



European  
Commission

# Rhine Danube



Fourth Work Plan of the  
European Coordinator

**Karla Peijs**

MAY 2020

Mobility  
and Transport

MAY 2020

This report represents the opinion of the European Coordinator and does not prejudice the official position of the European Commission. The European Commission does not guarantee the accuracy of the data included in this report. Neither the Commission nor any person acting on the Commission's behalf may be held responsible for any potential use which may be made of the information contained herein

## Table of contents

1	Towards the RD Corridor 4 <sup>th</sup> Work Plan .....	5
1.1	Introduction .....	5
1.2	Achievements along the Corridor since 2014 .....	6
1.3	Difficulties along the Corridor .....	7
2	Characteristics of the RD Corridor .....	8
2.1	Alignment.....	8
2.2	Compliance 2019 with the technical infrastructure parameters of the TEN-T guidelines by 2030 (status quo).....	9
2.3	Persisting bottlenecks and missing links (compliance by 2030).....	14
3	Transport Market Study .....	20
3.1	The Corridor scenario .....	20
3.2	Reference and Baseline scenario .....	20
3.3	Corridor specific scenario .....	21
4	What has still to be realised by 2030 .....	22
4.1	Rail & RRT .....	23
4.2	The ERTMS deployment 2023 .....	25
4.3	IWW & inland ports including RIS deployment plan and Maritime Ports on the RD Corridor, interactions and complementarity with the MoS Coordinator Implementation Plan for the RD Corridor .....	27
4.4	Road transport (incl. ITS deployment) .....	30
4.5	Airports .....	30
4.6	Innovation deployment of alternative fuels infrastructure .....	30
5	Funding and Financing.....	32
5.1	The funding needs .....	32
5.2	The innovative financial tools.....	34
6	The European Coordinator’s recommendations and future outlook .....	35
6.1	Recent EU Studies and Policies .....	35
6.2	Identified Critical Issues, future challenges and what has still to be done.....	36
6.3	Achieving the 2030 milestone with mature projects .....	36
6.4	Investment, growth and job impact of the CNC .....	37
6.5	Modal shift and impact to decarbonisation .....	38
6.6	Climate change adaptation.....	39
6.7	Military mobility and Corridor extensions as upcoming challenges.....	39
6.8	The future of the Connecting Europe Facility .....	39
6.9	Final Remark.....	40

## Figures

Figure 1: Alignment of the RD-Corridor .....	8
Figure 2: Status of national ETCS deployment on RD CNC.....	10
Figure 3: Rail compliance by 2030 overview .....	15
Figure 4: IWW compliance by 2030 overview .....	16
Figure 5: Road compliance by 2030 overview .....	19
Figure 6: Number of projects by country and category (project implementation status 06/2019), total = 736 projects.....	22
Figure 7: Number of projects on the RD Corridor by completion time cluster (project implementation status 06/2019), total = 736 projects.....	23
Figure 8: Rail and RRT projects on the RD Corridor by country (total: 185 Rail, 33 RRT, data status: 06/2019) .....	24
Figure 9: Current status of ETCS deployment program until 2030 on RD CNC .....	26
Figure 10: RD Project List Analysis.....	32
Figure 11: RD PL Funding and Financing Sources Analysis.....	33

## Tables

Table 1: Rail compliance rates per MS .....	9
Table 2: RRT compliance rates per MS.....	11
Table 3: IWW compliance rates per MS.....	11
Table 4: Seaports & Inland Ports' compliance rates by Member State .....	12
Table 5: Road Compliance rates per MS.....	13
Table 6: Airport Compliance rates per MS .....	13
Table 7: Expected situation with inland ports compliance in 2030.....	17
Table 8: ETCS deployment by MS, period and status .....	27
Table 9: Job & Growth Multipliers for TEN-T CNC projects .....	37

## Abbreviations

bn	Billion
CEF	Connecting Europe Facility
CNC	Core Network Corridor
DG MOVE	European Commission – Directorate General for Mobility and Transport
DTP Interreg	Danube Transnational Programme
EC	European Commission
EIA	Environmental Impact Assessment
ERTMS	European Rail Traffic Management System
ERDF	European Regional Development Funds
EU	European Union
GDP	Gross Domestic Product
INEA	Innovation and Networks Executive Agency (EU)
IWW	Inland waterway
km	kilometre
KPI	Key performance indicator
m	metre
mn	Million
MoS	Motorway(s) of the Sea
MoT	Ministry of Transport
MTMS	Multimodal Transport Market Study
MS	Member States of the European Union
n.a.	not available / not applicable
OEM	Orient / East-Med (Corridor)
p.a.	per year / annual
RDC	Rhine-Danube
RFC	Rail Freight Corridor
TEN-T	Trans-European Transport Network
TMS	Traffic Management System
WG	Working Group
WP	Work Plan

### Country Codes after ISO 3166:

AT	Austria
BG	Bulgaria
CZ	Czech Republic
DE	Germany
FR	France
HR	Croatia
HU	Hungary
RO	Romania
RS	Republic of Serbia
SK	Slovakia
UA	Ukraine

# 1 Towards the RD Corridor 4<sup>th</sup> Work Plan

## 1.1 Introduction

The 4th version of the Work Plan of the RD-Corridor highlights the main results of the Corridor development and defines the priority work areas to ensure a multimodal, seamless and environmentally friendly Rhine-Danube CNC by 2030. It is of utmost importance to use the remaining time to deliver a technically compliant and operationally functioning Corridor.

Based on the objectives set in Regulation (EU) No 1315/2013, the Corridor infrastructure focuses on greening the impact of transport to ensure growth and competitiveness, increasing energy efficiency and enhancing safety.

Therefore, the Work Plan illustrates the results achieved since 2014, and identifies key remaining persisting bottlenecks to overcome. Furthermore, it illustrates the actual implementation process based on monitoring the projects' progress and highlights the serious risks of not meeting envisaged completion times. As a conclusion, measures to overcome existing obstacles to the implementation and the future development of the Corridor will be presented.

A new element introduced is the identification of the additional projects contributing to technical compliance, removal of bottlenecks and/or shift to environmentally friendly transport modes that may be potentially supported under the multi-annual financial framework.

Becoming the world's first climate neutral continent by 2050 is the ambitious goal of the European Commission which was clearly highlighted in the European Green Deal. Accounting for 25% of the EU's emissions, transport plays a crucial role in reaching this target. An infrastructure that facilitates the modal shift from road to rail and inland waterways is therefore essential, but this requires a capacity increase of these more environmentally friendly modes. Another key driver in the EC's policy to tackle climate change is the decarbonisation of all transport modes. Targeted investments and well-coordinated infrastructure plans are needed to promote decarbonisation while ensuring efficient transport systems.

In light of the above, the present document will be geared especially towards the notion of sustainable and future-oriented mobility as well as towards combatting climate change by promoting modal shift and innovation deployment. In this way, Member States and stakeholders can scale the level of investments in emissions reduction and consider more effective action and funding in support of their implementation.

## 1.2 Achievements along the Corridor since 2014

Between 2014 and 2019, 232 reported projects have been completed along the RD-Corridor with total investment costs of € 14bn. Below is a selection of key projects that have contributed to the achievement of the *Key Performance Indicators* (KPIs), set as targets for completion of the Corridor by 2030. These KPIs aim at measuring the progress of all nine Core Network Corridors in a comparable way and were jointly defined for each transport mode. They allow the evaluation of the recent compliance levels against the infrastructure quality targets set out in Regulation No.1315/2013, thus highlighting the progress made so far.

### Rail

State	Project	Achieved KPIs	Compl. Date	Costs (€)
AT (SK)	Works and studies for upgrading the railway line Wien - Bratislava	Electrification, Track gauge, ERTMS	12/15	846mn
HU	Rehabilitation of lines 100, 120 Budapest-Szolnok-Lőkösháza III.1	Line speed, Train length, Axle Load	12/14	125mn
RO	Modernisation of the section Curtici - Arad	ERTMS, Line Speed, Axle Load	12/17	257mn
DE/AT	Upgrade Salzburg – Freilassing (DE) – border section (CEF co-financed)	Elimination of capacity bottleneck	12/19	180mn
CZ	Optimisation of the line Beroun (incl.)–Kraluv Dvur (CEF co-financed)	Line Speed	10/19	74mn

### Road

State	Project	KPI	Compl. Date	Costs (€)
RO	New motorway construction (A1) Orastie-Sibiu; Dumbrava-Deva; Timisoara – Lugoj; Nadlac (HU/RO) – Arad	Motorways	07/15 –12/19	1.93bn
SK	New motorway construction (D1) Hricovske Podhradie - Lietavska Lucka; Budimir – Bidovce; Feeder Lietavská Lúčka – Žilina	Motorways	12/19	706mn

### IWW

State	Project	KPI	Compl. Date	Costs (€)
RO	Locks modernization (Cernavoda, Agigea, Ovidiu) in 2 phases	Contribution to Good Navigation Status	06/16 06/19	104mn 122mn
RO	High Performance Green Port Giurgiu-Stage II – Construction (CEF co-financed)	-	03/20	16mn
EU	Fairway Danube	Contribution to Good Navigation Status	12/21	21.7mn
RS	Construction of New Žeželj Bridge in Novi Sad	Height under bridges (≥5.25m)	12/15	45mn

### 1.3 Difficulties along the Corridor

Despite the achievements of recent years, the Corridor development is hindered by delayed projects and projects with unknown completion dates or a planned finalisation after 2030. 16 projects with KPI-relevance fall into the latter category. For more than a third of all ongoing CEF-funded projects (93) along the Corridor, an amendment for extension has already been made.

A number of recurrent **reasons for delays** are given below:

- Although aiming at simplifying public procurement procedures and making them more flexible, the 2014 EU public procurement Directive has triggered significant **changes in national procurement legislation**. As a result, beneficiaries were obliged to adopt new internal practices and, in some cases, to resort to new additional legal services and expertise. These changes, often combined with complex administrative processes, have lengthened the time taken in tender procedures, in all sectors and across Member States. The bulk of CEF-funded railway actions are subject to delays between 6 months and 2 years.
- Allocation of **inadequate staff and a lack of staff** led to delays from preparatory phase (technical designs, permitting procedures and public procurement) to the completion (even on the supplier side).
- Lengthy **expropriation procedures** and problematic **land acquisition** processes due to low project management capacities.

Some of the main work interventions face **costs overruns**, resulting from bids that were higher than the initial tender price estimates. As a result, new financial commitments by the concerned MS governments or the revision of existing designs are required. These changes delay further the start of the actions. In this situation, the availability of sufficient national budgets and the adequate allocation of experts following the new procurement rules represent two important challenges that need to be addressed in order to facilitate the overall implementation of the actions.

An additional issue is the continued **low commercial speed** of international freight trains in certain Member States of the Corridor, mainly related to the long dwelling times at border stations due to inefficient rail safety checks or suboptimal logistical interfaces between railway undertakings. Travel time lost before and at border stations counteracts the efforts of rail infra managers and Member States to upgrade railway sections for higher line speeds and continuously trigger the undiscerning modal shift from rail to road.

Another concern is the **unused potential for trans-national Corridor evolution**. The need for improved cross-border and transnational cooperation and exchange of best-practice in order to achieve coordinated trans-national development of Corridor infrastructure and mobility services is still high, as infrastructure planning and construction remains strictly within national frameworks, paralysing the breakthrough of the Corridor spirit. This could be fertilised by the establishment of several European Groups of Territorial Cooperation, as shown by the good-practice examples of the Czech-German EGTC for the joint development of the High Speed Rail connection Dresden – Ústí n.L. – Praha or the EGTC for the Rhine-Alpine Corridor.



## 2 Characteristics of the RD Corridor

### 2.1 Alignment

The Rhine-Danube Corridor is the main east-west link in continental Europe. It comprises nine Member States (France, Germany, Austria, Czech Republic, Slovakia, Hungary, Croatia, Romania and Bulgaria) and four neighbouring countries (Serbia, Bosnia and Herzegovina, Moldova, Ukraine) all along the Main and Danube rivers to the Black Sea.

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:

- 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 – Constanța – Sulina.

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 core waterway network:

- Serbia: related to inland waterways (Danube, Sava) and two ports (Beograd, Novi Sad);
- Bosnia and Herzegovina: related to inland waterways (River Sava);

The Corridor includes around 5,800km of rail network, 4,500km of roads and 3,900km of waterways (incl. 19 ports).

