 46km of new motorways have been completed in this period. New construction projects as well as capacity enhancements and a feasibility study for the new motorway between Arad and Timisoara have been completed. Three ITS study projects were completed on the corridor Of particular importance is the removal of the cross-border bottleneck between Mako (HU) and Nadlac (RO), providing a continuous motorway connection between both Member States.

Airport related KPI did not change since 2013, even if six projects have been completed. Most relevant are the completion of rail connection of airport Wien to the Wien central Station (KPI target achieved), the adaptation of the rail platform at the airport Wien and the connection of the Ostrava airport to the railway network. Other projects have been studied on rail connections to the airports of Frankfurt and München.

The following Table 3 presents the performance of the corridor measured by the KPI.

Table 3: Generic supply-side KPI

Rail KPI	Baseline 2013	Status 2015
Electrification	91%	91%
Line speed ≥ 100 km/h	95%	95%
Axle load ≥ 22.5 t	67%	67%
Train length ≥ 740 m	47%	47%
Track gauge = 1,435 mm	100%	100%
IWW KPI	**Baseline 2013**	**Status 2015**
CEMT requirements for class IV IWW	89%	89%
Permissible Draught (min 2.5m)	80%	80%
Permissible Height under bridges (min. 5.25m)	83% (5)	87% (4)[1]
RIS implementation (minimum requirements set out by the RIS directive)	100%	100%
Targeted depth according to waterway manager reached	51%	43%
Inland ports KPI & TP	**Baseline 2013**	**Status 2015**
CEMT Class IV waterway connection (KPI)	100%	100%
Connection to rail (KPI)	90%	90%%
Availability of clean fuels (KPI)	0%	6%
Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges (KPI)	100%	100%
Intermodal facilities (TP)		71%
Minimum draft (TP)		88%
Shore-side power supply facilities (TP – non-compulsory)		88%
Road KPI	**Baseline 2013**	**Status 2015**
Express road/ motorway*)	77%	77%
Availability of clean fuels**)	available	available

*) Note: Due to the completion of short road projects there is only a slight improvement of the KPI from 76.6% to 77.4% between 2013 and 2015.

**) Note: The availability of clean fuels along the road network is a dynamic commercial process depending on various factors such as number of operative vehicles suited for alternative drive technology, petrol price. Alternative fuels (CNG, LPG and LNG and electric charging stations) are widely available in all RD countries although the density of stations along the Corridor differs from section to section and country to country. The majority of the stations are located in the vicinity of urban nodes.

Airport KPI	Baseline 2013	Status 2015

Connection to rail*)	67%	67%
Availability of at least one terminal open to all operators	100%	100%
Capacity to make available clean fuels to airplanes Availability of clean fuels**)	available 67%	available 67%

*) The KPI includes only those airports, which are to be connected to rail by 2050.
**) This KPI considers only the availability of clean fuels to ground services

Rail Road Terminals	Baseline 2013	Status 2015
Capability of handling intermodal transport units	44%	44%
Accessibility by trains of 740m train length	2%	2%
Accessibility by electrified trains	16%	16%
Availability of at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges	100%	100%

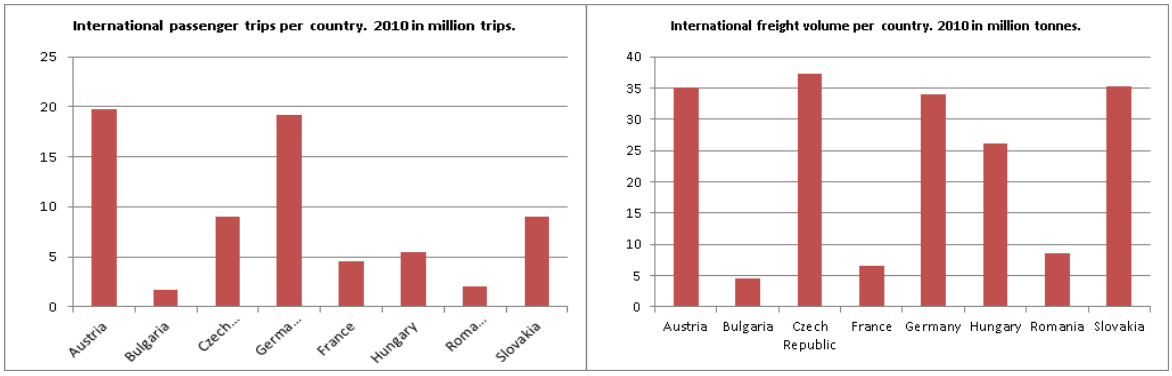
3. Results of the transport market study

The KPI background figure presents the transport demand situation on the corridor. Under the KPI framework new data was collected in addition to the 2014 study data. For transport statistics there generally is a delay before statistics become available for all countries or nodes. Therefore the 2014 is seen as the most recent and complete data. Further, this chapter provides information on the future transport volumes. Finally the Western Balkan countries traffic is presented in a separate paragraph.

Figure 4: Modal Split 2010

Source: Study on the Rhine-Danube Corridor (2014)

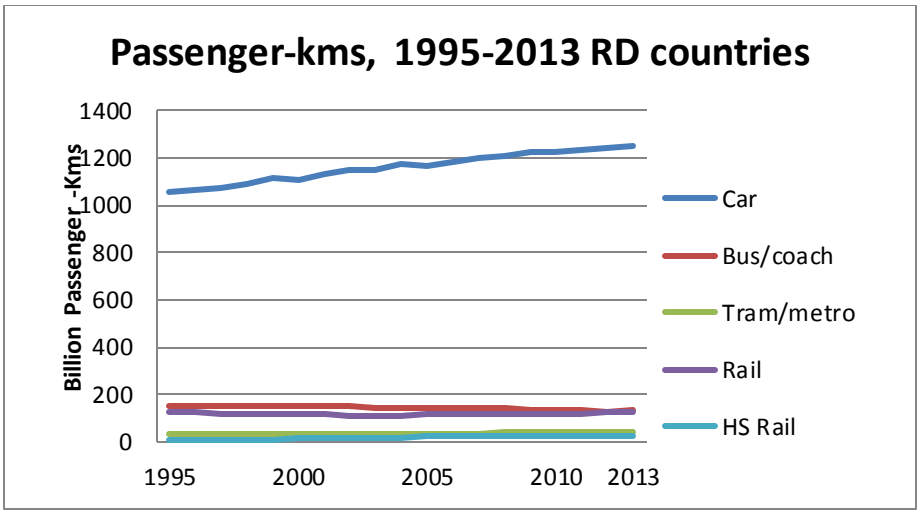
Figure 5: International passenger trips and freight volume 2010

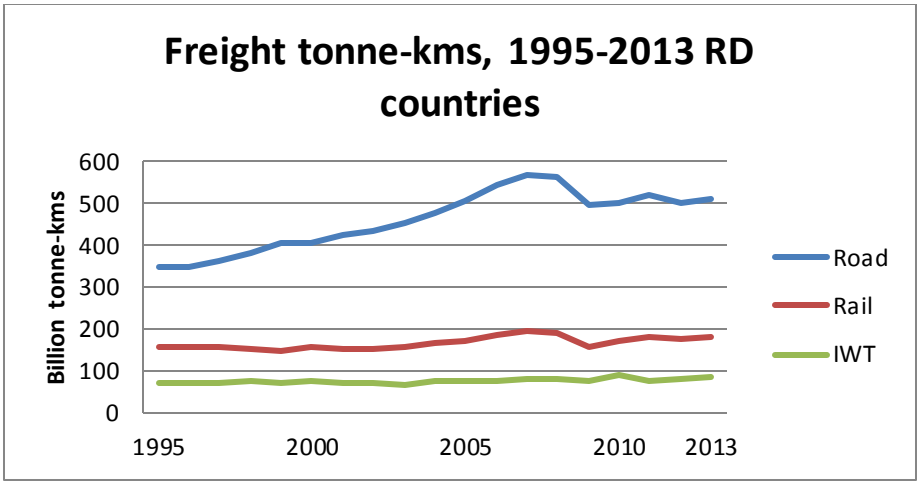


Source: Study on the Rhine-Danube Corridor (2014)[4]

[4] *The corridor alignment, as reported in chapter 2.1, includes Croatia and Bulgaria only for inland waterways and not for the overall international traffic.*

Figure 6: Evolution of passenger- and tonne-kms





Source: Eurostat 2016.

