Integrating Danube Region into Smart and Sustainable Multi-Modal & Intermodal Transport Chains

Danube Ports Analysis of infrastructure investment needs in the future for the agricultural Danube ports (Country-based & Summary)

Summary Report [RO, BG, UKR, HU, AT, SK]

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Abbreviations

Abbreviation	Explanation
AGN	European Agreement on Main Inland Waterways of International Importance
C.N. A.P.M	Compania Națională Administrația Porturilor Maritime S.A. Constanța/ National Company Administration of Maritime Ports S.A. Constanta
CR	County Road
DR	Danube Region
DWT	Deadweight
ETA	Estimated time of arrival
FAME	Fatty acid methyl ester
IWT	Inland waterway transport
LLC	Limited Liability Company
LOA	Length overall
LR	Local Road
PJSC	Private Joint Stock Company
RO-LA	Rolling highway
SB	State Border
SEZ "Reni"	Reni Special Economic Zone
SPaP	Slovenská Plavba a Prístavy, a.s.
TEU	Twenty-foot equivalent unit
TIR	International Road Transports
TRACECA	Transport Corridor Europe-Caucasus-Asia
UTI	Intermodal Transport Units
ÚNS	Central Freight Station

ZSSK	Železničná Spoločnosť Cargo Slovakia, a. s. / Railway Company Cargo Slovakia
ŽSR	Railways of the Slovak republic

1 Focus of the country report

Feasible and high performing hinterland connections are vital for enhancing port activities and connectivity with the mainland corridors and main production and/or consumption areas of interest.

In order to assess the rail, road and maritime connectivity of the DR agricultural ports, an analysis of the status-quo and mid-term perspective of road/rail/maritime infrastructure in Danube ports will be executed. A 4-pillar connectivity assessment i.e. (1) Rail connectivity, (2) Road connectivity, (3) Maritime connectivity and (4) Port infrastructure will be carried out to assess ports connectivity to/from the main national and European transport corridors and main production and/or consumption areas.

2 Executive summary

AUSTRIA

Generally, the rail infrastructure connections within Austria, to the main trade markets and along the TEN-T corridors is very well developed, with most of the KPIs being reached. However, the majority of the country's network is non-compliant regarding the train length of ≥740m[1]. Also the ERTMS/ETCS compliance is still relatively low.

The immediate rail connections to the four intermodal ports Vienna (Albern), Ennshafen, Krems and Linz to their hinterland and catchment areas are well developed with no special bottlenecks.
The rail infrastructure within the four ports ensures a good intramodal shift. There are rail freight stations connecting to the railway network, rail tracks in block train length, optimal railway sidings and tracks for loading/unloading. Usually, more trains can be attended to in parallel, which raises the logistics efficiency. The connections to the destinations in the European north and south ports for both pre-carriage and onward are very satisfactory and subject to continuous development.
The Austrian transport policy is generally driven by a model shift strategy, from road to rail. By 2025, 40% of freight transport should be done by rail. One important focus is set on the harmonized deployment of ERTMS/ECTS, which is still very undeveloped. 17.5 billion euros will be allocated in the expansion and modernization of the rail infrastructure over the next six years 2021 – 2026.

Austria features 2.242 km of motorways and expressways available for road transport/traffic. Road infrastructure along the TEN-T corridors is mostly compliant to all KPI's. Non-compliant sections are minor and only found in the Austrian-Czech cross border area. Some capacity bottlenecks exist mostly in western parts of the Rhine-Danube Corridor, in sub-urban areas of main nodes and big cities.
The road connection to the four main ports from the hinterland and catchment areas is very good. The ports can be easily reached by motorways, expressways, and federal highways.
The road infrastructure within the ports, as well as the related road services - to the extent information was available – ensures a good transport, loading and unloading flow and efficient logistics. There is a focus set on the digitalization of the processes, clean logistics and renewable energies. The businesses located on the premises of the ports invest regularly in the modernization and renewal of the road infrastructure, developing new services (e.g. truck washings facilities, access gates, digitized truck handling, investments in the truck fleet and licenses for the transport of different goods).