**Figure 1: Alignment of the RD-Corridor**



## 2.2 Compliance 2019 with the technical infrastructure parameters of the TEN-T guidelines by 2030 (status quo)

Regulation (EU) 1315/2013 lists compulsory targets to be reached for the infrastructure requirements per mode for the Core Network Corridors to be met by December 2030 at the latest. To assist the monitoring towards achieving these target values, Key Performance Indicators (KPI) are defined for all modes. A compliance analysis is regularly performed to determine for each Member State along the Rhine-Danube Corridor the current and expected status of the infrastructure and the actual compliance with the standards stipulated by the Regulation. The results of the analysis are shown in Table 1.

It should be acknowledged that although infrastructure is compliant, other parameters and operational restrictions, such as safety, emission or capacity issues may still remain to be addressed, in order to reach the EU's goal of an efficient and sustainable single European transport area. This is, for example, highly relevant for improving the situation at border crossings, where long waiting times are a real obstacle for freight rail traffic (e.g. HU/RO border).

### 2.2.1 Rail Compliance

KPI	AT	FR	DE	CZ	SK	HU	RO	Total
Electrification	100%	100%	79%	91%	100%	100%	96%	<b>91%</b>
Line speed 100 km/h (freight)	100%	100%	100%	87%	88%	99%	95%	<b>96%</b>
Axle load 22.5t	100%	0%	97%	92%	100%	84%	25%	<b>76%</b>
Track gauge	100%	100%	100%	100%	100%	100%	100%	<b>100%</b>
Train length 740m	100% <sup>1</sup>	100%	100%	0%	0%	100%	34%	<b>57%</b>

**Table 1: Rail compliance rates per MS**

The compliance analysis showed that:

- 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 Romania.
- The entire rail infrastructure of the Corridor provides for standard gauge (1,435 mm).
- An operating speed of at least 100 km/h for freight traffic is enabled at more than 96% of the rail lines. Line sections with insufficient operating speeds are located on the "CS branch" (Czech Republic, Slovakia) and on the "Black Sea branch" (Slovakia, Romania; Hungary: local speed drops in the Budapest node).
- 76% of the rail network allows for 22.5 tonnes axle load. Line sections not fulfilling the requested standards are mostly located in Romania (if speed limitations are taken into account, the required axle load can be reached in Hungary and partly in the Czech Republic).
- A maximum train length of 740m is permitted at 57% of the rail infrastructure. Sections which only provide for shorter trains are located on the "CS branch" (CZ/SK) as well as in Romania.

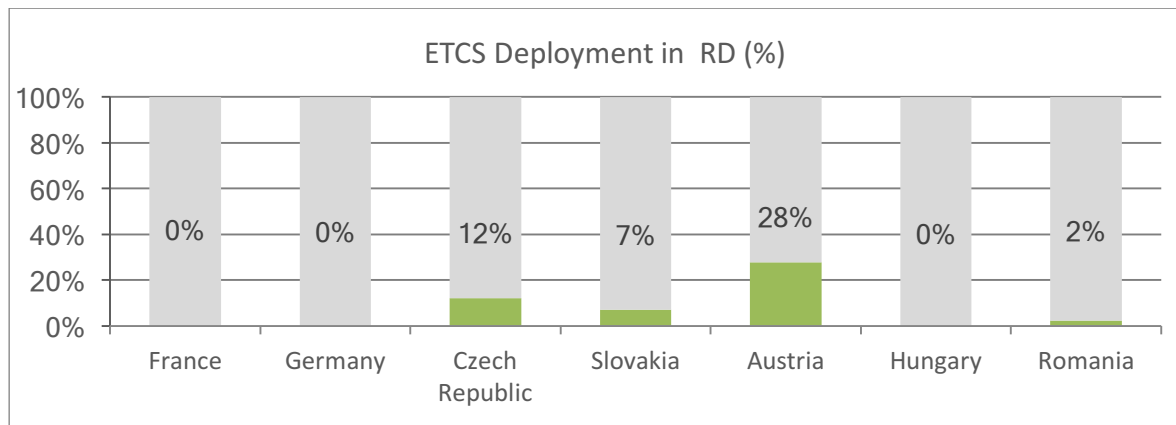
<sup>1</sup> Limitations occur depending on the schedule and the actual train path.

## 2.2.2 ERTMS compliance

ERTMS/ETCS is partially deployed in Slovakia, Austria, Hungary and Romania. The current state of the ERTMS deployment of the RDN Corridor length planned by the end of 2019 is 33%.

Overall, on 5% of the Corridor ETCS is in operation, on 52% of the Corridor GSM-R is in operation. The following graph shows the status of ETCS deployment by MS in the RD-Corridor:

**Figure 2: Status of national ETCS deployment on RD CNC**



Source (both): *Technical support for the Deployment of ERTMS along the Core Network Corridors, INECO & EY, December 2019*

The following bottlenecks are identified:

- Most sections in Germany are planned to be in operation with ERTMS beyond 2023. In addition, Hockenheim – Karlsruhe and Mannheim – Bruchsal were planned to be in operation by 2022, but are delayed to 2023. Karlsruhe – Appenweier is delayed from 2020 to 2030. The cross-border section Passau/AT is delayed from 2020 to 2023.
- In the Czech Republic the sections Plzeň – Praha and Ostrava – Slovakian Border ERTMS will not be in operation by 2023.
- While the neighbouring sections are already in operation, the Austrian section Wels – St. Pölten is planned to be deployed beyond 2023.
- All the sections in Romania planned in the ERTMS European Deployment Plan to be deployed by 2023 are delayed to 2025, including the lines București (Bucharest) – Constanța and Simeria – Sighișoara (planned to be operational by 2018 in the EDP).
- The sections in Slovakia where ERTMS is going to be deployed by 2023 link with sections that would be operational beyond 2023.

Budapest (Hungary) – Lőkösháza (HU-RO border crossing) should have been in operation since 2018 but it is delayed to 2021. It should be noted that the border section in Hungary (Békéscsaba- Curtici) is not yet under construction, thus even the 2021 deadline might be endangered. The rest of sections in Hungary are delayed to 2024 (Austrian border – Budapest and Slovakian border – Hegyeshalom).

### 2.2.3 Rail/Road Terminal compliance

KPI	AT	FR	DE	CZ	SK	HU	RO	Total
Intermodality	100%	50%	56%	25%	25%	67%	25%	<b>50%</b>
740m train length	17%	0%	6%	0%	25%	33%	0%	<b>9%</b>
Electrified access	50%	0%	38%	0%	25%	0%	0%	<b>23%</b>
Open availability	100%	100%	100%	100%	100%	100%	100%	<b>100%</b>

**Table 2: RRT compliance rates per MS**

The KPIs for Rail/Road Terminals (RRT) are not explicitly laid down in the Regulation; instead, they are derived from market needs in order to make intermodal transport competitive to road. The analysis of the 44 RRTs that are currently in operation in the RD core nodes revealed only low compliance to these market-driven parameters.

- Only half of the terminals are able to handle all three types of loading units (containers, swap bodies, semi-trailers). The focus on single types of loading units might be explained by the past/current market orientation (e.g. focus on maritime or continental transport, key customers with special logistics profiles).
- The compliance rate for electrified access is only 23% and the limited length of the handling tracks, where only four sites fulfil the KPI target, creates a real burden for an efficient supply of intermodal transport services.
- Many of the existing rail/road terminals were constructed as re-use of obsolete sidings in the peripheral areas of marshalling yards or port areas. Thus, the rail infrastructure of these terminals is characterised by one-side connection to the main line, by non-electrification and by short usable length of the transshipment tracks. Moreover, due to their location within existing infrastructure, they show no or only very limited expansion options. In short, the layout of these terminals does not correspond with the requirements of market-driven transport services, namely:
  - Access by 740 m trains
  - Possibility of electrified train arrival/departure
  - Both-side connection to the main line

Despite their unfavourable conditions, many of these “historically grown” terminals are still in operation and are only gradually/partially being replaced by modern facilities.

### 2.2.4 IWW compliance

KPI	AT	DE	SK	HU	RO	BG	HR	Total
CEMT class IV	100%	100%	100%	100%	100%	100%	30%	<b>90%</b>
Draught > 2.5 m	100%	90%	100%	100%	100%	100%	30%	<b>82%</b>
Bridge height	100%	45% <sup>2</sup>	100%	100%	100%	100%	100%	<b>83%</b>
RIS	100%	100%	100%	100%	100%	100%	100%	<b>100%</b>

**Table 3: IWW compliance rates per MS**

<sup>2</sup> The calculated KPI-rates refer to the length of entire TENtec sections. If a section contains a non-compliant bridge, the entire section is indicated as non-compliant.

- 90% of the inland waterway network, including Serbia, is classified as a class IV waterway or higher, only the Sava River is assigned to a lower class.
- A minimum draught of 2.5m is fulfilled on 82% 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 (below 2m at 59% of days in 2018).
- Four bridges offer a clearance below 5.25m; 89% of the sections length complies with the requirement. Two of these bridges are on the Main (59.55 rkm, 252.32 rkm) and two on the German part of the Danube (2311.27 rkm, 2225.75 rkm).
- River Information Services are available along the Inland Waterway Core Network but to a different extent and quality. International and national exchange of fairway or traffic related data between the RIS operators is not always ensured. Activities to ensure sustainable further development, implementation and operation of infrastructure and services for harmonised RIS are ongoing (e.g. RIS COMEX), including those which are aiming to increase efficiency within inland navigation transports on the whole RD Corridor by means of increased quality and availability of fairway-, traffic- and transport information services.
- A particular challenge for the Rhine-Danube Corridor is the extent to which the targeted fairway depth is met. This relates to the concept of a 'Good Navigation Status', which aims at enabling efficient, reliable and safe navigation in addition to meeting purely technical parameters. But the achievement of targeted depths varies dynamically as it depends not only on the waterway infrastructure conditions, but mainly on the hydrologic circumstances.

The project FAIRway Danube identified the following sections as highly critical in terms of maintenance and rehabilitation given the gap between available water levels and actual fairways depths: the Hungarian Danube, the area around Milka/Belene/Coundur (BG) and Cochirleni (RO).

### 2.2.5 Port compliance

KPI	AT	DE	SK	HU	RO	BG	HR	Total
<b>Inland ports</b>								
Rail connection	100%	100%	100%	50%	83%	100%	100%	<b>89%</b>
CEMT connection	100%	100%	100%	100%	100%	100%	100%	<b>100%</b>
Clean fuels	50%	0%	0%	0%	0%	50%	0%	<b>5%</b>
Term. availability	100%	100%	100%	100%	100%	100%	100%	<b>100%</b>

**Table 4: Seaports & Inland Ports' compliance rates by Member State**

The main findings are as follows:

- All 19 ports comply with the CEMT IV class connection KPI and with the KPI requirement to have at least one freight terminal open to all operators in a non-discriminatory way and application of transparent charges.
- 17 of them have rail connection, except Komarom (HU) and Cernavoda (RO).
- Currently, 18 out 19 ports do not have supply alternative fuels. At the moment, only the Port of Ruse (BG) has LNG bunkering facilities (since 2016). In addition, the Port of Enns (AT) has LNG fuel supply facilities since 2018, but currently only for trucks as ships cannot berth on the water side of the facility, and the facility does not have the necessary equipment to supply LNG to vessels.

## 2.2.6 Road compliance

KPI	AT	FR	DE	CZ	SK	HU	RO	Total
Motorway	100%	100%	100%	88%	53%	94%	49%	<b>78%</b>

**Table 5: Road Compliance rates per MS**

- 78% of the Corridor is classified as motorways (express roads).
- The density of facilities and the variety of different alternative fuel types vary from country to country. While LPG is available along the entire Corridor, the supply of CNG and electric recharging stations in the western parts of the Corridor is higher than in the eastern parts.
- The length of rural two-lane' roads that should be brought in compliance with motorway/express road requirement exceeds 1 000 km, the predominant part of which are in Slovakia (164 km<sup>3</sup>) and in Romania (735 km, out of which 319 km are common section with OEM CNC).
- Capacity bottlenecks exist, predominantly in western parts of the Corridor and especially in sub-urban areas of main nodes and other big cities.

## 2.2.7 Airport compliance

KPI	AT	DE	CZ	SK	HU	RO	Total
Rail connection	100%	100%	0%	0%	0%	0%	<b>67%</b>
Clean fuels	0%	0%	0%	0%	0%	0%	<b>0%</b>
Term. availability	100%	100%	100%	100%	100%	100%	<b>100%</b>

**Table 6: Airport Compliance rates per MS**

- No fixed storage tank facilities for aviation biofuel are reported to be in use in any of the airports. Although, the airport Wien is increasingly using alternative transportation fuels in its fleet for airport ground services (e-mobility, hydrogen, CNG, LPG).
- Out of the six major core airports, 2 (Praha and Budapest) are not connected to "heavy rail", i.e. not capable to operate high-speed passenger trains.
- Nürnberg, Bratislava, Timișoara and Bucharest airports miss entirely a direct connection to the rail network.