Table 4: Demand side KPI

Node	KPI	Unit	2010	2013	2014
Core Seaports	Total passenger flows	# of trips per year	21,286	54,226	64,861
	Total freight flows	Million tonnes per year	43.0	47.2	46.6
Core Inland Ports	Total freight flows	Million tonnes per year	54.8	56.0	55.8
Core Airports	Total passenger flows	Million passengers per year	150.2	161.4	165.6
	Total freight flows	Million tonnes per year	2.8	2.6	2.8

Source: Panteia

Both for passenger and freight transport road has grown as a transport mode in the period 1995-2013. Looking in detail at the period 2010-2013 it can be seen that road

volume is growing, but that the relative modal share is no longer growing. This is the case for both passenger and freight. For passenger it should be noted that air travel has increased as well in the time period. The effect of modal share stabilising is visible in Germany, where a lot of transport takes place. The effect is not limited to Germany. In the other Corridor countries the road mode share is also not growing.

The amount of passengers handled at the airports is growing in the time frame 2010-2014. More than 10% passengers have made use of the Corridor airports in 2014 compared to 2010, leading to a total of 166 million in 2014. Frankfurt was and is the largest airport. Frankfurt airport has also grown the most in the time period. Freight volume for air is stable in the period 2010-2014. The trend is to make less use of dedicated freight airplanes and more of the cargo hold in passenger airplanes. This is facilitated by the increase of passenger flights.

Freight volume for seaports has increased in the period 2010-2014. There was a decline of volume in 2014 compared to 2013. The port of Constanța, which has a much larger volume of traffic compared to the other seaport Galați, had the largest volume growth. Also the passenger volumes of the seaports have grown; numbers show that freight plays a far bigger role compared to the passenger function.

The volume of inland ports shows a similar pattern as the seaports. In the period 2010-2014 the volume increased and there was a decline of volume in 2014 compared to 2013. The growth in the period 2010-2014 of 2% isn't that large, therefore "stable" volume would also be a correct classification. The individual ports growing and the ports declining in volume do not present a specific pattern over the years.

International transport volumes and modal share

The existing transport pattern indicates that road is the most used cross-border transport mode for passenger and freight. For passenger transport road covers 83% of the total trips, followed by rail with 13% and air with 4%. For the individual modes the bidirectional traffic flow between Austria and Germany is the most important traffic flow, except for rail. For rail the most import flow is between Austria and Hungary. For road the bidirectional traffic flow between Austria and Slovakia is the second highest. The single French region on the Corridor has a high number of road traffic. For rail the highest intensity is the flow between Austria and Germany, and for air the flow between Germany and Hungary. International Freight demand transport is concentrated on the western part of the Corridor. The transport in between the areas of Austria, Germany, Czech Republic and Slovakia accounts for 82% percent of the total Corridor transport.

In the period 2010-2013 the road traffic has kept its modal share on the Corridor regarding freight transport. The transport volume for road within the Rhine-Danube Corridor is twice as big as for rail, and four times as big as for inland waterway. Or in percentages: 58% for road, 28% rail and 14% IWT. The Czech Republic has the highest rail and highest road volume of the Corridor countries. The IWT freight pattern presents an imbalance in loads. For example the load from Hungary to Romania is twice the volume of the load from Romania to Hungary. The load from Slovakia to Austria is also a considerable volume, but the flow from Austria to Slovakia is not. In terms of transport volume on the Danube Romania ranks highest. For Germany there is relatively high transport to the French Strasburg region compared to the Danube volume. For rail, the transport connection between the Czech Republic and Slovakia accounts for about 34% of the total volume. The Czech Republic has the highest international freight volume on rail and road, in the Corridor, compared to the other countries.

Traffic forecast

The conclusion on the demand side is that road transport will be dominant in the future market in the baseline scenario. Currently road is dominant and the position is expected to strengthen practically Corridor wide in the baseline situation. This is the case for international and national traffic, passenger and freight. In a number of cases the growth rates are higher for alternative modes of transport, but the net volume growth is generally highest for road. Passengers are forecasted to have more individual wealth, more car ownership and in a limited number of countries face deteriorating public transport. In the baseline freight scenarios a continued trend is generally assumed, which is beneficial for road because if a mode shift has not taken place in the past years, no future mode shift is forecasted in some models. Still in scenarios of higher road costs and improved alternatives, road is still expected to remain dominant. This leads to the conclusion that there is a need to strengthen the rail and inland waterway transport modes on the Corridor to take over future transport volumes through the improvement of the rail and the inland waterway network and not to stop there to support modal shift. International traffic, import, exports and transit is expected to grow in all forecasts. This helps to create a larger playing field for intermodal operations. The traffic of the Eastern part of the Corridor will grow at a higher rate. However the Member States of Austria, Czech Republic, Germany and entry/exit node France (Strasbourg) on the Corridor are expected to maintain the high transport demand by 2030. In Germany the latest forecast of 2016-2030 indicates a more moderate transport growth, compared to the 2007-2025. For both freight and passenger transport especially road transport has more moderate growth. This result in lower volume, but also in a more favourable modal split compared to the old forecast.

4. Capacity issues

Capacity issues are defined as a lack of traffic throughput at a location, or congestion. The capacity is closely related to the transport demand and focusses on the development of the supply side of the infrastructure.

The supply side, information on capacity and the utilization at infrastructure level has been analysed:

- Road currently has short distance capacity issues around corridor nodes, which influence the long distance travel as well. Germany has the most urban areas and also the most utilised road infrastructure. In the expected implementation plan Germany has the highest number of capacity upgrades projects. Slovakia also has a high number of capacity projects in the implementation plan. Other supply characteristics presented in the TMS are border waiting time and infrastructure charges.

- Rail is faced with capacity issues on short and long distance areas. This does include cross border sections but not particularly. Future supply is foreseen in the 2030 Federal Transport Infrastructure Plan (BVWP) for rail. For Germany this will improve the situation and less capacity bottlenecks are expected in 2030 due to capacity projects. For the Czech and Slovak Republics rail free capacities are expected to remain stable. The added capacity is to be consumed by the higher transport demand. In Hungary the most relevant capacity issue is at the Budapest node. Due to large increase of traffic, the node is expected to become a significant bottleneck. The lack of a second track between Hungary and

Romania may become an important bottleneck in the future although for the time being the existing traffic is handled properly.

- IWT would have sufficient capacity if the parameters according to fairway ECMT classifications would be observed. However, this is not the case. Existing locks on the sections have sufficient capacity for the near future but some are in a bad state of maintenance and have therefore become a bottleneck. Lock projects are identified in the implementation plan. Furthermore, the Danube fleet is operating under low water conditions and therefore the barges cannot use their full loading capacity. All free-flowing sections on the Corridor are problematic in terms of fairway depth, depending on the time of season. Icing periods, which sometimes occur between January and February, limit the capacity as well. The operation of larger ships and convoy arrangements may increase the capacity of the Danube fleet. To improve the IWW supply in the future all bottlenecks are to be relieved and all fairway maintenance needs to be coordinated until 2030 and beyond.

- Core and comprehensive ports have been evaluated. For a number of ports, intermodal connections in particular with rail have to be improved. When all the capacity projects will take place no more large capacity problems are expected for the ports.

- Air passenger traffic is the overall highest growing transport mode in the reviewed forecasts of the TMS. The current air volume is low however, both for freight and passengers. Capacity expansions at the largest air nodes of Germany, Austria and the Czech Republic are considered as needed and are ongoing. Hungary also has a large air node, but further capacity is not needed immediately.