The maritime connection from/to the main 4 Austrian ports is given along the TEN-T corridors, between the maritime ports in the North, Baltic, Black and Mediterranean/Adriatic Seas. The infrastructure in the ports is being continuously modernised, with a special focus on optimisation of

[1] Review of the 2020 Work Plans of the four TEN-T corridors passing Austria

the logistics, digitalisation of the processes and introduction of innovative trans-shipment technologies.

On the Austrian Danube section are handled mainly import commodities from Hungary, Croatia, Serbia, Romania. Austrian ports are very well equipped with equipment for handling agricultural products (loading hoppers, silos - mostly all certified, big bag filling systems, etc.). Services such as heavy cargo trans-shipment, warehousing, packaging, and bunkering are available. Major international companies in the field of agriculture (grains, fertilizers, bioenergy, etc.) are present in all ports, with production, processing, storage, and distribution facilities. These private businesses regularly invest in the infrastructure for the handling of agricultural goods and create larger capacities for transportation and modal shift.

BULGARIA

The information for this report was gathered from previous research related to DIONYSUS project, as well as from other projects' documents related to the port infrastructure of the Danube ports (in particular, project DAPhNE), desk research in the available online resources of all relevant ports and port operators, as well as direct communication with representatives of the port terminals.

In modern logistics, ports play the role of intermodal junctions – a place, where different transport modes meet in order to carry out, distribute, allocate and deliver cargo as efficiently as possible to its final destination. There are some prerequisites that the ports must meet in order to effectively and successfully fulfil their role as transport junctions – they need to have the supporting infrastructure, so that they can provide the necessary services for the processing of the cargo, which passes through them. This includes the construction of proper cargo storage and handling facilities, as well as the purchasing of suitable equipment and machinery. There is also one more aspect, which is essential in turning the port into a true intermodal hub – the available connections it has to the hinterland. When more modes of transport are connected to the port, that makes it more effective in being an intermediate point, through which cargoes pass before they reach their final destination.

Bulgarian ports are at different stages when it comes to their rail connection to the hinterland and to the national railway network. The seaports in Burgas and Varna have a comparatively better developed rail infrastructure within the territory of the port itself, as well as its connectivity to the national network, than the Danube river ports, since most of the cargo passes through and gets processed in them. There are not enough connections of seaports, inland waterway ports and airports with the national railway network, in terms of increasing the potential for the development of intermodality.

The road connections between the Bulgarian ports and the national road network vary from one port to other. Some of them are in bad condition and require renovation. The road infrastructure problems,

related to the Bulgarian ports, need to be sorted out. This is essential for improving the road connectivity of both seaports and those on the Danube. A renovated and well-maintained road network, connecting the ports to the hinterland is of great importance to improving not only the port connectivity to the national road network, but also the cross-border connections.

A large share of Bulgaria's international trading goes through the seaports. Over 60% of the imports and exports of Bulgaria's international trade passes through them and this has an extremely strong impact on the overall development of the country's economy. Significant investments are needed for the improvement and maintenance of the current infrastructure, as well as for the technological renovation of the Bulgarian ports. In Bulgaria as a whole, the infrastructure of river ports is morally obsolete, but it nevertheless allows for the processing of not only the current amounts of cargo, but also for the acceptance of new ones.

CROATIA

The analysis of transport infrastructure refers to road, rail, air and inland waterways transport and infrastructure for performing public transport utility activities in Port of Vukovar and Vukovar-Srijem County in general. Until the Homeland War, the county was an important transport and logistics center, but due to war casualties and major damage suffered, primarily on the railway infrastructure that status has been lost.

Nevertheless, the potential of the County as a transport and logistics center still remains unquestioned. Favorable geolocation, superb connectivity and good international relationships contribute to the factors that this hub had a perspective but also still has and is putting constant effort into development of the existing infrastructure and superstructure. European transport corridors pass through the area of the county, the corridor VII (Danube) and Corridor X (Salzburg - Thessaloniki, with the section Zagreb passing through Croatia - Bajakovo). While road corridor X is in very good condition, further improvement in railway traffic is needed before its quality is at the level of European standards.