<sup>3</sup> This number refers to predefined non-compliant TENtec sections, the actual length of non-compliant roads is 157,74 km.

## 2.3 Persisting bottlenecks and missing links (compliance by 2030)

A dense pipeline of on-going and planned infrastructure projects along the RD Corridor has been presented. However, persisting bottlenecks and missing links still exist and projects are not planned to tackle them (need for additional projects, discussed in Chapter 4),

### 2.3.1 Railway network bottlenecks

Figure 3 presents a compliance overview for the **railway** network of the TEN-T parameters "Electrification", "Track gauge", "Line speed" and "Axle load" for year 2030.

Compared to the current situation, substantial progress for these KPIs can be expected until 2030 on most Corridor sections. In particular, the following large Corridor sections will be upgraded:

- "Stuttgart 21" + High-speed line Stuttgart – Ulm,
- München – Freilassing – Salzburg and connecting high-speed line Salzburg – Wien ("Neue Westbahn"),
- Northern Romanian TEN-T core route Curtici – Predeal (Brasov-Sighisoara),
- Nürnberg – DE/CZ border – Cheb – Plzeň and
- Regensburg – DE/CZ border – Ceska Kubice – Plzeň.
- Žilina – Košice (Liptovský Mikuláš – Poprad-Tatry) and Váh – Strečno

In addition to the requirements of Regulation 2013/1315, the achievement of intermodal profile P 70/400 (or higher) might be essential to ensure competitiveness of combined transport to road. In this respect, particularly the following Corridor sections are at risk in terms of achieving the KPI objectives:

- Strasbourg – FR/DE border (axle load, intermodal gauge);
- Wien – AT/SK and AT/HU border (train length);
- Bratislava – Petržalka and Petržalka – Rajka (line speed),
- Rajka – Heyeshalom (axle load);
- Braşov – Predeal – Bucureşti – Feteşti – Constanţa (train length);
- Southern Romanian TEN-T core route Arad – Craiova – Bucuresti (axle load, train length). On this Corridor part, several projects are foreseen, however, maturity of these actions is low, financing not secured; therefore, the realisation until 2030 is doubtful;
- Hranice na Morave – CZ/SK border and Ostrava region (line speed);
- Large parts of Slovakia and Czech Republic (train length). On single sections, projects are planned or ongoing;
- Czech Republic, Slovakia and Romania (intermodal gauge);
- Missing link Bucureşti – Constanţa (new high-speed line): currently there is no project foreseen to realise this new line before 2030.

Regarding the permitted train length ( $\geq 740\text{m}$ ) in Slovakia, existing projects refer to single sections, leaving the majority of the countries' network non-compliant. The same applies to the Czech Republic and Romania.

The limited ERTMS compliance is described in section 4.2.

Figure 3: Rail compliance by 2030 overview



The situation of **Rail/Road Terminals** on the RD Corridor shall be improved by new constructions and upgrading measures in existing terminals. New terminals are planned in the Czech Republic (Ostrava 2021, Přerov 2030), in Romania (Timișoara and Craiova, both without specified finalisation date) and in Bulgaria (Ruse, finalisation date unknown). With respect to the long-term or even unknown realisation timeline, the completion of most of these projects by 2030 is doubted. Projects designed to achieve compliance in existing terminals are planned in Germany (Karlsruhe, Kornwestheim, Stuttgart SCT, München), in Austria (Linz) and in the Czech Republic (Ostrava-Paskov).

### 2.3.2 IWW network bottlenecks

Navigation reliability (or good navigation status) is the decisive parameter for **IWW**. It is expected that a good navigation status is only partially reached throughout the Corridor. Within the current financial perspective, a number of actions have been funded through CEF along the main cross-border sections in Hungary, Croatia, Slovakia, Bulgaria and Romania. These Actions aimed in particular to ensure that all environmental permits have been acquired to start the works for the upgrade after 2022. Therefore numerous works projects or studies along these cross-border sections are foreseen from the start of CEF II.

The CEF funded action FAIRway Danube monitors the waterway conditions and analyses their changes over the years. The action includes the following steps

- Update national action plans regularly
- Concerted purchase of advanced equipment for hydrological services
- Carry out pilot activities regarding new technologies and innovative solutions
- Identify innovative approaches for fairway rehabilitation and upgrade.
- Prepare documentation for implementation of future selected measures that further support the deployment of the "Fairway Rehabilitation and Maintenance Master Plan".



A CEF funded Action along the cross-border section between Sava in Croatia and BIH aims at obtaining all environmental clearances to start the works in the future.

Intentions to increase the bridge clearance are missing for all of the bridges not complying with the Regulation. Two of the bridges (Alte Mainbrücke, Würzburg; Rail Bridge Bogen, rkm 2311.27) can represent a particular challenge for the navigation of passenger vessels and would also represent an obstacle if container transport on the Danube develops. However it has to be noted that the 12th century Alte Mainbrücke in Würzburg is a landmark of the city. Therefore possibly this issue cannot be solved due to the particular historic value.

A key element for inland waterways to be more and more a real alternative to other transport modes is the removal of **administrative barriers and improve institutional capacities to tackle major societal changes**. The barriers and procedures that most affect inland waterway transport were identified in the Danube Transnational Programme (DTP) Interreg project DANTE (<http://www.interreg-danube.eu/approved-projects/dante>)

The work carried out in the framework of the EU Strategy for the Danube Region (Priority Areas 1a on Inland Waterways and 11 on Security) meanwhile resulted in practical solutions for simplified and harmonised border-crossing procedures along the Danube waterway. The synchronised application of a first set of so-called Danube Navigation Standard Forms (DAVID) was started in spring 2020 with their introduction in Hungary, Croatia and Serbia.

The main objectives regard to increased institutional capacity in Danube navigation by boosting **joint transnational competences and skills in education and public development services** were identified in the DTP Interreg project Danube SKILLS (<http://www.interreg-danube.eu/approved-projects/danube-skills>).

The next element on which IWW have to focus in the future is a fleet modernization, especially the Danube fleet. The fleet modernization aims to achieve a higher acceptance and use of inland waterway transport as an environmentally friendly transport mode contributing to economic growth and a more sustainable transport system in the Europe.

Figure 4: IWW compliance by 2030 overview



### 2.3.3 Port Compliance

Lack of functional railway connections are key bottlenecks for the **port** development. Such railway connections are currently missing in the Hungarian port of Komarom and Romanian port of Cernavoda. In addition, the lack of alternative fuels supply facilities in all but one port is a situation that needs to be tackled in the future project pipelines.

Clean Fuels: At the moment, inland ports do not have facilities for alternative fuels supply, but the Port of Budapest plans an LNG bunker station at the end of 2019 and the Port of Bratislava plans to complete similar facility in 2025. Completion of LNG bunkering station for vessels in the Port of Enns is planned for 2030.

#### Administrative barriers in inland ports:

The list below clarifies the most relevant administrative barriers for ports which exist along the Corridor:

Non-harmonized processes and different documents related to the vessel, its cargo, crews, passenger and vessel provisions in a number of cases cause additional administrative work by vessel operators and skippers, thus delaying and prolonging the process of vessel reporting at borders or in ports, especially when loading/unloading or just transiting third (non-EU) countries.

Different charging practices between Member States are also affecting the smooth transport. Due to different port administration models applied in various Member States, some ports are charging their infrastructure fees based on the load a vessel is loading/unloading, while some ports are charging the same fees based on the vessel capacity, vessel length, sometimes including the time component in the fee calculation. It has been noted that the various charging systems sometimes cause confusion and losses in profits of ship operators and/or shippers/receivers of cargos. This is sometimes caused by insufficient information on port charges needed for various freight and voyage calculations (freight rates, operating costs, etc.).

Lack of coordination for putting up projects involving multiple authorities: in some Member States, infrastructure managers identified difficulties in preparing/defining projects that need to involve different authorities within a port area (e.g. port authorities and rail authorities managing intraport railways) and beyond a port area. The latter refers to situations when, for example, upgrading a railway link is of lower importance for railway authorities, but it is of high importance for a port.

The situation on compliance with port KPIs expected in 2030 is given in Table 7 below.

**Table 7: Expected situation with inland ports compliance in 2030**

Criteria	CEMT IV Class connection	Rail connection	Alternative clean fuel supply facilities	Min 1 common user terminal
Port	Compliance Y/N			
Frankfurt A/M (DE)	Y	Y	N	Y
Nürnberg (DE)	Y	Y	N	Y
Regensburg (DE)	Y	Y	N	Y
Enns (AT)	Y	Y	Y	Y
Vienna (AT)	Y	Y	N	Y

Bratislava (SK)	Y	Y	Y	Y
Komárno (SK)	Y	Y	N	Y
Komarom (HU)	Y	N	N	Y
Budapest (HU)	Y	Y	Y	Y
Vukovar (HR)	Y	Y	N	Y
Slavonski Brod (HR)	Y	Y	N	Y
Drobeta TS (RO)	Y	Y	N	Y
Calafat (RO)	Y	Y	N	Y
Giurgiu (RO)	Y	Y	N	Y
Galati (RO)	Y	Y	N	Y
Cernavoda (RO)	Y	N	N	Y
Vidin (BG)	Y	Y	N	Y
Ruse (BG)	Y	Y	Y	Y

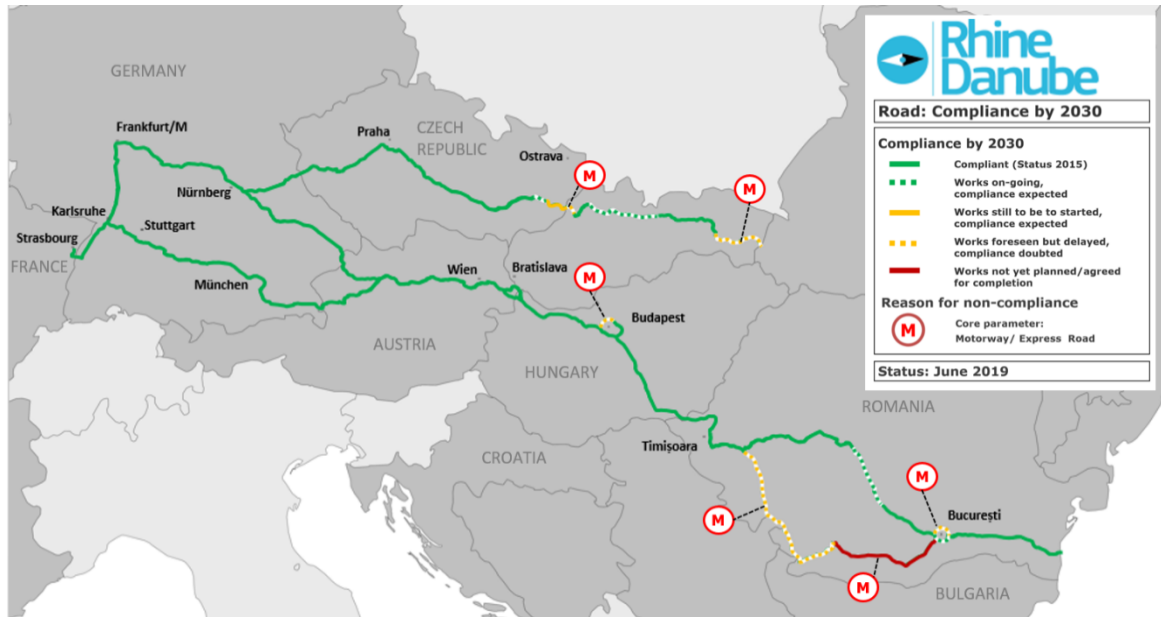
Source: iC consulenten, based on desk research and own survey

As far as seaports are concerned, the Rhine – Danube CNC has only one seaport: the Port of Constanta. This port complies with all KPIs except for the alternative fuels supply facilities. Nevertheless, the port authority plans to provide such facilities by the end of 2023.

### 2.3.4 Road Compliance

No missing road links exist and most of the currently non-compliant road sections are addressed by projects. It is expected that 92% of road sections will be compliant by 2030. However, there are doubts that the border section between Slovakia and Ukraine as well as the common section of RD and OEM CNC in Romania (Lugoj – Maglavit) will be compliant. No compliance is expected for the section Craiova – Bucuresti (218 km) since it is not addressed by any project. Provision of safe and secure parking areas for freight vehicles lags behind, especially in the eastern part of the Corridor. Specific attention is required in respect to deployment of ITS, which should play a major role in increasing the efficiency of road infrastructure use and improving safety.