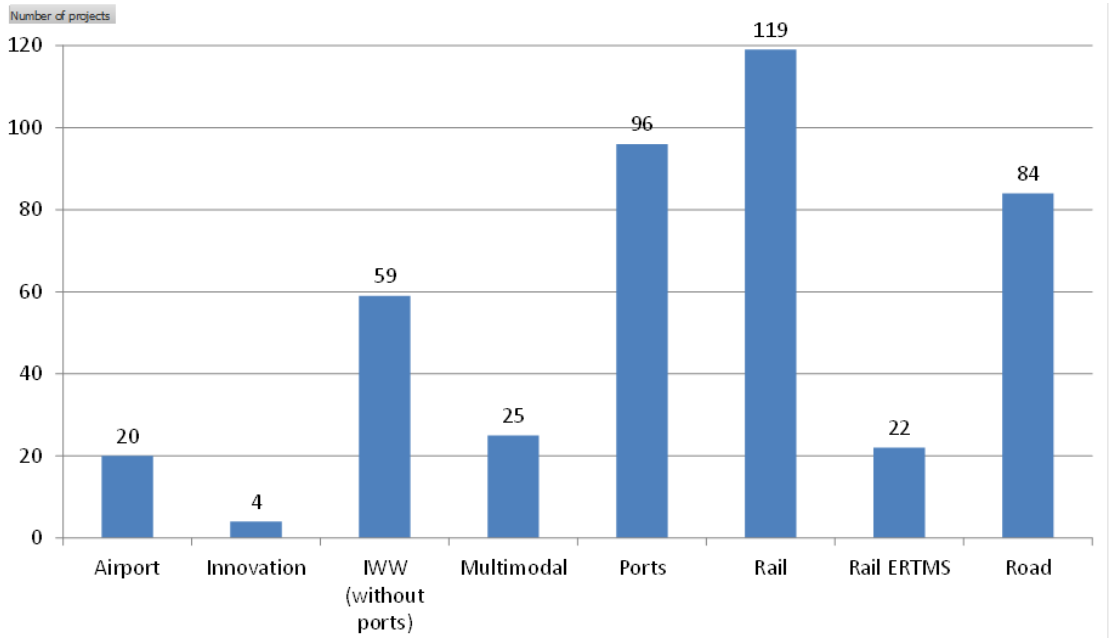
The German part of the corridor (South of Germany) has the busiest infrastructure for road and rail. This information was presented in the 2014 study. Expected infrastructure investments will help increase supply. In the latest German Federal Transport Infrastructure Plan (BVWP 2030) a capacity analysis was performed on the future transport volumes and the current network was compared with the 2030 network. In Germany some locations are problematic in 2030 as well as in 2010 for both road and rail. The current road congestion around the München and Nürnberg nodes is forecasted to decrease to more acceptable levels by 2030, as a result of the ongoing road projects. The node of Stuttgart will remain congested despite the road projects taking place. For rail the Frankfurt – Nürnberg – Passau section is presently considered the most congested section in 2030. Ongoing projects are funded to reduce such forecast. The rail section Frankfurt – Nürnberg will improve, but congestion will remain a topic on this section. The section South of München is also congested, however it is expected that this rail bottleneck will be solved by 2030.

5. The identified planned projects (Infrastructure and studies based on the project list)

As of mid-May 2016, the Rhine-Danube project list contains 429 projects altogether. This figure comprises all projects that have been concluded in 2014/2015 (i.e. since 11th December 2013, when the TEN-T Regulation was published) and all projects with envisaged finalisation in 2016 or later. Compared to the first version of the Work Plan in 2014, this means an increase by 91 projects (+27%).

287 out of overall 429 projects (= 67%) are located on the Rhine-Danube Corridor exclusively; another 92 projects (= 21%) have common sections with one and 41 projects (= 10%) with two other corridors. Further nine projects are allocated to four or more corridors. Most of these projects are in common with Orient/East-Med corridor (98 projects) and with Baltic-Adriatic corridor (46 projects). Figure 7 shows the distribution of the projects by categories. The lion´s share (141 projects = 33%) refers to Rail (incl. ERTMS), followed by Port (22%), Road (20% share) and Inland waterway (without ports, 14%) projects. Multimodal, Airport and Innovation projects contribute only minor shares to the overall projects' number.

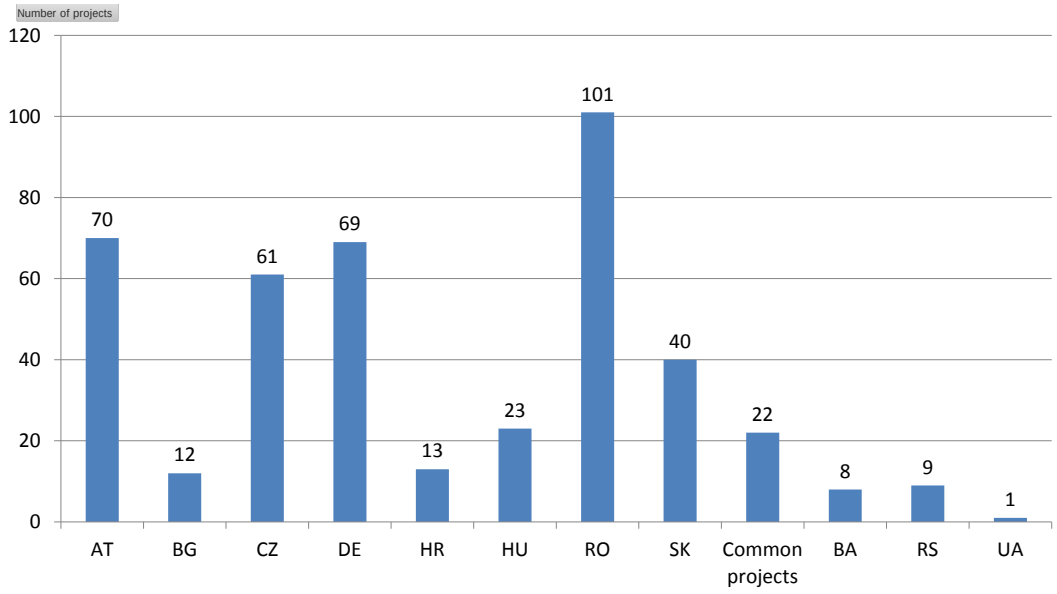
Figure 7: Total number of corridor projects by category



Source: HaCon, based on project list

The attribution of the projects to the countries of the Rhine-Danube corridor is displayed in Figure 8. The ranking is led by Romania, where more than 24% of all projects are performed; more than half of these Romanian projects refer to port related measures. Austria, Germany and the Czech Republic contribute by 16% - 14% to the total project number. In these countries and in Slovakia, rail and (in case of Germany) also road projects play the major role. All other countries each represent a maximum 6% of the project list.

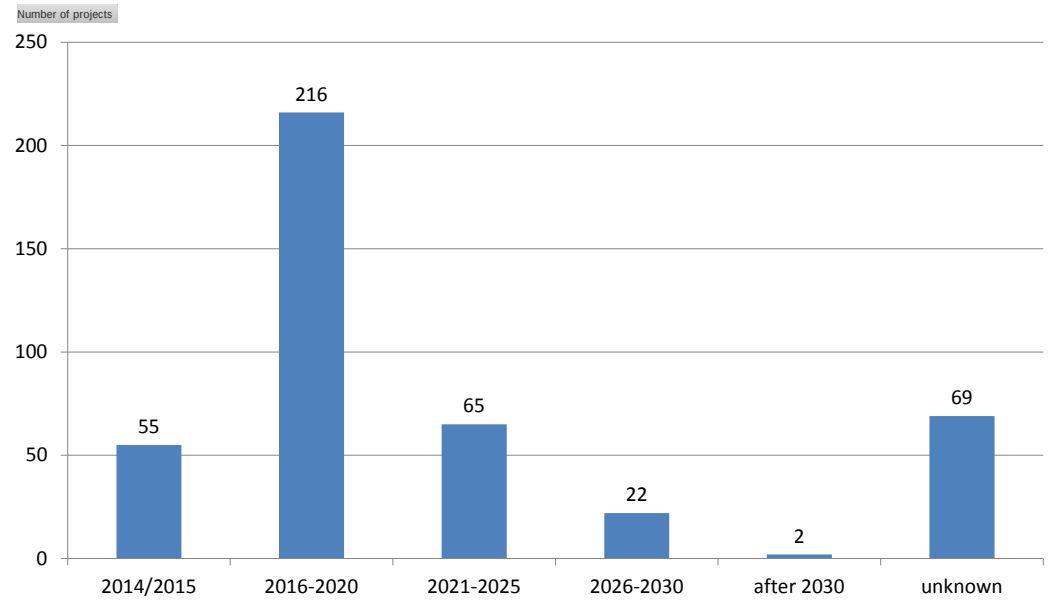
Figure 8: Total number of corridor projects by country