Road and rail network have their advantages as these modes of transport continue to be the most dominant strategy. Selection of transport modalities depend on various factors out of which the most important ones are end destinations and ways of transporting goods to those locations. Port of Vukovar has geographical advantage of being located on the bank of river Danube opposing to other Croatian river ports. This position ensures unobstructed port operations during the whole year. Work is being done on the electrification of railroad section connecting Vinkovci and Vukovar through several other municipalities ensuring long overdue modernization that is expected to improve connections with Vukovar. Access road to Vukovar port was recently finished which ensured a proper point of contact between two transport modalities.

There is an acute shortage of available space in present day port's area, especially in the part where cargo manipulation occurs and space between the water side and rails, as well as the traffic areas for arrivals and departures. Further work needs to be done, but effort can be seen with medium and long-term strategies on national level accompanied with projects already in the pipeline.

With the further port development, new jobs will be created in transshipment and forwarding sector, warehouses, transport and industrial plants. Employment opportunities also arise in companies specialized in trade and servicing the Vukovar and the Slavonian region.

All these segments, once certain criteria and longer-term goals are achieved, will help with Port of Vukovar's position in the regional hubs network. Reputation already exists from the pre-war era, but next step encompasses transition to sustainable business practices which mostly include better and more efficient connections with other ports and entities that will help with the achievement of desired growth.

HUNGARY

The Hungarian inland ports carry 6 million tons annually, mainly for export. The majority, 35-40% of goods carried in inland ports in Hungary are agricultural goods: grain, maize, corn, etc. Package is mostly bulk cargo or big bag. There are several ports specialized to the transshipment, loading, carrying, and warehousing of agricultural goods all along the Hungarian Danube section, but the greatest market players in the order of their capacity and turnover are: Adony, Paks, Baja and Dunaújváros. This report focuses on the above-mentioned ports due to their capacity and annual turn-over, besides, the most information regarding rail/road connectivity and port infrastructure are only available for the largest actors.

Adony (Adony Logisztika Kft.)

Adony is located in the middle of Hungary on the border of four regions, on the right bank of the Danube, next to the main road No. 6 and the M6 motorway, near Pentele road bridge. In addition to the excellent road access, there is also the possibility of water access (in addition, the Constantza - Rotterdam river-axis is approximately in the middle of the Adony area). Railway links to Pusztaszabolcs main line at Adony railway station.

- Covered storage area: 170,000 m2,84 warehouses with 500.000 tons of grain
- Loading capacity: 600,000 tons per year
- Annual turn-over: 350,000 tons per year

Dunaújváros (Centroport Kft.)

The port is located on the right bank of the Danube, in the bay between 1580-1579 rkm, on the Szalki island. The closest port is Adony to the north, and Dunavecse to the south. Pusztaszabolcs main railway line links to the port. On the road, it is affected by the M6 motorway and the constantly expanding M8 motorway It is also connected to important cities such as Székesfehérvár, via main road number 6. The M6 motorway runs south along the right bank of the Danube, connecting Budapest with Pécs, the capital of Baranya.

- Loading capacity: 300,000 tons per year
- Average annual turn-over: 136,000 tons per year

Paks (Sygnus Kft.)

Port of Paks is also an intermodal logistics centre. The port offers various logistics and transhipment services, such as ship, wagon and truck loading, road freight, grain storage and customs clearance services.
The goal of the company is to preserve and even enhance the enviable reputation achieved by SYGNUS Kft. Thanks to its reliability, efficient port and logistics facilities, as well as its value-added services.

- Loading capacity: 1,000,000 tons per year
- Average annual turn-over: 425,000 tons per year

Baja

Baja is currently the southernmost freight port on the Danube in Hungary, 30 km-s to the Hungarian-Serbian border. Baja railway station can be reached by the unelectrified, single-track. The port is on the Bátaszék-Baja-Kiskunhalas railway line. On road, it can be reached from Budapest on route 51, from Kecskemét, on main road 54, and from Szeged on the main road 55.