Figure 5: Road compliance by 2030 overview



## 3 Transport Market Study

### 3.1 The Corridor scenario

The objective of the Multimodal Transport Market Study (MTMS) is to determine the impact of implementing the projects in the Work Plan Project List on the Corridors network. The MTMS provides an estimation of the prospective traffic flows on the Corridors in 2030, while also offering a view on the associated effects on the GDP and the labour market. It does so by considering two different scenarios, the *Baseline Scenario* and the *Reference Scenario*. The Baseline Scenario assumes that the implementation of the core TEN-T network stops at the end of 2016 and no further investments are made. In the Reference Scenario, the core TEN-T network is assumed to be fully implemented by 2030, in line with the requirements of Regulation 1315/2013 on the development of the TEN-T.

#### MTMS methodology

The MTMS conducted for Fourth Work Plan is a follow up of the modelling exercise of the previous Work Plans, however this time around with a revised methodology that is harmonized across the corridors. To carry out the modelling, the TRUST and AsTra models from the companies TRT and M-Five are used. The year 2030 is selected as the forecasting horizon, as this year represents a major milestone for European policy. The MTMS was carried out using the following considerations:

- Data on traffic flows forming the basis of the two scenarios is collected from public sources and national authorities and reflects the transport flows of the year 2016.
- Macro-economic trends behind the modelling are derived from the *EU Reference Scenario 2016*.
- The Reference Scenario is based on the projects that are included in the 2017 Work Plan project list.

In addition to the Baseline and Reference Scenario, a third scenario is defined unique to each corridor. Referred to as the *Rhine-Danube Corridor Specific Scenario*, this scenario highlights the effects of a certain change that impacts the Corridor. For the scenarios relating to full corridor completion, this work plan draws on the results of the study *the impact of TEN-T completion of growth, jobs and the environment* published in 2019 by the European Commission. The corridor-specific scenario was instead elaborated as part of an additional study conducted in view of the of this work plan.

### 3.2 Reference and Baseline scenario

The impact analyses performed under the Growth and Jobs study allow capturing the direct effects of the new infrastructure developments in the transport sector and the indirect effects on supplying industries and the wider economic impacts induced by mechanisms such as higher productivity diffusing to other economic agents and into future years at regional/national scale. For the Rhine-Danube Corridor, according to this study, the implementation of the whole EU-wide core TEN-T (reference vs. baseline in 2030) will result, in the corridor Member States during the period 2016 - 2030, in an increase of about € 813 billion, and in the generation of a total of 2.3 million additional man-years of jobs.

These socioeconomic gains will be furthermore coupled with additional benefits in terms of reduction of external costs and environmental protection. The planned investments along the corridor, in accordance with the present work plan (notably in

the field of rail and the improvement of intermodal transport) will enhance the environmental performance of the TEN-T, creating favourable conditions to increase the modal share of greener transport modes, mitigating greenhouse gas emissions, noise and, as appropriate, other negative environmental impacts.

Whereas the transition to innovative and sustainable transport technologies will generally make possible the decarbonisation of all transport modes, a positive contribution is also expected from the large-scale adoption of alternative clean fuels and zero-emission vehicles. The ongoing and planned projects on the TEN-T are expected to play an important enabling role by supporting the early adoption of such technologies.

### **3.3 Corridor specific scenario**

The *Rhine-Danube Corridor Specific Scenario* investigates the impact on the RDC if various key projects from TEN-T project list are being implemented later than 2030. The selected projects concern all modes of transport with a focus on projects on the Eastern part of the corridor. Under this scenario, sixteen projects representing 9.6% of the total TEN-T investments on the corridor will be delayed and not be completed before 2030, meaning that transport time and cost savings will not be achieved.

Accumulated losses of GDP would amount to € 12 billion and 148,000 job-years would not be created. The impact on GDP and employment in relative terms is very small and of comparable magnitude with results of other corridors specific scenario's. At country level, the impact depends on the size of non-implemented TEN-T projects and on its relation to national GDP and to total investments. Moreover, productivity and demand impulses from TEN-T investments cause stronger impacts in less developed countries. Therefore, the relative impact is most noticeable in Czech Republic, Romania and Slovakia.

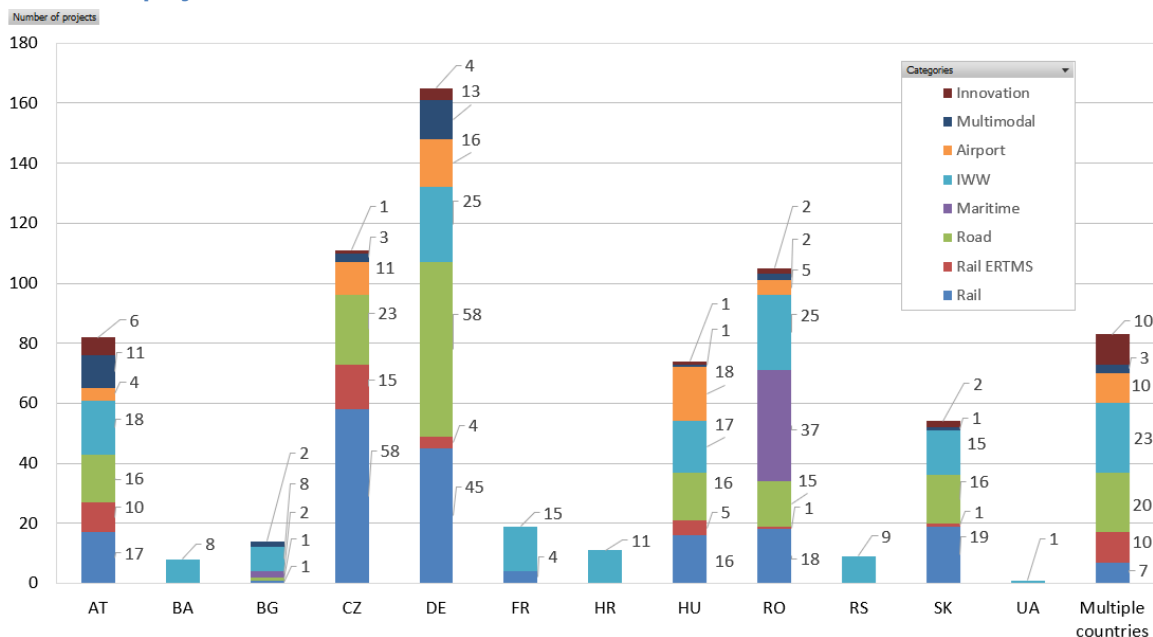
The member states not directly affected by non-completion of projects – France, Hungary and Austria – would experience (slight) positive effects on GDP due to productivity gains based on shifts in traffic and investments. The latter applies in particular to France.

## 4 What has still to be realised by 2030

The indicative RD Project List constitutes a supporting tool for monitoring and coordinating the development of the Corridor. This chapter looks, therefore, at the RD CNC identified projects to be realised by 2030. This time, a list of “additional” projects has been proposed by the consultants. These projects could be considered as additional input to support the Corridor development and its successful implementation. However, this recommendation does not question in any way the Member States’ competence in infrastructure planning.

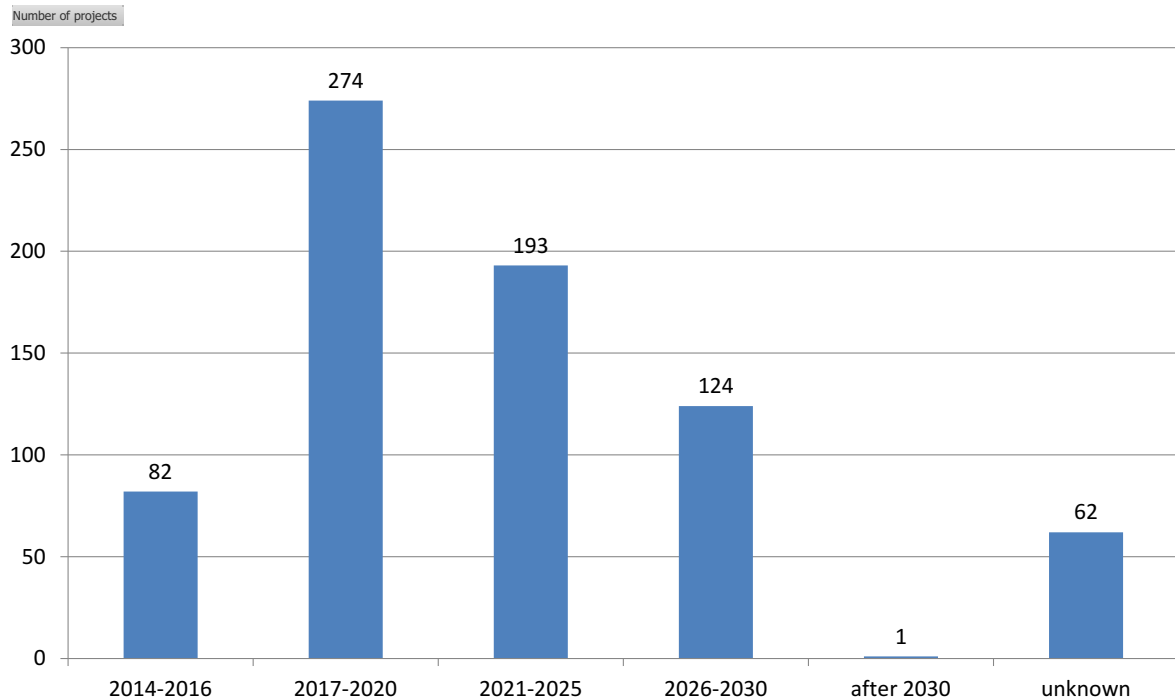
Following its continuous update, the latest project list of the RD Corridor refers to a project implementation status as of June 2019. It comprises 736 projects; thereof 231 Rail + Rail ERTMS, 165 Road, 39 Maritime, 64 Airport, 175 Inland Waterway, 26 Innovation and 36 Multimodal projects. Regarding geographical allocation, most projects come from Germany (165), followed by Czech Republic (111), Romania (105), Austria (82), Hungary (74) and Slovakia (54). 83 projects are allocated to two or more countries, as shown in Figure 6.

**Figure 6: Number of projects by country and category (project implementation status 06/2019), total = 736 projects**



As Figure 7 depicts, almost half of the projects (356) have already been concluded or will be completed by 2020. The completed projects are still included in the analysis in order to document the progress made on the Core Network Corridor since the implementation of EU Regulations 1315/2013 and 1316/2013. In the “critical” time window 2026-2030, 124 (17%) projects are still to be finalised. One (rail) project is scheduled to be completed after 2030, while another 62 projects are lacking information about the completion date.

**Figure 7: Number of projects on the RD Corridor by completion time cluster (project implementation status 06/2019), total = 736 projects**



The compliance analysis (2.3) showed that certain KPIs will only be partially fulfilled by 2030. Therefore, the CNC consultants proposed a list of 131 additional projects designed to complete the Corridor. The realisation of these additional projects would lead to additional costs in the range of (roughly estimated) € 14.7 bn.

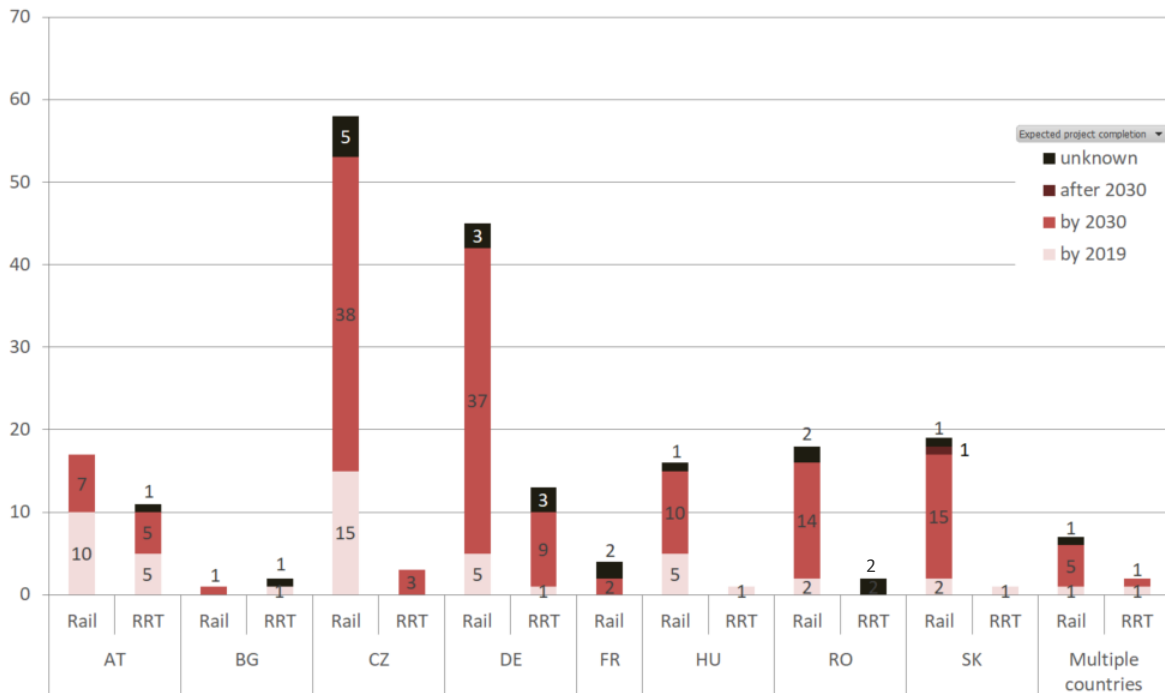
According to the identified compliance gaps, the majority of these additional measures refer to the TEN-T parameters “Train length” (Rail) and “Clean fuels” (all modes concerned). Next to the requirements of the Regulation, the list of additional projects also includes market driven measures, mainly intended to improve competitiveness of intermodal transport. These refer to the KPIs of Rail/Road Terminals and to the achievement of the P70/400 profile on the lines.