Source: HaCon, based on project list

The analysis of completion times shows that 55 projects have already been concluded in 2014 and 2015. For the remaining 306 projects it can be stated that - except for 1 rail and 1 road project - all studies and works are expected to be completed by 2030. Moreover, the majority (216 projects) will be finished already by 2020 latest. Between 2026 and 2030, only few (mostly rail and road) projects will still have to be finalised.

Figure 9: Total number of corridor projects by completion time class



Source: HaCon, based on Rhine-Danube project list, status: 17/05/2016

6. Infrastructure funding and innovative financial instruments

The development of core Network Corridors requires, inter alia, a critical mass of investment to take place within a short time-framework; therefore a careful exam of the potential financial sources has to accompany the corridor planning. Some key criteria to be appraised are reported in this section of the work plan.

The projects to be developed can be ranked in three different categories from the point of view of funding and financing needs:

For several revenue generating projects "closer to the market" in terms of development (technological components, including on large infrastructure of key European Interest, brownfield upgrade) or service provision (terminals for freight / passengers, enhancement of infrastructure capacity / performances), a substantial component of the project funding can come from own resources (e.g. equity) and financing resources gathered by the project promoters on the market (e.g. in the form of equity, loans or bonds). The private investors would need to recover their initial costs of capital and receive a reward for the risk born (the higher the risk the higher the return required).

The project may look at conventional lending from public and private banks, alternative financing from institutional investors (e.g. bonds) and at financial instruments (set in Annex 1) for instance to cope with the unbalances of cash-flow during its construction and rump-up phase until a sustainable flow of revenues is secured, and to address particular risks and market failures, and to secure lending with long maturity. Financial instruments could be provided in the form of credit enhancing and guarantees (be it a specific legal guarantee or a financial guarantee to ease access to financing).

Hard-infrastructure, greenfield, risky, long-term projects such as the majority of cross-border railway connections as well as inland waterways navigability improvements might require a substantial public support through public funding, even if innovative approaches can apply to project development and/or to specific components of the investment. Public funding can be structured in different ways (also depending on the budgetary constraints of the public authorities) such as lump sum subsidy (grant), fiscal incentives, operational deficit coverage and availability payment schemes.

In a variety of intermediate cases the project will require a more limited funding component in order to reinforce its financial viability – these projects could be supported through a blending of funding (e.g. grants) and financing.

In this respect, beside the national budget, the funding contribution can effectively came from the EU centralized managed funds, such as the Connecting Europe Facility (CEF) and from decentralized managed funds such as the European Structural and Investment Funds (ESIF) while the financing resources may came from the EU financial instruments, such as the CEF Debt Instruments and financial products available under the European Fund for Strategic Investment (EFSI).

For all these 3 different categories of projects the public intervention with the different degree of intensity is justified on the ground that these projects of high socio-economic and EU added value, substantially address overall public service obligations, suboptimal investment level, market failures and distortion due to externalities

(positive, for the projects supported, including in terms of strategic added-value, and negative for competing modes), and therefore calls for the transfer of resources.

When considering the project funding structure in a comprehensive and multimodal setting, earmarking of revenues and cross-financing solutions, applying "Polluter-pays" and "user-pays" principles ought to be duly explored.

A project can be fully developed through project financing if the revenue stream (secured by public and/or private funding), exceeds the investment and operational costs (CAPEX+OPEX). Such an approach calls for a careful risk sharing between the Member States (project management) and private partners.

Notwithstanding the project self-financing potential linked to user fees, a cautious and innovative approach aimed at exploiting the project' life-cycle and define clear responsibilities and risk sharing between project promoters, sponsors and implementing bodies is more and more needed to deliver projects on time, cost and quality and to fully exploit the potential, while minimising future liabilities on public budgets.

A pre-condition for project financing is a conducive regulatory and legal environment, in order to set the incentives right to enhance the public and private sector involvement in the delivery of infrastructure investment.

Within the Rhine-Danube Corridor, a screening exercise on the projects' list has highlighted the following: The project costs of the list sum up to 69.9bn EUR, which means an increase by about 5.2bn EUR or 8% compared to the 2014 Work Plan. For 35 projects no information about costs is yet available.

39% of these overall costs are allocated to Germany (with only 16% share of project quantity) meaning that German projects show an above-average volume. More than 80% of the German investments refer to rail projects; a similar rail dominance of the project costs can be found in Austria, whereas Romania, Slovakia and the Czech Republic also show a considerable or even higher share of road related project costs.

The project specific costs show a large variety, reaching from 60,000 EUR up to 6 bn EUR per project. Most of the projects are attributed to the classes:

- >10 – 100 Mio EUR (163 projects = 38%)
- >100 – 500 Mio EUR (94 projects = 22%)
- >1 – 10 Mio EUR (91 projects = 21%)

Particularly Innovation, IWW, Port and Multimodal projects are mostly assigned to the lower costs classes (max. 100 Mio EUR). In contrast, projects with more than 100 Mio EUR of investment are mainly represented by Rail and Road. In total, about 60% of the overall projects costs refer to Rail, followed by Road (26%).

It is worth highlighting some types of projects along the corridor, which can be supported through innovative financial instruments, for their potential for cross-fertilization:

- Motorway extension and new construction projects, structured as PPP
- port extension projects, structured as a PPP (Design, Build, Finance, Maintain and Operate)

7. Critical issues on the Rhine-Danube Corridor

The Study on the Rhine-Danube Corridor has led to identify prominent critical issues hampering the operation of this major European transport connection in line with the provisions of Regulation 1315/2013. The plan for the removal of physical and technical barriers presents assumptions on the compliance with Regulation 1315/2013 by 2030, based on the expected contributions of the identified planned projects to the Corridor's development.[5]

Rail

The analysis of the project list supplemented by evaluations of the RD European Coordinator regarding contributions to KPIs (line speed, electrification, axle load, train length) and other parameters (line capacity, single track sections, strong inclines) shows that substantial progress can be expected until 2030 on numerous corridor parts. In this context, the following global projects can be highlighted: Stuttgart 21 + High-speed line Stuttgart – Ulm, High-speed line Salzburg – Wien (Neue Westbahn), Northern Romanian TEN-T core route Curtici – Predeal, DE/CZ border – Plzeň (southern route) via Česká Kubice.

However, it also becomes evident that according to the current planning status the envisaged development of the corridor is jeopardized by several risks, particularly

- Missing projects or projects without reliable finalisation date, interrupting throughout KPI compliance on large, connected corridor parts. Main sections affected are: München – Mühldorf – Freilassing (electrification); Garching – Freilassing (axle load); Nürnberg and Regensburg – DE/CZ border (electrification), DE/CZ border – Domazlice (electrification, speed, axle load) ;) Southern Romanian TEN-T core route Arad – Craiova (axle load, train length) [6]; Predeal – București (axle load, train length); Craiova – București (axle load); Existing line București – Constanța (train length).