- Loading capacity: 2,000,000 tons per year
- Average annual turn-over: 800,000 tons per year

ROMANIA

Rail connectivity

- **Rail connections is available at the following ports:**
- Port of Constanta
- Port of Galati
- Port Calafat
- Port Drobeta Turnu Severin.

The highest capacity for rail is shown by the Port of Constanta. The railway network of the Port of Constantza is in excellent connection with the national and European railway network system, the Port of Constantza being a starting and terminus point for the Pan-European Transport Corridor no. IV (Orient – Est Mediteraneean).and Corridor Rin - Danube. Round-the-clock train services carry high volumes of cargo to the most important economic areas of Romania and Eastern Europe, the Port of Constantza being also an important transport node of TRACECA Corridor, providing the connection between Europe, Caucasus and Central Asia.
Each and every port terminal has direct access to the railway system, ensuring a safe and efficient transport of cargoes. Everyday shuttle trains provide fast transport of containers to the national destinations for just-in-time delivery. The total length of railways in the port amounts to 300 km.

Railway connection of the Port of Galati make possible the access to the Romanian national rail network at the European standard gauge, and also to the large gauge standard of Ukraine and Republic of Moldova, facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauges (1435 and 1520 mm) into the terminal's operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova

Railway connection of the Port of Calafat make possible the access to the Romanian national railway network, as well as the Port of Drobeta Turnu Severin.

However, rehabilitation of rail lines and increase of the capacity, as well as improvement of the rail access time, is hardly needed in the Port of Constanta and Port of Calafat.

New railway connection is needed in the Port of Giurgiu, and in the Western part of the Port Drobeta Turnu Severin.

Road connectivity

All ports have a good road connectivity to the national road network. However, only two ports are connected to high capacity and LOS – Level of Service Road infrastructure, namely Port of Constanta who is very well connected to A2 motorway, and Port of Giurgiu connected to DN5 4 lanes express way Giurgiu – Bucharest.

The connection between national road no. 6 and Western part of the Port Drobeta Turnu Severin is very poor.

Maritime connectivity

Maritime connectivity is ensured by the Port of Constanta, being the largest port in the Black Sea in terms of surface (approximately 4,000 hectares) and has the largest natural depths (8-19 m).

Ports of Galati, Tulcea and Braila have also maritime connectivity, which is limited to sea vessels up to max. 15,000 DWT. However, the capacity and draught of ships admitted to navigate on the Sulina Chanel and operation, and which may reach the ports mentioned above are conditioned by the minimum depth of the Danube recorded at Sulina Bar (the entrance on Sulina Channel) The minimal depth recommended by the Danube Commission, which should be insured is 7.01 m.