#### 4.1 Rail & RRT

As shown in Figure 8, 185 Rail and 33 Rail/Road Terminal (RRT) projects are allocated to the RD Corridor. Two thirds of these 218 projects are situated in the Czech Republic, Germany and Austria. Seven Rail projects are allocated to several countries; these refer to TAF TSI implementation, to multi-country studies and to low-noise equipment of freight wagons.



**Figure 8: Rail and RRT projects on the RD Corridor by country (total: 185 Rail, 33 RRT, data status: 06/2019)**



Out of these 218 projects, 40 Rail and nine RRT actions have already been concluded between 2014 and June 2019. With dedicated view on the year 2030, it can be stated that 169 Rail (91%) and 26 RRT (79%) projects are expected to be completed until then. However, the Rail project “Rail Node Bratislava – Works” is planned to be finalised in 2040 only. Another 15 Rail and 7 RRT projects are lacking any information about the completion date.

Of particular interest are projects that achieve one or more KPIs, since they contribute to the compliance of the TEN-T requirements.

- 76 out of 185 Rail projects fulfil this condition. In most of these cases (43 projects), they refer to ERTMS installation in connection with general line upgrades. Further main KPI achievements are “Track length” (38 projects), “Axle load” (37 projects) and “Line speed” (36 projects). Moreover, 94 Rail projects aim at the elimination of capacity bottlenecks.
- 12 (out of 33) RRT projects achieve at least one KPI. These KPIs are beyond the requirements of the Regulation, but are however necessary to meet market needs and to make intermodal transport competitive to road. In this respect, 11 projects shall enable transshipment of all standard intermodal loading unit types (containers, swap bodies, trailers), 10 RRT projects are designed to achieve terminal accessibility for 740m trains and nine projects shall realise electrified train accessibility.

The costs of the projects sum up to

- € 64.9 bn for Rail projects. This figure represents the costs which have been communicated by the Member States and the stakeholders, and do not take into account underspending due to lower bids accepted at the moment of the signature of the contracts or costs overrun. In Hungary, there are on average between 15-20% cost overruns; in Romania, due to the lengthy procurement processes, a price increase of 5% on average, while, in Slovakia and the Czech Republic, the costs at the end of the process are around 5% lower than originally forecasted. For Rail projects financed by other means than EU

funding, without official costs provided by the stakeholders, the consultants provided estimations, leading to additional costs of € 8.9 bn.

The total costs for rail projects are therefore calculated to € 73.8 bn. Nearly half of this total investment is allocated to 10 large-scale projects: ABS/NBS Karlsruhe – Basel, "Stuttgart 21", Frankfurt/Main node upgrade, "Middle Rhine" railway Corridor, ABS/NBS Hanau – Nantenbach, NBS Wendlingen-Ulm, ABS Karlsruhe-Stuttgart-Nürnberg-Leipzig/Dresden, line upgrade Arad – Simeria, ABS München-Mühldorf-Freilassing and ABS/NBS Ulm – Augsburg.

- € 0.78 bn (official costs) + € 0.38 bn (estimated costs) for RRT projects. Half of this total amount is allocated to the new construction of the terminal Wien-Inzersdorf (AT) and for the upgrade of Linz terminal (AT).

In order to ensure that the remaining bottlenecks are addressed and hence overcome, the consultants consider that 48 additional rail projects (not including ERTMS) have to be put forward. The vast majority (34) refers to the parameter "Train length", 11 to "Line speed" and 6 to "Axle load" and 2 to "Electrification". 18 additional projects aim at achieving P70/400 intermodal gauge on the lines. The latter KPI is not explicitly required by the Regulation, but from the consultant's point of view deemed necessary to improve competitiveness of intermodal transport.

The geographical allocation of these additional Rail projects shows that

- Proposed actions for achieving P70/400 profile cover the Czech, Slovakian and Romanian part of the Corridor as well as small sections in France and Germany;
- Proposed projects for realising 740m train length are predominantly allocated to the Czech Republic, Slovakia and Romania. On a number of these sections, projects are already ongoing or planned;
- Additional projects for "Line speed" and "Axle load" are restricted to single, small sections.

Next to rail, another 38 additional projects have been proposed for Rail/Road terminals. This means that almost every core node terminal on the RD Corridor is in need for action in order to be compliant to the three market-driven KPIs "Intermodal loading units", "740m train accessibility" and "Electrified train accessibility."

## 4.2 The ERTMS deployment 2023

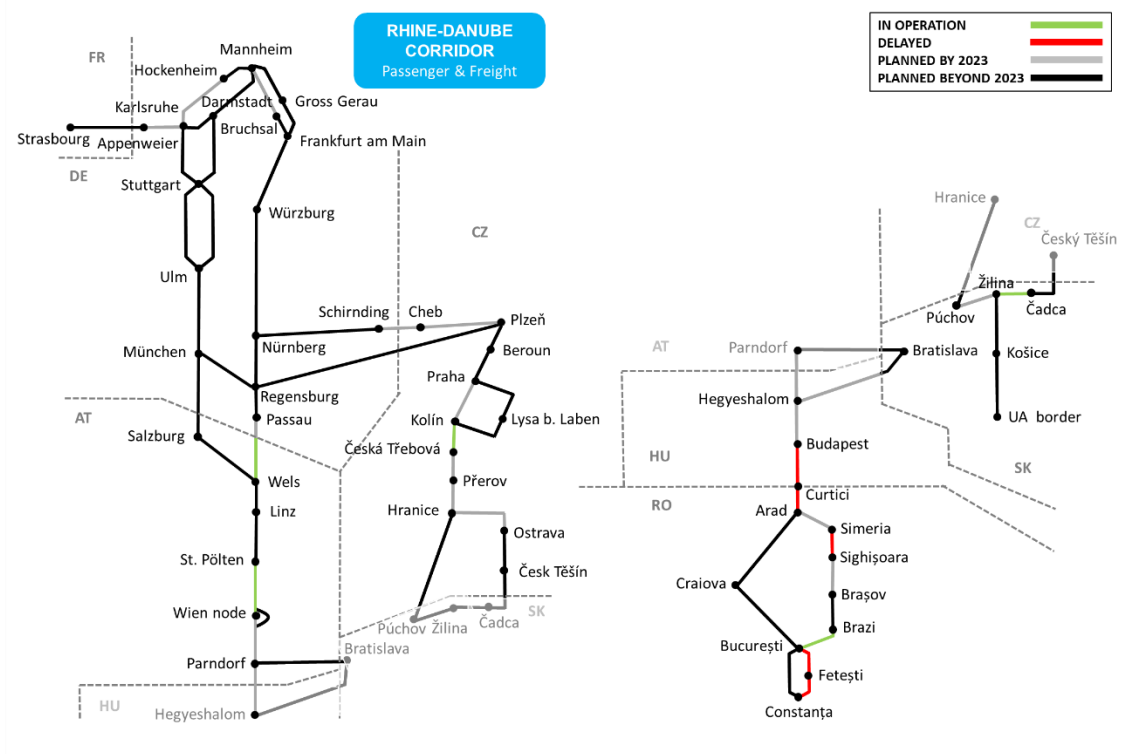
In 2013, the TEN-T Regulation (1315/2013) set guidelines and defined priorities for the development of a Trans-European Transport Network. The requirement for full deployment of ERTMS by 2030 was established for the entire length of the RD-Corridor with an intermediate target of 36% until 2023 set in the ERTMS European Deployment Plan (EDP - Commission Implementing Regulation (EU) 2017/6 of 5 January 2017).<sup>4</sup>

ERTMS business cases have calculated the specific IRR values for the deployment for RD CNC to 10%. Figure 9 depicts the state of play and deadlines for the ERTMS deployment in the RD Corridor.

---

<sup>4</sup> Note: Fitting of GSM-R is mandatory according to TSI CCS (Technical Specifications for Interoperability – Control Command and Signalling) only in specific situations. The EDP is not mentioned in the GSM-R specific implementation rules in the TSI CCS. ERTMS includes both ETCS and GSM-R, but GSM-R is mandatory only in cases stated in the TSI CCS, e.g. when implementation of ETCS level 2, level 3 or level 1 with radio in-fill needs data radio communication (TSI CCS §7.3.1)

**Figure 9: Current status of ETCS deployment program until 2030 on RD CNC**

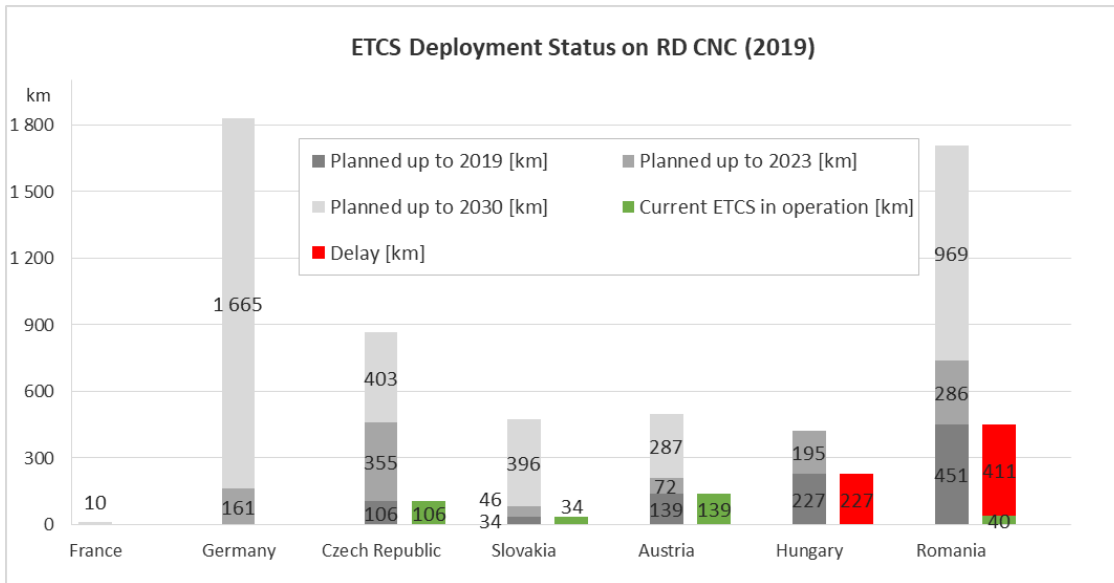


Source: Technical support for the Deployment of ERTMS along the Core Network Corridors, INECO & EY

For more than 3700km of the RD rail network ETCS operation is planned to start only after 2023, which accounts for 64% of the Corridor rail alignment. Table 8 shows the current and future status of ECTS deployment per Member State.

The longest sections with planned ETCS beyond 2023 are located in Germany (1665km), Romania (969km) and the Czech Republic (403km). In Slovakia 83% of the RD rail alignment (475km) is planned to have ECTS in operation not before 2023. Implementation delays are faced in Hungary (227km) and Romania (411km).

**Table 8: ETCS deployment by MS, period and status**



Source (both): Technical support for the Deployment of ERTMS along the Core Network Corridors, INECO & EY, December 2019

### 4.3 IWW & inland ports including RIS deployment plan and Maritime Ports on the RD Corridor, interactions and complementarity with the MoS Coordinator Implementation Plan for the RD Corridor

The projects which have been implemented at National level or funded through the EU, in particular via ESIF and CEF funding addressed existing difficulties that limit admissible draughts or hinder the achievement of target fairway depths. Targeting 6 major bottlenecks, the other CEF-funded IWW projects concentrate mainly on three areas of intervention: upgrade and construction of infrastructure, studies with pilots addressing environmental concerns and the implementation of RIS along the whole Danube.