- Missing KPI compliance regarding permitted train length ≥ 740 m in (almost) entire Slovakia and Czech Republic;

- Missing KPI compliance regarding axle load ≥ 22.5 t in small parts of Hungary and in France

- Missing link București – Constanța (new high-speed line), which is part of the corridor alignment, but is not equipped with any kind of realisation project, yet;

- Single track lines, which currently show no capacity problems with mostly regional traffic, but might become a severe bottleneck with the envisaged (long-haul) volume increase by 2030. In this respect, the following line sections should receive particular attention: Germany: Marktredwitz – border DE/CZ,

[5] *Projects submitted for the CEF 2014 call are included in the project list and in the Work Plan, projects submitted for CEF 2015 call will be considered in the next step*

[6] *According assessment of RD European Coordinator*

Schwandorf - border DE/CZ, Mühldorf - Freilassing[7]; Czech Republic: border DE/CZ – Plzeň (both lines from Nürnberg and Regensburg); Slovakia: border-crossing sections between Parndorf – Kittsee (AT) – Bratislava and Bratislava – Hegyeshalom / Hungary;

- Not yet approved, complete financing of projects or missing respective information. As all information have been gathered from official documents and furthermore approved by the Ministries of Transport or other stakeholders, the envisaged dates for realisation have been taken for granted. It has to be noted that such gaps in project financing might just be due to missing information. Such information gaps shall be closed in the further corridor development process involving official documents as well as additional data from Ministries of Transport or from other stakeholders.

- The Budapest node, due to large increase of traffic, is expected to become a significant bottleneck.

In the following figure an overview on the expected compliance situation of the corridor in 2030 is given. Critical sections are marked in red and yellow-dotted.

Figure 10: Rail compliance by 2030

Source: HaCon, May 2016

Making up the balance, the prospected development of the corridor shows a heterogeneous picture: on the one hand, the KPIs 'Electrification' and 'Line speed', which have a high degree of compliance already today, show only small progress until

[7] *According to the Federal Infrastructure Plan (BVWP 2030) there will be no capacity problem as long as the type of traffic does not change. In case the character of this line changes significantly, for instance if this line becomes a real Corridor line with trans-European long-haul high-speed and freight traffic, then new studies will be necessary.*

2030. On the other hand, compliance of the parameters 'Axle load' and 'Train length' will increase considerably until 2030; the target value of 100% will be missed clearly, though.

In December 2014, the European ERTMS Coordinator started a consultation with Member States about ERTMS implementation of the core network corridors, with the aim to review the current European Deployment Plan (EDP) of 2009. This activity launched a close dialogue in all TEN-T corridors with the Member States. The ERTMS Coordinator had numerous bilateral discussions with high-level representatives of the Transport Ministries and Rail Infrastructure Managers. This review process has been closed and the new EDP will be part of the Work Plan for ERTMS 2016. The reviewed ERTMS deployment plan shall cover all the TEN-T Corridors alignments and will be then subject to a Commission adoption procedure to be finalised by the end of 2016.

In summary, it has to be stated that from today´s point of view an overall compliance with the core rail parameters will not be achieved until 2030. Additionally, some projects with a planned end date close to 2030 feature a low maturity grade and unsecure financing. This might lead to further delays in the project realisation.

Table 5: Rail – KPI development and prospects (2030)

Rail KPI	Baseline 2013	Status 2015	Prospects 2030*	Target 2030
Electrification	91%	91%	93%	100%
Line speed ≥ 100 km/h	95%	95%	97%	100%
Axle load ≥ 22.5 tonnes	67%	67%	81%	100%
UIC track gauge = 1,435 mm'	100%	100%	100%	100%
Train length ≥ 740 m	47%	47%	62%	100%
ERTMS	7%			100%

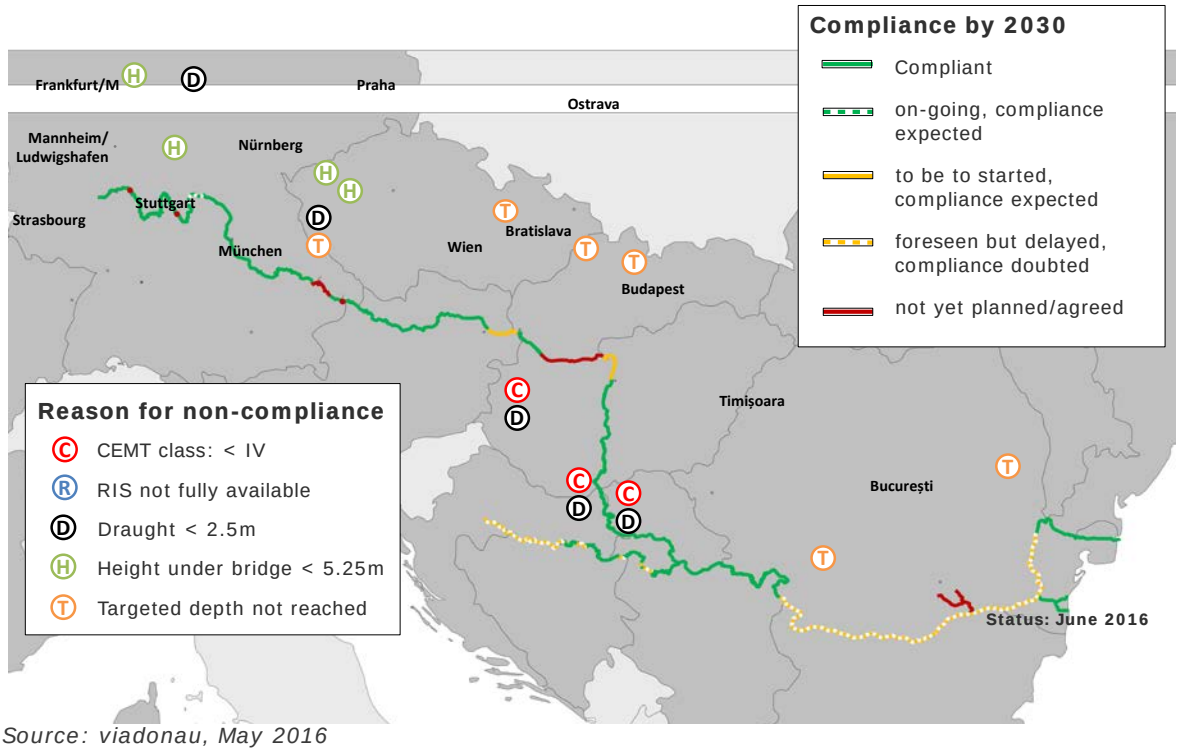
*) Based on RD corridor study and the evaluation of the European coordinator
Source: viadonau, May 2016

Inland waterways

The identified planned projects are expected to increase the permissible draught at the Upper Main River (Germany) and will contribute to the provision of targeted fairway depths between Wien and Devin (Austria/Slovakia) as well as between Szob and Budapest (Hungary).

The following figure shows the expected compliance of inland waterways with Regulation 1315/2013 by 2030.

Figure 11: IWW compliance by 2030



Source: viadonau, May 2016

In contrast, activities are ongoing but the set targets are below the requirements of regulation 1315/2013 at the section between Straubing and Vilshofen, which is considered most critical. Activities related to the upgrade of the Sava are planned but the timing and financing is still unclear, therefore the completion is considered to be at risk. Intentions to increase the bridge clearance are missing for all of the bridges not complying with regulation 1315/2013. An improvement is also expected for the IWW KPI "Targeted depth reached", which relates to the goals set by the waterway administration itself. The Main, the Main-Danube Canal and the Danube-Black-Sea Canal are expected to comply with this KPI in 2030. The non-compliant sections are expected to include Straubing-Vilshofen, the Austrian-Slovak, the Slovak-Hungarian and the Bulgarian-Romanian border sections. Further downstream on the Danube, only the section between Braila and the Black Sea is expected to be compliant. As a consequence, this KPI is estimated to reach only 51% in 2030.

Activities at the Slovakian-Hungarian border section, the Bulgarian-Romanian border section and in Romania in order to reach the targeted fairways depth and thereby increase navigation reliability still need to be followed-up by subsequent steps in order to complete the network.