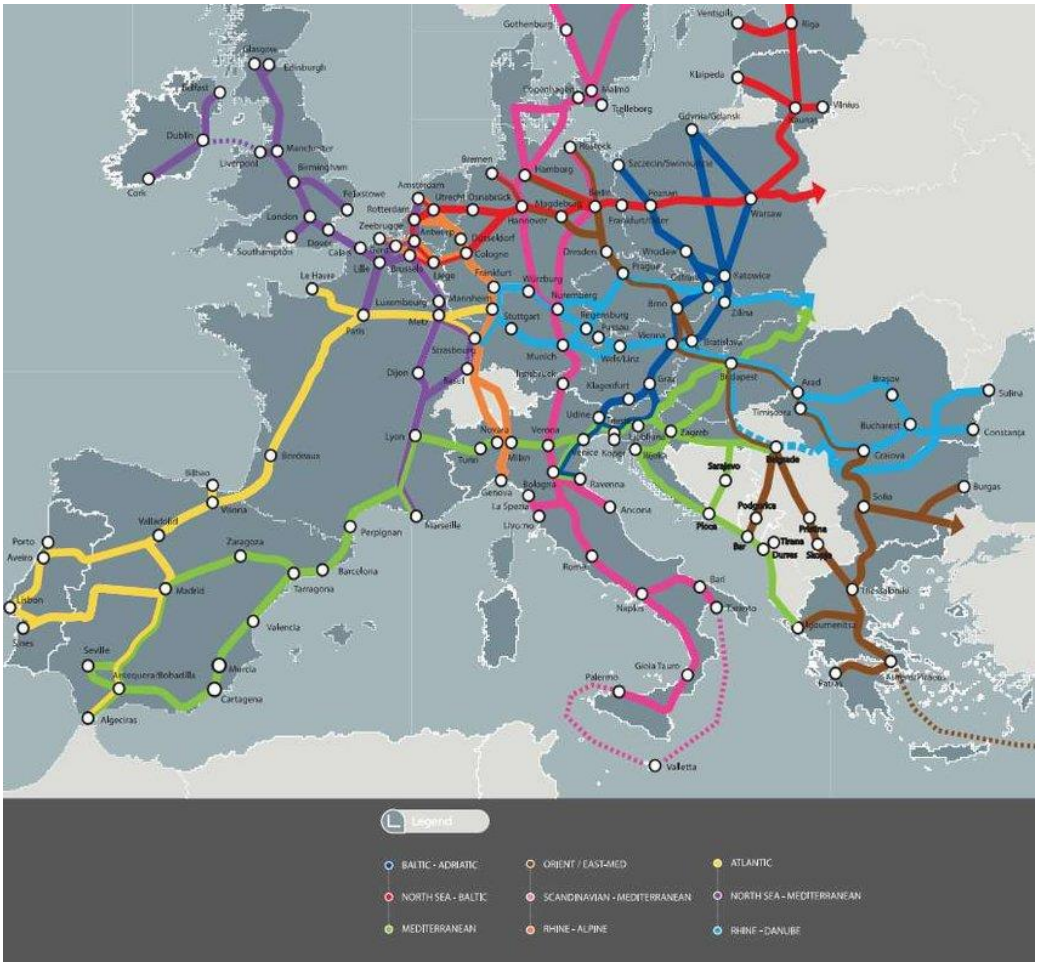
We should mention that Tulcea and Braila ports have very good rail and road connection.

SERBIA

Serbia is a landlocked country situated at the crossroads of Central and Southeast Europe, in the middle of three geo-political entities: Danube macro-region, Adriatic-Ionian macro-region and Western Balkan 6 initiative. By analyzing and assessing the geostrategic and geopolitical comparative advantages of the Republic of Serbia in the wider European area, the main advantage of the Republic of Serbia is being the traffic connection of Western and Central Europe with Southeastern Europe and the Middle East, as well as the connection of Central European countries - the Middle Danube towards the South Adriatic, the Aegean and the Black Sea, or the Mediterranean.

Serbia is crossed by the two main transport corridors recognized as Pan-European Corridors X and VII. According to the European Union TEN-T classification and latest indicative extension of TEN-T network to Western Balkan, former Pan-European corridors are replaced by branches of Orient/East-Med Corridor and Mediterranean corridor as shown at following picture.

Figure 1: Trans-European Transport Network – indicative extension to the Core Network Corridors



Main transport infrastructure in Serbia makes sections of the main international corridors of the TEN – T core network (Corridor X, or Orient/East-Med Corridor and Mediterranean corridor and Corridor VII or Danube – Rhine – Main river corridor) and comprehensive network.

Road network in Serbia has an approximate total length of 45.000 km, including approximately 800 km of highways, 5.000 km of first-level state roads, 11.000 km of second-level state roads and over 25.000 km of local roads.

Railway network has approximate length of 5.000 km, out of which is only approximately 20% electrified and 10% double tracked. The railway network is mostly in poor condition with over 300 bottleneck spots, whose reconstruction is estimated to approximately 4 billion euros. However, at the moment, there is a great number of rehabilitations, re-construction and construction works on the network on-going.