Several bottlenecks resulting in unreliable, unsafe and non-compliant navigation infrastructure are being tackled through works actions, namely: the reconstruction of the cross-border Komárno-Komarom Bridge (2014-EU-TMC-0485-W) and Upgrade of Gabčíkovo lock (2015-SK-TM-0151-W) or the upgrade of the inland ports of Giurgiu (2014-RO-TMC-0313-W) and Galati (2015-RO-TM-0275-W).

The other group of Actions aims at ensuring a long term good navigation status side by side with a good ecological status (GES) along three stretches of the Danube and the Sava rivers: the Romanian-Bulgarian and Hungarian-Slovakian common sections (Actions 2014-EU-TMC-0297-S and 2016-SK-TMC-0263-S, respectively) as well as the Croatian Sava (2014-HR-TMC-0122-S). The studies and consultations for obtaining the EIA decisions and all other necessary environmental assessments have started in all countries in line with the integrating guiding principles of the International Convention of the Protection of the Danube River (ICPDR). Civil society and environmental stakeholders have been associated to the implementation of the Actions.

Operational bottlenecks are being addressed through RIS-related pilot Actions involving all Danube riparian countries (2014-HU-TM-0619-W and 2015-EU-TM-0038-W, 2015-EU-TM-0036-W). Their objectives are the promotion of a more transparent and effective data exchange process and the simplification of complex administrative procedures. By end of 2018 the overall Corridor RIS concept and architecture option were approved by the beneficiaries.

The majority of these projects are not related to works, but to studies. They will pave the way for the future works to be funded in the next financial perspectives. For the countries along the Danube, the EU support is essential, not only from a financial point of view, but from a political one as well. Coordinators have been extremely active in supporting the countries to work together to find sustainable solutions and consensus, while reaching out to the many different stakeholders. The involvement of NGOs in these projects has been essential to develop an integrated approach to ensure good navigation status while preserving the good ecological status.

In the Northwestern part of the Corridor, the plan approval decision for the section Straubing-Deggendorf was issued in 12/19. For the critical section Deggendorf – Vilshofen plan approval procedure started in 2018, but is still ongoing. Objective is to enhance navigability conditions by increasing fairway depth by 25cm to 2.25m at Low Navigable Water Level (LNWL)<sup>5</sup>. Although not fully in line with the requirement of Article 15 of the TEN-T regulation that foresees the minimum requirement of draught of 2.5 m, this will be a significant improvement for IWW transport.

Work is on-going between Slovakia and Hungary to address the common section and to finalise a feasibility study which will harmonise works interventions for both countries to tackle existing bottlenecks. This future work project will not consider the existing locks or the construction of new ones in this section. Slovakia wants to follow up on a feasibility study of Lower Vah navigability in the section Piestany – Komarno (rkm 113,40 – rkm 0,00), which was elaborated as a part of the implementation of action 2014-EU-TMC-0231-S, and elaborate a detailed feasibility study of the river Vah navigability in sections not included in the previous feasibility study - these sections are Piestany – Trenčin and Trenčin – Zilina. The river Vah is part of the TEN-T Core Network (between Zilina and Komarno) and connects the Baltic-Adriatic Corridor with Rhine-Danube Corridor in Komarno. The FAST project between Bulgaria and Romania (funded through CEF) is on-going and planned to be completed by end 2021. Discussions are on-going between the two countries on the governance structure of a future project and how the funding and financing decisions should be taken. The Rhine-Danube Coordinator is very involved in both processes and supports both countries in their work.

The Sava river in Croatia needs to be upgraded with regard to CEMT class requirements and the minimum draught of 2.5m. Croatia is currently working on finalising a final design for the Croatian section and the common section with Bosnia Herzegovina in order to obtain decisions and permits for a future work project to address this situation. Cooperation is on-going with Serbia for both the Danube and the Sava.

Although not yet in the Corridor, the CEF funded Iron Gate I Action is on-going and will be finalised end of 2021. Serbia is extremely active in the field of IWW and strongly appreciates the CEF support including the involvement of the Coordinator in these projects.

In inland ports, two ports (Komárom and Cernavoda) need to provide railway connection to the hinterland, although no such project is foreseen in the planned project pipeline. For this reason, the study team suggested two additional projects to cover these missing links. Furthermore, since only 4 ports would comply with the requirement of provision of alternative fuels supply facilities by 2030 (Ruse, Budapest, Bratislava and Enns), 14 additional projects for construction of alternative fuels supply

---

5

[https://www.gdws.wsv.bund.de/SharedDocs/Downloads/DE/Planfeststellungsverfahren/600\\_Donau\\_Straubing\\_Vilshofen\\_TeilabschnittII\\_2018/Mappe\\_1/001\\_Beilage.pdf?\\_\\_blob=publicationFile&v=4](https://www.gdws.wsv.bund.de/SharedDocs/Downloads/DE/Planfeststellungsverfahren/600_Donau_Straubing_Vilshofen_TeilabschnittII_2018/Mappe_1/001_Beilage.pdf?__blob=publicationFile&v=4)

facilities have been suggested in the category of “additional” projects, in order to cover the lack of such facilities in 14 ports.

### **Motorways of the Sea – RDC interaction and complementarity**

In 2018, Constanta, as the only seaport of the Rhine-Danube CNC handled 40 million tonnes, while a river port of Galati, capable of handling smaller seagoing vessels, handled 1.3 million tonnes of seagoing cargo, mostly dry bulk and general cargo related to the local steel industry. Seagoing cargo handled in these ports amount to 1% of all cargo transiting through EU ports in 2018. Most of this traffic is hinterland traffic and hence moving between the ports and the Corridor.

A modal shift from road to less carbon-intensive modes is one way to reduce the carbon emissions of the transport sector. A shift from road to sea is not possible on the Rhine-Danube Corridor because its alignment is mainly inner-European.

However, the Rhine-Danube CNC is a typical hinterland Corridor for its CNC ports. Regular ro-ro services prolong the Corridor to neighbouring countries in the Black Sea and there is a large volume of bulk traffic from and to the Black Sea ports. The Danube is particularly used for bulk transport between Constanta and the hinterland, but also between Constanta and Galati, the latter serving the regional heavy industry. For Bukarest (still within typical truck distance) and the Northern part of Romania, the rail infrastructure and services must be developed in line with demand. The Hungarian container market is already dominated by Koper and the German North Sea ports with regular rail connections, but the Romanian ports can play an important role for bulk traffic via the Danube river.

The Core Network Corridor must be developed in line with growing demand in the different cargo segments. The Rhine-Danube Core Network Corridor shall

- make sure to provide the necessary rail capacity to and from ports in the Black Sea
- work together with ports, forwarders and ship operators to improve the administrative procedures and data flow across all modes
- assure the reliability of the network in order to guarantee the smooth flow of goods between MoS and the Corridor and avoid delays

The attractiveness of rail transport to and from the ports is essential to a shift of traffic from road to rail, but also to increase the acceptance of transport in general and of ports in particular. This can be complemented by measures to improve the acceptance of rail transport (e.g. noise barriers in densely populated areas).

The top legislative drivers/emerging trends for the Rhine-Danube CNC are the following:

- **Decarbonisation:** The EU is taking firm steps towards incentivising decarbonisation through legislative tools. Over the next few years, ports of this Corridor will need to adapt to this new framework, especially with regards to the integration of the maritime sector into the EU ETS scheme, sulphur caps for ship fuel and “green” conditionality of EIB loans.
- **Clean fuels:** In the same line as the previous trend, an increasing emphasis is placed on the use of clean fuels for ships. Issues to look out for include a global sulphur cap for marine fuels (0.50%), the switch to LNG and the development of alternative technologies such as hydrogen or electric power.
- **LNG bunkering:** Increasingly, LNG is seen as a viable solution to reduce the emissions of the shipping sector. Investments will need to be made to not only build the adequate infrastructure in ports, but also retrofit existing fleets.
- **Water pollution:** a rising concern with regards to water and waste management relates to the wash water from Exhaust Gas Cleaning Systems

(scrubbers), with some Member States beginning to ban the use of open loop scrubbers. Adapting fleets will be an upcoming issue.

- **Sustainable tourism:** The development of mass tourism, in particular through the rise of cruises is becoming less and less sustainable. However, the revenue streams it brings cannot be neglected. As a result, a balance needs to be found, one where the damage to ports and the local environment is contained.

The Black Sea serves as a bridge between Europe and Asia. Its ecosystem is suffering from substantial environmental degradation as it is an enclosed inland sea. The enormous pressure from numerous human activities such as industrialization, urbanisation, overfishing or transport (not only of hydrocarbons since the arrival of invasive species in ships' ballast water has also been proven to represent a serious environmental threat) has led to serious problems of pollution, loss of biodiversity, extinction of species and eutrophication.

There are high volumes of traffic travelling each day as the Black Sea is a much-used Corridor for transporting also hydrocarbons, raising the risk of encountering devastating consequences in case of an oil spill.

#### 4.4 Road transport (incl. ITS deployment)

Out of 165 road projects in total, 26 have been completed by the end of 2018 and 44 more are planned to be finalised by the end 2020. Total costs for on-going and planned projects are estimated at some € 24.3bn. These mainly (64%) relate to upgrading existing or building new infrastructure, while alternative fuels and ITS deployment projects amount to 59 in total.

Three additional projects are proposed to bring the Budapest ring and the section Craiova – Bucuresti in line with requirement for motorway or express road. Furthermore, two new projects were identified to address the lack of facilities for alternative fuels in Slovakia and Hungary. The estimated total costs of these additional projects are € 1.2 bn.

#### 4.5 Airports

64 existing projects for airport development along the RD CNC are under analysis, including measures for infrastructure or telematic applications development (according Reg. 1315, Article 31). Out of the total, 14 are already completed and 32 planned to be finalised by the end 2020. Ongoing and planned projects have a value of over € 5.1 bn. Additional projects that need to be implemented to achieve compliance are availability of clean fuels in all core airports along the RD CNC.

#### 4.6 Innovation deployment of alternative fuels infrastructure

The potential for innovation of the Corridor is reflected in its performance to apply better transport solutions that meet new and existing mobility needs. Innovative projects are considered those involving some form of sustainable and future-oriented mobility, such as:

- Deployment of alternative fuels recharging and refuelling infrastructure for inland waterway, maritime, road and air transport and associated mobile assets.
- Transport telematics applications, according to Regulation (EU) 1315/2013, Article 31.
- Implementing sustainable freight transport services, according to Regulation (EU) 1315/2013, Article 32; excluding MoS.

According to the Corridor Work Plan Project List, 5% of the investments allocated to the projects contain an innovative component, which is on par with the Corridor average. Telematics related projects receive 76% of all investments that go into innovative projects, while 17% goes to the realisation of clean fuels infrastructure and 7% to sustainable freight transport services. Looking at the transport modes, most innovation projects relate to road transport, followed by projects for air and inland waterway transport. A high proportion of innovative projects (38%) involve cooperation between multiple countries, 23% are located in Austria, 15% in Germany the remaining projects are allocated to the rest of the Member States. It is to be noted, that many projects include innovative measures, but are allocated to a certain transport mode and not to the category "Innovation".

The supply of alternative fuels along the road Corridor is steadily increasing. Currently, on 81% of the road network Corridor clean fuels refuelling stations are found within a ten kilometres radius, which is expected to further increase towards 2030. Already over twenty road projects are planned to further incentivize the use of alternative fuels in road transport. Alternative fuels supply for other modes are limited and remain uncertain towards the future.

Currently, only one inland port (Ruse, BG) has an alternative fuels supply facility with the possibilities to supply vessels, for the moment using it for LNG fuelled trucks, as there are no LNG-fuelled vessels on the Danube. Only land-side LNG station exists also in the port of Enns (AT), but it currently has no possibilities (or demand) to supply vessels. Port of Budapest, Bratislava and Enns plan to provide LNG bunkering facilities to vessels in 2019, 2025 and 2030, respectively. The only seaport on the Rhine-Danube CNC currently has no alternative fuels supply facilities but it plans to complete the LNG bunkering facility by the end of 2023. Plans for alternative clean fuel facilities have been reported by the Port of Constanța and Port of Bratislava while some of the remaining core ports on the Corridor took part in the LNG Master Plan on the Rhine-Main-Danube axis, meaning that plans for provision of alternative clean fuels facilities might be considered at a later stage depending on the timing of actual introduction of LNG fuelled vessels into operation on the Danube, creating the initial demand. No provision of alternative jet fuels is taking place nor is expected, as the high technical requirements makes the feasibility of using alternative fuels for commercial aviation low, currently and in the near future.