River Information Services are already available at all sections of the Rhine-Danube Corridor, even if to a different extent and quality. The analysis of already completed, on-going and planned IWW projects, in total 59 projects can be summarised as follows: The largest investment refers to the Danube-Bucharest canal (1.38 billion €), actually not yet even planned. Integrated river engineering projects, rehabilitation and maintenance equipment and River Information Services would require 1.3 billion € as foreseen at the moment although not all projects are running and many are still in a feasibility study phase. The rehabilitation and upgrading of several locks in Obernau, Erlangen, Kriegenbrunn, Gabčíkovo, at the Iron Gate I and II and at the Danube - Black Sea Canal including the Poarta Alba – Midia Navodari

Canal would require 767 Mil.€. All the above leads to the conclusion, that gaps in development of the IWW corridor will remain in 2030 as the target value of the various IWW KPIs will not be met.

Table 6: IWW – KPI development and prospects (2030)

IWW KPI	Baseline 2013	Status 2015	Prospects 2030	Target 2030
CEMT class: > IV	85%	85%	85%	100%
Permissible Draught > 2.5m	77%	77%	83%	100%
Permissible Height under bridges > 5.25m	86% (5)	86% (5)	86% (5)	100% (0)
RIS fully available	100%	100%	100%	100%
Targeted depth reached	45%	42%	51%	100%

Source: viadonau, May 2016

The most important step for the improvement of the infrastructure conditions is to enhance fairway rehabilitation and maintenance of the Danube and its navigable tributaries. Based on the joint "Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries" the majority of the concerned Member States committed themselves to increase their efforts in order to provide a more reliable waterway infrastructure. This commitment was re-confirmed by the Conclusions signed by the Transport Ministers (or their representatives, except Hungary) in June 2016 in the framework of the TEN-T Days. With FAIRway Danube and the regular elaboration of National Action Plans first progress is made in order to accelerate the removal of bottlenecks. As the study results and the critical issues map above show subsequent activities are desperately needed to complete the inland waterway network of the Rhine-Danube Corridor in line with the provisions of Regulation 1315/2013 by 2030.

Next to improvable technical infrastructure conditions, the below described operational and administrative barriers undermine the development of inland waterway transport along the corridor.

- Waterway administrations are often not provided with the necessary resources to fulfil their duties, particularly concerning maintenance of good navigability conditions, struggle with limited human and financial resources and inadequate organisational structures. Therefore state of the art approaches, inclusive and service-oriented project implementation are taken up only slowly. Often stated by environmental stakeholders, waterway administrations sometimes have only limited experience with the integrated approach – taking into account the interests of inland navigation and ecology at the same time.[8]

- Administrative processes and paperwork are seen as a competitive disadvantage for inland waterway transport on the Rhine-Danube Corridor as they cause time losses and operational costs. Besides differences between national rules, it has

[8] *Guidance Document "Inland waterway transport and Natura 2000 – sustainable inland waterway development and management in the context of the EU Birds and Habitats Directives"*

to be taken into account that not all Danube riparian states are EU Members and not all EU states are part of the Schengen area. Most important measures can be summarised into the main areas: harmonisation, simplification and digitalisation of border controls in order to increase both, effectiveness and efficiency.

Ports

Out of total 96 port projects 87.5% are involving infrastructure works and partly a mixture of studies and infrastructure works together. These infrastructure works involve various categories of works, ranging from infrastructure rehabilitation and upgrade to completely new construction works on port infrastructure. Small share of port projects belong to telematics project and clean fuels supply facilities.

Currently, no projects tackling missing functional railway connection in the ports of Komarom (HU)[9] and Cernavodă (RO) are planned, thus impeding the development of intermodality in these ports and the Corridor itself and not contributing to the improvement of the railway connection KPI.

In terms of incompliance with technical parameters, the ports of Cernavodă (RO) and Vidin[10] (BG) do not provide minimum draft of 2.5 m at all water levels, but the port of Vidin aims to solve this incompliance within a larger global project on inland waterways interventions. No such projects have been planned for the port of Cernavodă. Concerning the provision of alternative clean fuels supply facilities, only port of Constanța has planned a project involving a construction of such facilities. Projects combating the lack of intermodal facilities have been reported and identified by the ports of Slavonski Brod (HR) and Drobeta Turnu Severin (RO). Ports of Calafat (RO), Cernavodă (RO) and Komarom (HU)[11] have not planned any actions related to provision of intermodal facilities.

Although not strictly a demand in terms of TEN-T Regulation, but being one of the corridor objectives, the provision of shore-side power supply facilities is still not provided in the ports of Wien (AT) and Galati (RO).

The analysis of the already completed, the on-going and planned port projects (96 projects in total with an investment volume of 2.6bn Euro) leads to the conclusion, that gaps in development of the ports in the corridor will remain in 2030 as the target value of the various port KPIs will not be met.

[9] *Preliminary studies were submitted to the CEF call 2015*
[10] *One of the terminals (Vidin North) complies already with the requirement of 2.5m depth.*

[11] *Preliminary studies were submitted to the CEF call 2015*

Table 7: Ports – KPI development and prospects (2030)

Port KPI	Baseline 2013	Status 2015	Prospects 2030	Target 2030
CEMT Class IV waterway connection	100%	100%	100%	100%
Connection to rail	90%	90%	90%	100%
Availability of clean fuels	0%	5%	10%	tbd
Freight terminal open to all operators and transparent charges	95%	95%	95%	100%

Source: iC consulenten, May 2016

Roads

Hungary, Czech Republic, Slovakia and Romania plan to proceed with their ambitious construction programme on their motorway network in the upcoming years. The identified on-going and planned projects will improve the KPI on motorways/express road to 91%. Still some sections in Slovakia (towards the Ukraine border) and in Romania (between Craiova and Bucuresti and sections of the ring road around Bucuresti) are expected to remain incomplete. High traffic utilisation and capacity constraints are an issue at some road sections in Germany, Austria, Czech Republic and in Hungary around Budapest as well as in Romania around București. In the Czech Republic there are additional critical sections regarding over-ageing and in Slovakia regarding safety. About 84 projects were identified.

Regarding the requirements of Directive 2010/40/EU setting the framework for the deployment of Intelligent Transport Systems in the field of road transport and interfaces with other modes of transport, at moment, the existing systems do still not sufficiently provide real-time traffic and weather information (RDS-TMC), facilitating seamless corridor road traffic. Within the CROCODILE project, traffic information service providers of R-D-CN-countries (Austria, Czech Republic, Germany, Hungary, and Romania plus the associated members Bulgaria and Slovakia) have set up a data exchange infrastructure with the goal to provide harmonized cross-border real-time traffic information services along the whole corridor. A specific focus within the CROCODILE project lies on safety-related and truck parking information services. Two Memoranda of Understanding on improvement of information exchange were signed in 2014 and 2015 among Austria, Hungary, Romania and other MS.

A priority should be given to improving the quality of the non-compliant road sections in terms of capacity and safety, implementation of sufficient secure parking areas and the interoperability of toll collecting systems and real-time traffic information along the corridor.

Cross-border sections:

Following cross-border sections form a part of the missing links of the Rhine-Danube Corridor, which do not comply with the technical standards:

- Czech–Slovakian border: between Zlin and Žiliná: on the Czech side from Zlin to the border R49 and on the Slovakian side the R6 from the border to Belusa;

- Hungarian-Slovakian border: M15 (Mosonmagyaróvár-HU/SK border) relates to the OEM Corridor with impact to the Rhine-Danube corridor: The M15 Expressway (14 km between Rajka/SK border – Hegyeshalom/M1) is only a half motorway and functions currently as an expressway with 2x1 traffic lanes.[12]

Projects to resolve the critical issues at cross-border sections are listed in the project list; the road project on the CZ-SK border is in study phase, and start of construction works is envisaged later. However the projects are national projects and include the construction works only in one Member State.