Highest development potential has the inland waterway transport (IWT). The Danube is the most important element of the inland waterway system in Serbia. With the Sava and the Tisa rivers, it creates a 1,680 km long network of waterways. The Danube's section in Serbia (588 km) is navigable

for all types of river ships. There are 7 international ports in the Serbian sector of the Danube: Bogojevo, Bačka Palanka, Beočin, Novi Sad, Pančevo, Belgrade, Smederevo and Prahovo.

In accordance with the Strategy on Development of Waterborne Transport of the Republic of Serbia for the period from 2015 to 2025, a list of the most important investments is defined and initialized including: construction and reconstruction of Serbian ports, eliminating all critical sectors for navigation on the waterway network, further improvement of intelligent waterway transport systems.

UKRAINE

Ukraine has favourable natural conditions for the development of agricultural production, which is its traditional activity. Odessa region is a highly developed industrial region of the state, the industry of which plays a significant role in the structure of the national economic complex of Ukraine. Agriculture is a vital branch of the industry of Ukrainian Danube region in terms of production and employment of labour resources. Almost all productive lands are assigned to land users working in agricultural production. The main specialization of agricultural production of the region is grain and cattle breeding with developed production of sunflower, grapes, poultry and pig breeding.
Agricultural clusters for grain processing are located on its territory, and port operators specializing in the transportation of grain, sugar and other bulk agricultural cargo operate in the ports of Reni, Izmail, Ust-Dunaisk. There are also capacities for transhipments of liquid agricultural cargo (vegetable oils).
The development of the agricultural sector in the Danube region is hampered by the lack of land reform, lack of investment in the main port facilities and in the development of railway and road transport infrastructure.
The Danube ports of Izmail, Reni and Ust-Dunaisk, which annually process around 6 million tons of cargo, have 50 berths with a length of almost 5 km and can accept vessels with a draft of up to 6 meters.
A brief overview with regards to transportation of agricultural cargo in Ukrainian ports of the DR is given below.

The Port of Reni is a maritime port located on the Danube River at the junction of the Ukrainian, Romanian and Moldovan borders, at the intersection of international transport corridors, along the left Danube bank, from 123,6 to 128,3 km.
The total length of access roads located on the territory of the Reni seaport is 21,4 km, adjacent to the railways of the Reni station of the regional branch "Odessa Railway" of PJSC "Ukrzaliznytsia" and maintained by it. The length of the railways is 13,4 km. The Reni port's railways are connected with the railways of the Reni station and provide a railway connection Reni-Galati, Reni-Chisinau, Reni - railway stations of Ukraine.
Port`s roads are connected with the Bucharest - Reni - Odessa highway, as well as the Reni - Chisinau highway.

Access to the Black Sea is provided through a deep-water fairway "Danube River – the Black Sea" along the Bystroe mouth and the Sulina canal.

The total length of berths in the port is 3860,25 m. Three cargo areas of the port specialize in transhipments of general cargo, containers and bulk cargo.

Agricultural cargo transhipments of Reni Port

The geographical location and significant production potential of the DR allows port to handle about 1.5 million tons of grain cargo annually.

Transhipment of grain cargo is carried out by means of 15 berths of the first and second cargo handling areas of Reni port, allowing to accept the vessels with a draft of up to 7 meters, using several technologies: grapple crane cargo handling (unloading), unloading directly from a bulk (grain) carrier through an elevator, as well as through the terminals of port operators of JSC "Reni elevator" and "Reni-Line" LLC.

Taking into account that state terminal operator of Reni port does not have its own storage tanks (siloes), grain cargo is handled according to the direct technology (rail wagon - grain carrier (truck) – bulk carrier (vessel), the transhipment rate of state terminal operator at Reni port is around 1000 tons / day for an average working day under favourable weather conditions.

Storage of grain cargo is carried out at the "Reni Elevator" OJSC, which has a storage capacity of 100 thousand tons per year. Loading is carried out from trucks and wagons according to the direct cargo handling method and through the warehouse. The capacity for one-time storage is 30 thousand tons.