## 5 Funding and Financing

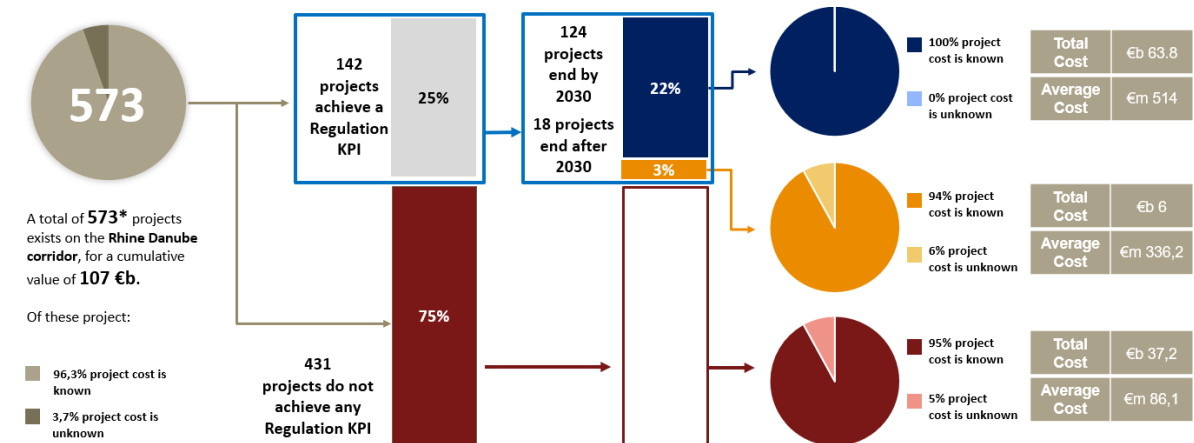
### 5.1 The funding needs

This section of the document provides information related to the projects' cost, maturity and financial viability.

The project list can be analysed through a series of lens, in order to shine a light on different aspects of the projects composing it. Firstly, the maturity of the projects has been assessed and it is summarised in Figure 10. This exercise included counting the number of active projects and clustering them through different metrics, such as their contribution to at least 1 Regulation KPI, their timing and the availability of an official cost figure.

As shown in the diagram, the cost is known for the vast majority (96.3%) of the projects included in the RD Project List, and this high share is also reflected through the three subcategories.

**Figure 10: RD Project List Analysis**



\* The analysis does not consider projects ending before 31/12/2018 and sub-projects, i.e. projects for which the cost is included in bigger projects

The following step was to determine the funding or financing sources of the projects, with particular reference to the EU funding. As observed in Figure 11, we have clear and complete information on the funding sources of projects accounting for € 75.2 billion, or 70.3% of the list's value; of those, € 15.5 billion (20.6%) come from EU funding, with a split between CEF (42.4%) and ESIF grants (57.6%). It should also be noted that only 57.5% (€ 8.9 billion) of the EU funding has already been approved<sup>6</sup>, with the remaining share of funding still listed as "potential", i.e. yet to be confirmed.

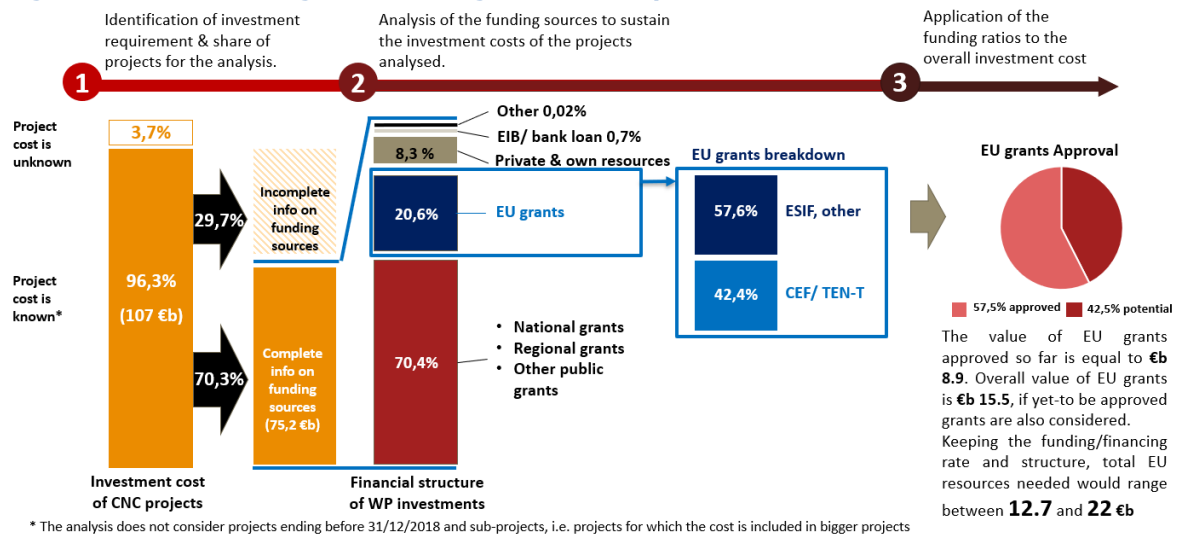
Next to the EU grants is the financing, notably coming from the EIB. The amount of money the EIB lent to projects in the RD CNC might in fact not be fully represented by the 0.7%<sup>7</sup> (roughly € 550 million) shown in the graph, due to different possible reasons, including incomplete reporting from the project promoters or unavailability of information prior to the financial closing. To this extent, it is important to note that the

<sup>6</sup> Only CEF/TEN-T grants marked as approved have been evaluated and confirmed by the EU. Amounts listed as potential have no assurance of being secured, and in some cases they only represent the intention of the project promoter to submit the request for funding.

<sup>7</sup> The EIB was not involved in the data collection phase, and has not yet disclosed official figures concerning its current and expected contribution to the RD CNC development.

reported € 550 million refer to a total of 2 ongoing projects - the maturity of which allows for complete and reliable information, as the EIB only include mature projects in its pipeline - resulting in a final figure possibly undervaluing the overall contribution of the EIB to the CNC development. The same applies to other financial institutions.

**Figure 11: RD PL Funding and Financing Sources Analysis**



The final step of the analysis entails determining the number and value of RD projects able to generate returns from the market to cover operating costs and possibly a share of the capital expenditure. According to the findings, more than 25% of the projects are potentially financially sustainable or already financially sustainable. More specifically:

- **25.5%** of the projects, for a total value of **€ 30.2 bn**, are **financially sustainable**. Projects fall in this category following either a direct assessment from the project promoter or a subsequent analysis of the consultants.
- **3.1%** of the project list, for a total value of **€ 7.9 bn**, presents **good potential for financial sustainability**. Projects included in this category, are considered appropriate based on consultants' assessment.
- **71.4%** of the project list, for a total value of **€ 68.9 bn**, present **low to non-existent potential for financial sustainability**. This is based either on a direct assessment from the project promoter or on a subsequent analysis of the consultants.

Financially sustainable projects are relevant because they can be developed with less - or no - impact on public finances, and/or supported with softer support measures (i.e. soft loans, blending instruments, de-risk instruments, etc.), as detailed below. The more infrastructure is developed through projects generating returns from the market, the less the amount of grants and MS's public finance is needed to complete the TEN-T network.

Projects in the transport sector - and in some sub-sectors in particular, i.e. rail, inland waterway, to mention a few - usually face difficulties being (fully) financially sustainable. Various factors, among which is the presence of financing gaps, can indeed prevent the project owner from meeting the desired returns. In this case, projects are potentially financial sustainable, but require some financial aid. Innovative financial tools, as further described in the next section, can support these projects being structured to generate revenues from the market and, thus, prevent or reduce the use of public finance/ grants (together with technical assistance structuring the project accordingly, when needed).

## 5.2 The innovative financial tools

In line with the TEN-T CNC Coordinators' Work Plans, the aggregate demand for investment in the TEN-T Corridors represents a total cumulated value of about € 640 billion, which can only be supported with a substantial contribution of private financing.

Around 20% of the European Investment Bank's (EIB) total lending goes to the transport sector, representing more than EUR 150 billion of investment mobilized since 2014. In the period 2014-2018, about 60% of EIB transport lending went to the TEN-T. Lending to TEN-T CNC projects represented about a quarter of the overall EIB transport lending during this period. A share of EIB financing is backed by the EU budget, notably in the form of the EU financial instruments and budgetary guarantee, such as the European Fund for Strategic Investment (EFSI). While the EFSI delivered well in areas such as road and airports, mobile assets and rolling stocks, due to the economics and risk profile of transport infrastructure, the use of EU financial instruments for the financing of the TEN-T, in particular for rail projects, fell below expectations.

To improve the quality and bankability of TEN-T projects, DG MOVE and EIB tested in the current multiannual financial framework (MFF) the blending approach, setting up the CEF Blending Call and Facility. Under the first CEF Blending Call, 72 projects were supported, of which 33 already reached full finance close, with EUR 1.4 billion of CEF funding mobilizing close to EUR 8 billion of overall investments. In the next MFF (2021-2027), the InvestEU will cover all financial instruments, as well as blending. The InvestEU will also offer a broader risk spectrum than the EFSI, allowing for both lower and higher risk projects to be financed. This, together with blending, is expected to lead to a higher uptake of innovative financial instruments for the financing of the TEN-T.

The 3<sup>rd</sup> CBS report of September 2019 by Coordinators Bodewig and Secchi "Enabling the uptake of the TEN-T pipeline by the financial market" gives a more detailed insight into financing issues for the TEN-T networks (available under the download section of TEN-T: [https://ec.europa.eu/transport/themes/infrastructure/downloads\\_en](https://ec.europa.eu/transport/themes/infrastructure/downloads_en)).

## 6 The European Coordinator's recommendations and future outlook

### 6.1 Recent EU Studies and Policies

The time for further reflection on the future TEN-T policy has come. To this end, the European Commission has started the review of the TEN-T process in April 2019, with the finalization date expected to be mid-2020. Depending on the outcome, the TEN-T policy and guidelines might require fine-tuning, and therefore the revision of the guidelines might start in the second half of 2020. An additional *"Proposal for a regulation on streamlining measures for advancing the realization of TEN-T"* has been put forward by the European Commission, in order to facilitate permitting procedures for TEN-T core projects and especially for cross-border projects. Besides this, the European Commission has identified the value of the TEN-T network for the movement of military forces and equipment in the *"Action Plan on Military Mobility"* (2018). This is a step towards the creation of a Defence Union. Finally, a proposal for the establishment of the legal basis for Connecting Europe Facility (CEF) funding after 2020 has been made by the European Commission (2018).

During the time covered by the Third Work Plan period, many important studies have been carried out; most of them have been completed, while some are still on-going and nearing finalization. The European Commission intends to complete the TEN-T Core Network by 2030, and most of the studies have been devoted to supporting this goal. An example is the *"Study on permitting and facilitating the preparation of TEN-T Core Network projects"* (2016) and the subsequent impact assessment that led to the European Commission's *"Proposal for a Regulation on streamlining measures for TEN-T implementation"* (2018). Another priority was improving efficiency – infrastructure usage optimization and removing bottlenecks – as demonstrated by the EC policy document *"Transport in the European Union: Current Trends and Issues"* (2018), as well as the study on *"Comprehensive analysis of the existing cross-border rail transport connections and the missing links on the internal EU borders"* (2018). A crucial aspect of improving efficiency is digitization and facilitation of (automated) communication, which became the focus of a significant number of studies, including *"Digital Inland Waterway Area: Towards a digital inland waterway area and digital multimodal nodes"* (2017) and the *"Study on the Deployment of C-ITS in Europe"* (2016). Improving transport safety remains a key focus, as demonstrated by the *"Preparatory work for an EU road safety strategy 2020-2030"* (2018) and a myriad of ERTMS-related studies. Finally, a number of sustainability studies have been completed related to both modal shift and clean energy. Respective examples are *"Consultations and related analysis in the framework of the impact assessment for the amendment of the Combined Transport Directive (92/106/EEC)"* (2017) and *"Clean Power for Transport Infrastructure Deployment"* (2017).