Missing links:

Missing sections of the core parameter motorway/express way exist in the CZ, in Slovakia and in Romania. While the missing section in CZ is related to the cross-border project Zlin – Žiliná, in Slovakia the situation regarding the corridor alignment is as following:

The connection from the CZ border to the motorway D1 is the R6 at Lysá pod Makytou – Púchov to Beluša. The R6 is classified as express way, has a length of approximately 26km, whereby 7.5km are in operation. The project is under study–> Status: unfinished EIA process;

The corridor alignment follows then the D1 motorway up to the border to the Ukraine. The priority axis funds will be used, in particular, to finance the project preparation and construction of the missing sections.

In Romania the situation is as following: A1 motorway between Bucuresti and Nadlac: 63% of total length of the A1 (576km) is in operation, 14% under construction and 23% are planned. The section between Deva and Lugoj (length 99.5km) is partially open, partially under construction. The main missing link is the section between Sibiu and Pitesti.

A6 motorway between Lugoj and Calafat, length 260km, 4% of the motorway are open (section Balint and Lugoj), the remaining 96% are planned

The road between Craiova – Alexandria to Bucuresti is also not compliant. The ring road around Bucuresti is a single lane road and to the largest extent non-compliant to motorway parameter.

Critical issues on capacity and infrastructure rehabilitation:

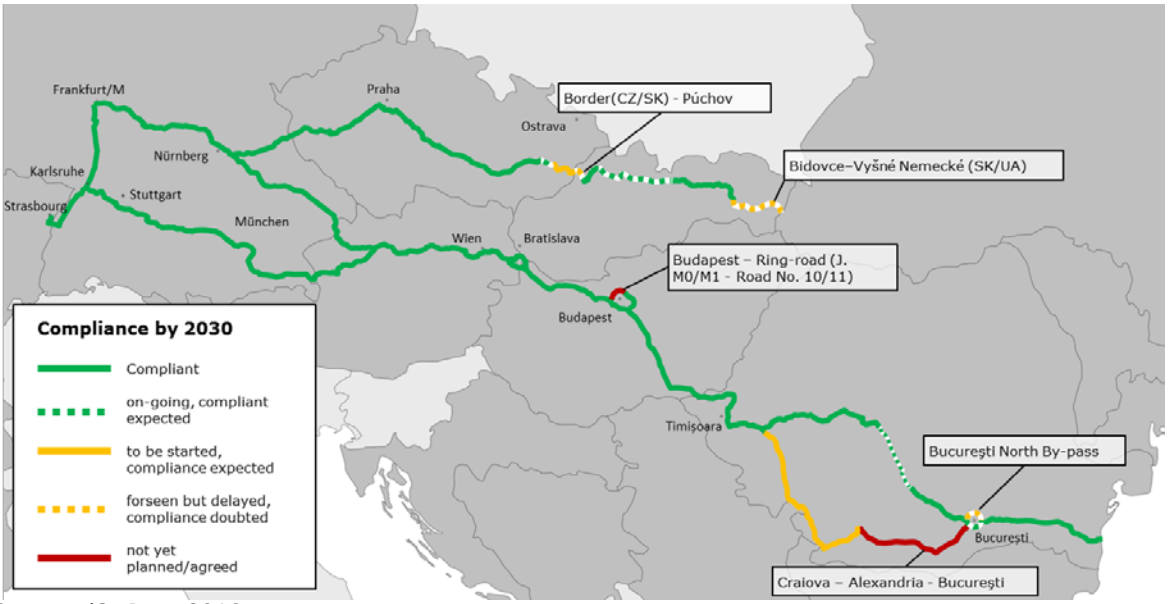
Critical sections or bottlenecks due to high traffic utilisation, capacity reasons and safety reasons, but also need for rehabilitation of the aged infrastructure are existing in Germany, Austria, Czech Republic, in Hungary around Budapest and in Romania around București.

The analysis of the already completed road projects (11) and the on-going and planned port projects (85 projects with an investment volume of 2.6bn Euro) results in the fact, that the target value of the various KPIs will not be met.

[12] *The procurement procedure for upgrading of the motorway is in preparation.*

The analysis of the already completed, the on-going and planned road projects (84 projects in total with an investment volume of 16.5bn Euro) leads to the conclusion, that gaps in development of the road corridor will remain in 2030 as the target value of the road KPI will not be met.

Figure 12: Road compliance by 2030



Source: iC, June 2016

Table 8: Road – KPI development and prospects (2030)

Road KPI	Status 2015	Prospects 2030	Target 2030
Motorway/Express Road	77%	91%	100%

Source: iC consulenten, May 2016

Airports

The Airport of Praha (Václav Havel International) and Budapest Airport (Ferenc Liszt International) are to be connected to heavy rail until 2050. For both airports plans are under investigation to connect them by railways.

Vienna airport has improved the rail connection to the Vienna central station. There are studies to connect Vienna Airport with the "Ostbahn" in easterly direction by two-tracked heavy rail, thus filling the missing link to the east, specifically to SK and HU. Ostrava airport connection although not required, is completed.

Rail/Road Terminals

Only Linz Stadthafen will be capable of handling intermodal transport units and be accessible by electrified trains with a length of 740m. Several terminals will fulfil the requirements of Regulation 1315/2013 to a higher degree in 2030 than they do now but are still expected to lack the compliance with all three parameters. However, for the majority of terminals no project is foreseen at all.

Administrative and operational barriers

Continuity of passenger and freight flows by rail is jeopardized at cross-border sections, due to changing technical parameters. Full exploitation of train capacities is particularly impacted for long-haul train runs, as they have to cope with frequent changes and multi-system locomotives are needed. Border control procedures influence transport/travel times, costs and resource efficiency of rail transport negatively. Also deviating infrastructure parameters at last mile connections or missing interconnections hamper the increase of rail transport.

Inland waterway transport might be improved by providing waterway infrastructure managers with adequate budget to fulfil their national maintenance duties. Also the well qualified human resources for the preparation and implementation of complex, integrated waterway management and engineering projects is not sufficiently available in some countries. As Member States struggle with providing the required fairway depths at free flowing river sections, intentions to legally relieve themselves from their responsibilities have been observed (e.g. Restrictions of vessel draught, Force Majeur Certificates). Administrative processes and paperwork are seen as a significant competitive disadvantage for inland waterway transport on the Rhine-Danube Corridor, which typically runs long distances. Information on current fairway conditions is often not available or difficult to access; therefore planning of inland waterway transports is overly complex. Fees on the Danube-Black Sea Canal are calculated according to loading capacity and double punish shipping companies in case of bad fairway conditions.

Ports set their charges autonomously and may differ substantially in line with the applied organisational scheme. Increased transparency, e.g. by an obligation to publish tariffs on the ports websites would support inland waterway transport. Non-harmonized administrative procedures in ports delay or prolong transports significantly.

Non-interoperability of diverse tolling systems between Member States are an obstacle and burden for the hauliers and freight forwarders on long distance transport.

First investments were done in Germany, Austria, Hungary, Czech Republic and Romania in equipping truck parking areas along the motorways with intelligent infrastructure (towards safe and secure truck parking).
Further investments in ITS test infrastructures are done by the Czech Republic, Germany, Austria and Hungary for connecting the vehicle with the infrastructure (C-ITS). Here traffic information services will be transmitted directly from the infrastructure operators into the vehicles and vice versa vehicles will be used as "driving sensors" to improve the data necessary for traffic management.

The only cross-border cooperation system is established between Austria and Germany. Distance or time based charging schemes exist in all countries of the Rhine-Danube Corridor, but only five use an electronic fee collection system.

Administrative processes and paperwork are seen as a significant competitive disadvantage for inland waterway transport on the Rhine-Danube Corridor. Besides differences between national rules, it has to be taken into account the fact that not all Danube riparian states are an EU Member State and not all EU states are in the Schengen area. Therefore, for instance, border checks for passengers and crews are necessary, as well as required customs clearance procedures for imports and exports.

A first analysis of administrative forms in use demonstrated that more than 15 forms are to be filled in for a single transport. On many occasions multiple data entry of the same data is required. The administrative bottlenecks – as mentioned by inland waterway operators – that cause the biggest time losses and highest operational costs can be summarised into three main areas: administrative bottlenecks related to customs, ports, border police and navigation surveillance.

Urban nodes

According to Regulation 1315/2013, the Rhine-Danube corridor core network is characterised by thirteen urban nodes, located in seven European countries (France, Germany, Czech Republic, Slovakia, Austria, Hungary and Romania): Strasbourg (FR), Mannheim (DE), Frankfurt/M (DE), Nürnberg (DE), Stuttgart (DE), München (DE), Ostrava (CZ), Praha (CZ), Bratislava (SK), Wien (AT), Budapest (HU), Timişoara (RO) and București (RO).

The overall corridor network compliance check for Rhine-Danube urban nodes shows that 70% of the analysed parameters are compliant with Regulation 1315/2013. Some 20% are partly compliant and 8% of the parameters are non-compliant.

Corridor rail lines within the thirteen nodes suffer of several bottlenecks. About 65% analysed rail parameters per node are compliant while about 35% of them are not satisfying on at least a rail section within the urban node. Rail parameters most afflicted by bottlenecks are “train length” and “capacity utilisation”, that are partly compliant or non-compliant in 45-50% of the nodes.

Corridor lines for inland waterways have been analysed for eight urban nodes. About 75% IWW parameters per node taken into account are compliant with the regulation and 25% are partly or non-compliant. Parameters showing the most of problems are “draught” and “good navigation status”, that are compliant in 50% analysed nodes only.

The road corridor in Rhine-Danube nodes is almost totally compliant with the regulation.

8. Recommendations and outlook by the European Coordinator

The Rhine-Danube corridor develops from east to west along two main streams of traffic converging towards the central part of the European Union providing two important lines of connection between north, north-west and south-eastern Europe.

The more northern branch starting at the Slovak-Ukrainian border is bimodal in its strict definition, although it runs in parallel with the Orient-East Med corridor and its component of inland waterway on the Elbe River in Czech Republic. This stream also runs in parallel with the Rhine-Alpine corridor and the Rhine River between France and Germany.

The other branch, from the ports on the Black Sea in Romania crosses all Balkan States along the river Danube until the central European Union States. It is a multimodal connection with a strong inland waterway component developed through the Danube River, its tributary Sava, the canal Main-Danube and the river Main until the Rhine River.

This geographical connotation underlines the importance of setting up a multimodal, interoperable, interconnected and reliable transport system in the region.

Rail and road infrastructures are the architecture of connectivity both for passengers and for freights; however particularly in this Core Corridor, the inland waterways transport can perform an important role for the development of the region.

The above statement is conditional to a real political will to develop navigability as this has to take into consideration, more than other modes of transport, that if its development is not done properly, it may have a damaging effect on the living habitat of the rivers. This may sound paradoxical as this mode of transport is more environmentally friendly than the others in terms of an overall impact on the environment but it has to be taken into account.

As we have seen in the analysis of the present situation and in the evaluation of the projected situation in 2030 as studied in these last two years and reported in the previous chapters, it clearly appears that the goal of achieving a fully developed Rhine-Danube Core Corridor will not be achieved in many aspects, unless targeted measures will be put in place timely.

The Regulation for the Guidelines on the development of the Core Corridors clearly states which performances are required for a high standard level structure; that it has to be interoperable despite the crossing of national borders and the use of different technologies and finally that it has to make the best use of each single mode of transport as this will in the best way relate to each specific region: all this to be achieved by 2030.

The success of this operation depends on the available budget, international, national or private and on the political will to develop each infrastructure. Two aspects that are not and cannot be included into the Regulation: they are subject to the budget requirement and availability as well as on the approach undertaken to use available resources to develop a homogeneous and reliable transport system.

In these aspects comes the role of the Coordinator can be decisive, who, together with national and regional authorities, with the Commission and all involved stakeholders

can help identifying the necessary steps keeping into account the limitation of funding, the various forms of funding and the respects of righteous constraints like the one imposed to achieve a sustainable transport system.

Therefore I would like to focus the attention to the following recommendations:

- It is important to explore all possibilities to develop a modern, sustainable and efficient Core Corridor
- In the case of the Rhine-Danube Corridor, we have the clear advantage of a really multimodal corridor as, besides the rail and road components, the inland waterways one is of great importance and can play a significant role in reducing the overall environmental impact of the other modes
- To take due advantage from this situation, it is necessary to develop sustainable and reliable navigability conditions, including dredging, where needed, to attract investments in the inland waterway transport that can compete with costs of transport in the other modes
- The Danube River and its tributaries represent an important source of unspoiled transport capacity. This does not mean that transport should be developed no matter what is the impact on the living habitat: it has already been demonstrated by the Joint Statement Principle, as referred to in the introduction, that a sustainable way to development can be found if there is a political will to reduce the impact, taking into account the European Environmental Legislation including admitted compensatory measures when and where needed.
- There is no sense in claiming that inland waterway transport is a preferred mode for its low impact on the overall environment if then no measure is undertaken by the governments to ensure its reliability and therefore supporting its choice by the operators of the sector.
- Reliable navigability means that users, sailors, forwarders, producers and not to forget the tourist sector need to be sure that navigability will be ensured for a given period of time, throughout the year long, so that planning is possible and a profitable revenue is within grasp. Otherwise entrepreneurs will turn their head towards other modes of transport and most specifically to road transport.
- Major steps have been undertaken with unprecedented funds contribution by the European Commission to analyse the situation on the Danube and its tributaries, I like to mention the FAIRway project that is being performed by six countries collecting data from all riparian countries, clearly indicating what needs to be done to achieve such reliability conditions. This is not the only one and many others are also undertaken by the national authorities.
- One thing is for sure, the use and maintenance of river navigability for transport is safer and much cheaper than the use and maintenance of roads and rails.
- FAIRway has drafted the Action Plan for the implementation of the Master Plan for the rehabilitation of good navigability conditions, now it is important that relevant measures be consistently undertaken by all countries involved.
- However it is not yet enough as, for instance, maintenance actions cannot be financed via European funds and are the responsibility of each country to ensure necessary funding. Sometimes it is understandable if national governments give priorities to projects aiming to ensure more modern rail and road infrastructures, particularly in the south eastern European countries where these infrastructures have been neglected for decades, however maintenance of good navigability conditions is a prerequisite that cannot be underestimated. Either the national government will ensure yearly the necessary budget or it should be found a way such that international funds will be able to finance maintenance activities. In fact if maintenance activities are not performed in a single country, the overall navigation on the Danube will suffer and the system will collapse.

- On rail it has been reported that, despite important interventions and large budgets, there are still bottlenecks, particularly represented by lack of capacity in terms of axle loads availability or by missing electrification, for which plans are not yet being filed. Exploitation costs, maintenance and lack of passengers in the start-up phase, should be taken on board seriously. Moreover, if we all want a multimodal system, it is important to think about modern industrial sites using spatial planning methods. It is impossible to unlock scattered industries by train.
- Not for all but certainly for many of these cases there is still the possibility of undertaking timely measures: once more political will, combined with appropriate and targeted funds are necessary to achieve the goal set for 2030.
- In conclusion, the combined action set up by the European Commission with the Member States, after extensive consultation with a wide spectrum of stakeholders has provided initial important results and, for the first time ever, an overview of what is needed.
- It is the task of all to critically analyse the situation in the light of the reported studies and to undertake initiatives in order then to make the most needed political choices including recommendations for targeted funding.
-

Contacts

Karla Peijs, European Coordinator

Cesare Bernabei, Advisor

Desiree.oen@ec.europa.eu

Corridor website:

http://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/corridors/corridors-studies_en.htm

Contact details:
European Commission – Directorate General for Mobility and Transport
Directorate B – European Mobility Network
Unit B1 – Trans European Network
http://ec.europa.eu/transport/index_en.htm
email: move-info@ec.europa.eu

Offices:
Rue Demot 28
1049 Brussels Belgium

Design & Layout by TENtec