## 6.2 Identified Critical Issues, future challenges and what has still to be done

The main critical issues for a successful development of the RD Corridor can be summarised as follows:

- There are still several **technical** and **physical gaps** along the Corridor's infrastructure in terms of it missing the necessary quality and TEN-T standards, as shown by the compliance analysis.
- **Operational** and **administrative issues**, particularly a lack of harmonisation and cross-border cooperation are causing bottlenecks especially for rail and IWW transport.
- A lack of **financial resources**.
- **Multi-modality**, key in increasing the efficiency of the Corridor, is in need of improvement, especially due to missing last-mile connections and lack of intermodal infrastructure (e.g. enhancing rail capacities to and from ports, better integration of ports/RRTs into logistic chains).
- A potential modal shift to inland waterways is hindered by the **poor reliability of free-flowing inland waterways**, which is determined on external hydrological conditions, but can be decisively influenced by continuous and flexible maintenance work.
- There is need for improved and **integrated international transport services** (client oriented) on the Corridor, both for freight and passengers, including multimodal travel planner and multinational road tolling.
- Unresolved national bottlenecks are blocking the efficient functioning of the entire Corridor. In addition, there is evidence of **lack of coordination/integration of national strategies/plans** (all modes) towards TEN-T objectives and 2030 milestones, particularly for cross-border sections.
- The **significant delays** in several infrastructure projects' **implementation pose a serious threat to 2030-compliance** as described under 0. Several projects are being postponed to a later completion date close to 2030 or even after that. Therefore it is important to reinforce the cooperation between Member States, project promoters and EU supporting tools (PSA, EIB, Hub, etc.), as well as the early involvement of the civil society on a local level.

## 6.3 Achieving the 2030 milestone with mature projects

The achievement of the Corridor by 2030 is based on a mutual commitment by Member States and the European Commission to implement the networks.

It is of the outmost importance that Member States explicitly map recent EU Policies and the TEN-T Regulation in their respective National Transport Plans. The attention of related governments should be pointed to their European engagements and responsibilities when setting works priorities and implementing decisions in a strict manner. From my point of view the well-oriented and precisely applied influence of the European institutions in this respect cannot be overestimated.

In the current MFF, there is adequate co-funding available for infrastructure investments; nevertheless, RD infrastructure project implementation is not fully

starting. In the next MFF period, the completion of then mature projects with an end date of 2026-2030 would only be realistic, if enough funds are available to implement all important projects. If not, the time window of opportunity will have been lost and an important opportunity for the Member States to improve the socio-economic and environmental development will be missed. The synchronisation of adjacent projects along each CNC sector is an important issue to be taken into consideration by the Member States, together with caution that the acceleration of projects' implementation does not come at the expense of the network's capacity.

In this respect, Member States representatives are urged for more openness and relevant communication whenever the implementation of Corridor projects is becoming obviously critically delayed. A regular feedback on the projects' implementation should be realised by the Member States.

The representatives of the European Commission offer their assistance when needed as it is essential to identify ways to solve difficulties jointly. Member States should take care about the availability of necessary human resources for planning, work follow-up and the availability of the adapted legal tools.

Another crucial aspect to be looked at is the systematic public procurement appeals and lawsuits for major infrastructure projects that are delaying significantly their implementation.

#### 6.4 Investment, growth and job impact of the CNC

A preliminary macro-economic analysis on the impact of RD CNC projects resp. investments was performed back in 2017 employing two methods. Based on a few CNC project samples, the number of generated direct construction-related jobs by total investment costs spent was estimated, being roughly 1 direct job per € 1 million investment.

Based on another approach developed by the Fraunhofer Study "Cost of Non-completion the TEN-T Core Network (2016)", multiplying factors (see Table 9 below) were derived, and then linked with the latest 2019 list of projects and their total costs.

**Table 9: Job & Growth Multipliers for TEN-T CNC projects**

Categories	Type of investment			Unit of measurement
	Average	Cross-border	Innovation	
<b>GDP-Multiplier</b>	<b>4,35</b>	<b>16,8</b>	<b>17,7</b>	bn€-GDP / bn€-INV
<b>JOB-Multiplier</b>	<b>16.300</b>	<b>37.000</b>	<b>38.700</b>	FTE-JobY / bn€-INV

Source: Fraunhofer Study on the Cost of non-completion of the TEN-T (2015)

Those RD CNC projects for which cost estimates are available and that are planned to be implemented over the period 2016 to 2030 amount to an investment of € 110 bn. The implementation of these projects will lead to a total € 813 billion increase of GDP over the period 2016-2030. Further benefits will also occur after 2030.

The investments will also stimulate additional employment. The direct, indirect and induced job effects of these projects will amount to 2,348,697 additional job-years created over the 2016 – 2030 period. Further increase in job-years is also expected after 2030.

The above further highlights the socio-economic dimension of infrastructure projects. In this respect, in an effort to quantify resulting socio-economic impacts, I have opened an on-going dialogue with the Banks (EIB) and the scientific sector (ETH Zurich, ARL, TU Vienna, Democritus University), chairing also the "1<sup>st</sup> Joint Working

Group Meeting of the Orient/East-Med and Rhine Danube Core Network Corridor Fora on Economic Aspects of Transport”, in June 2019 in Brussels.

In addition, one should consider that EU funds spent in Member States are never “lost money”, as they are also dedicated to induce positive socio-economic impacts in the respective regions. To this end, CNC members must act as ambassadors for the idea of the Cohesion fund in the budget negotiations by putting forward these particular socio-economic benefits of the projects.

## 6.5 Modal shift and impact to decarbonisation

Representing almost a quarter of Europe’s greenhouse gas emissions, transport is a key sector in reaching EU’s decarbonisation objectives. In 2015, the transport sector in the RD Member States<sup>8</sup> emits in total around 244 million tonnes of CO<sub>2</sub>. While transport volumes are forecasted to increase over the period 2015 – 2030, modal shift and efficiency gains are outweighing growth. CO<sub>2</sub> emissions are estimated to fall by 10.6% in 2030 if all planned TEN-T projects on the Corridor are implemented. This is a further reduction of 1.7% compared to a scenario *without* the implementation of all TEN-T projects, reducing CO<sub>2</sub> emissions by an additional 3.7 million tonnes.

The extra decarbonisation is the result of additional modal shift or the acceleration of the deployment of low-emission alternative energy for transport, in addition to autonomous developments already taking place. In particular the modal shift to rail facilitates decarbonisation. The modal share of passenger transport for rail is expected to increase from 15.1% in 2016 to 19.2% by 2030, with the share of rail freight transport growing from 26.6% to 32.7%. For passenger transport, two-thirds of the shift will not be realised if the TEN-T projects are not implemented, whereas half of the modal shift for freight will not be realised, demonstrating the relevance of TEN-T projects to realize this shift.

A negative modal shift is expected for IWW freight transport as well, falling from a current modal share of 13.8% to 12.2% in 2030. Being an environmental friendly mode of transport, it is desirable that more of the growth in freight transported is accommodated by IWW transport. However, the Danube suffers from various bottlenecks and capacity issues that need to be addressed before its full potential can be unlocked. This includes poor maintenance for some locks and insufficient fairway draught on the free-flowing sections. To improve the IWW capacity supply in the future all bottlenecks are to be relieved and all necessary fairway maintenance works need to be coordinated until 2030 and beyond.

Still, much work is required to achieve the decarbonisation objectives. In the 2011 White Paper for Transport, the EU set out its goal to reduce GHG emissions from transport by 2050 to a level that is 60% below that of 1990. This includes the intermediate goal for 2030 of reducing GHG emissions from transport by 20% compared with 2008 levels. However, in 2017 GHG emissions from transport were still almost on par with 2008 levels. Further actions to increasing the efficiency of the transport system, speed up the deployment of low-emission alternative energy for transport and transition towards zero-emission vehicles are urgently needed. Already a number of projects are carried out on the Rhine-Danube Corridor that achieve just this while also being easily transferable, meaning that such projects are easily applicable to other parts of the Corridor.

---

<sup>8</sup> Emission values reflect the sum of the total emissions coming from the transport sector in each Rhine-Danube Member State. While being part of the Corridor, France is excluded since it covers only a fraction of the Corridor.

## 6.6 Climate change adaptation

Climate change poses a critical threat to the Corridor infrastructure networks, requiring adaptive measures to minimize the losses and disruptions caused by extreme weather conditions. While weather and other climate-related extremes are becoming more frequent and intense in Europe, the impact on the Rhine Danube Corridor is moderate as the Alpine region and coastal areas are most vulnerable. Most of the road and rail infrastructure on the Corridor is still relatively safe, except the overall issue of increasing micro-local strong precipitation and strong wind events. As regards to the inland waterways, along the Danube the free-flowing stretches could suffer from low water levels due to drought and dryness.

On a Member State level, the road pavement is expected to become more and more vulnerable to heat stress mainly in parts of southern Germany, Austria, Slovakia, Hungary, and eastern Romania. The eastern part of Austria, southern Romania, and to lesser extent southwest Germany will become more vulnerable to rail track buckling. Furthermore, in the eastern parts of the Czech Republic and Austria as well as southern Romania bridges are expected to become more exposed to bridge scour. The areas surrounding the most outer parts of the Corridor are likely to be exposed to droughts more often in the next century. The centre part of the Corridor (southeast Germany and the Czech Republic) is likely to become wetter.

It must be recognized that any effective improvement, through human action, in present climate trends can be achieved only by concerted cross-border activities in all societal and economic areas including transport. The EU Climate Adaptation Strategy launched in 2013 has already contributed towards this, providing momentum and support to national, regional, local and cross-border adaptation. Adaptation measures are already taken by a number of countries, for example, special Danube embankment protection walls are planned to be built in various sensitive locations such as river ports. Moreover, In Bulgaria, design codes are being reviewed, new operation and maintenance standards and procedures per transport mode are being prepared and climate change adaptation guidelines for transport projects are to be developed. Still, an evaluation of national climate change adaptation strategies has shown that this topic is just beginning to mature for transport infrastructure.

## 6.7 Military mobility and Corridor extensions as upcoming challenges

Since the adoption of the Action Plan on Military Mobility, the Commission is working to improve movements of military forces by addressing shortcomings in the transport infrastructure. Under the military mobility envelope in the Connecting Europe Facility 2021-2027, the Commission would fund transport infrastructure built or upgraded for military purposes provided it is also useful for civilian transport (so-called dual-use infrastructure). It would be a win-win initiative for both defence and transport in the sense that it will allow a smooth mobility of armed forces within and beyond the EU while contributing to the completion of the TEN-T network.

## 6.8 The future of the Connecting Europe Facility

The new CEF Regulation and the new MFF will be the basis for our work and priorities by 2030. Priorities will have to be settled jointly with Member States and infrastructure managers in order to implement those projects with the highest impact on efficient and sustainable transport. This dialogue should be established in the same positive spirit recognising CEF financing as of great added value for Member States and their citizens.



## 6.9 Final Remark

This Fourth Work Plan has been prepared since November 2019 and was finalised in May 2020.

In the meantime, the world has been affected by the SARS-CoV-2 pandemic and it has a great impact on our lives, our health systems and our economies.

We know only part of the pandemic's dramatic effects on people and economies so far.

The transport sector has been heavily impacted by the containment measures in Europe and worldwide. Continuity of service has been ensured by transport workers under difficult conditions, showing their critical function in serving the population's basic needs. The transport sector will also be crucial in supporting the economic recovery.

It is too early at this stage to undertake a thorough analysis and to draw conclusions in this Work Plan.

Nevertheless, I propose that in the coming weeks, I will start an initial analysis with all the Member States and important stakeholders of our Corridor and gather insight on the impact of the crisis and related recovery plans on transport infrastructure investments, as well as views on the future possible orientation of the Corridor work and Work Plan priorities.

Without jeopardising the final objective of the realisation of the Rhine-Danube Corridor, this approach is intended to further align our activities with current events which have considerably changed our social and economic life and will affect our approach towards mobility and transport, along with the climate and digital transitions.

## **Contacts**

### **Karla Peijs, European Coordinator**

[Karla-Maria-Henriette.Peijs@ec.europa.eu](mailto:Karla-Maria-Henriette.Peijs@ec.europa.eu)

Désirée Oen, Political advisor

[Desiree.OEN@ec.europa.eu](mailto:Desiree.OEN@ec.europa.eu)

Corridor website:

[https://ec.europa.eu/transport/themes/infrastructure/rhine-danube\\_en](https://ec.europa.eu/transport/themes/infrastructure/rhine-danube_en)







**Contact details:**

European Commission – Directorate General for Mobility and Transport

Directorate B – Investment, Innovative & Sustainable Transport

Unit B1 – Transport Networks

[http://ec.europa.eu/transport/index\\_en.htm](http://ec.europa.eu/transport/index_en.htm)

email: [move-info@ec.europa.eu](mailto:move-info@ec.europa.eu)

Offices:

Rue Demot 28

1049 Brussels, Belgium