In accordance with the Law of Ukraine "On the special economic zone "Reni", a complex for the transhipment of grain and the production of fodder is operating on the territory of the port by LLC "Reni-Line" with a capacity of 200 thousand tons per year, on the territory of which technological processes have been put into operation, allowing to carry out loading of grain on vessels, both from rail wagons and trucks. The capacity of the complex for one-time storage is 20 thousand tons.

Reni port is the only port in Ukraine, which is served by the railway of the neighbouring state - the Republic of Moldova. Due to the passage of direct railway transport, as a result, the uncompetitiveness of railway tariffs for the port of Reni in comparison with railway tariffs for neighbouring ports, it practically does not process grain for export, processing mainly transit grain cargo from Moldova, which is sent to the countries of Central Europe, Asia and Africa.

The Port of Izmail is a maritime port located on the left bank of the Kiliya Branch between 84 and 94 km of the Danube River (Izmail, Odessa region). Vessels enter the port through the Sulina Canal or through the deep-water fairway "Danube River – the Black Sea" on the Ukrainian section of the Danube. The total length of the berths of this port is 2.6 km (24 berths and 5 shore fortifications), with depths of up to 8 m.

The seaport is served by one railway station is adjacent to highways.

Three inland waterway sections belonging the TEN-T Rhine-Danube corridor link the Port of Izmail with the Port of Sulina and Black Sea. All of them have been completed and are part of the Core Network. Port of Izmail is a node in the TEN-T Comprehensive network. There are no road and railway connections from the TEN-T corridor network to the Port of Izmail with other ports of the region.

Agricultural cargo transhipments of Izmail Port

Izmail Port is not specialized on the transportations and handling of agricultural products. Main cargo of Izmail Port is ore, which constitutes up to 75% of a total turnover of the port. Second largest share in Izmail turnover has metal and steel cargoes (around 10%).

In 2020 Izmail Port had processed 11 700 tons of grain cargo and around 95 000 tons of vegetable oil. With regards to these indicators, it can be mentioned that currently agricultural cargo handling rate at Izmail Port is rather low.

At the same moment, it has to be emphasized that some types of agricultural cargo had become typical for Izmail port. For example, transportation of sunflower oil, which has already become a traditional cargo in the nomenclature of the Izmail seaport is provided for export from Ukraine to Spain, Italy and Turkey. Five years ago, Izmail also started to transport transit Moldavian grain and nowadays this is an important agricultural cargo exported to Israel, Spain, Italy, Cyprus, Lebanon, Turkey, Portugal.

Port of Ust-Dunaisk is a maritime port located in the southern part of the Zhebryyans`kyi Bay of the Black Sea. The water area of the port includes the area of the port harbor, the approach channel, three anchorage areas, the water area of the connecting channel of 1.5 kilometers within the shores, the water area of the mouth of Prorva, the water area of the roadstead for unpowered fleet, the water area of the Bazarchuk. The port includes Kiliya harbor station and Vylkove harbor terminal.

At the present time, Ust-Dunaisk sea port has been engaged in the majority of cargo transshipment from seagoing vessels for further transportation to the countries of the Danube and in the opposite direction, as well as servicing passenger ships.

The port facility has road connection, the nearest train station Dzynilor is 42 km away. A cargo berth (the only cargo berth of the seaport of Ust-Dunaisk) has a length of 150 m. The berth specializes in handling of bulk and general cargoes. It can serve vessels with carrying capacity up to 5 thousand tons. The depth at the berth is 2,5 - 3,5 m.

Agricultural cargo transhipments of Port of Ust-Dunaisk

Port is specialized on grain (export) and oil products. Cargo storage is provided at a warehouse with an area of 960 m^2 and at open-air storage areas of 10.8 thousand square meters.

3 Data collection base year 2019

(1) existing and status of the rail infrastructure connection and existing/possible services on the rail (specifications: categories of goods, frequency, transport time, quantity, type of train, time to the destinations, constraints and bottlenecks; and customers identification;

(2) existing and status of the road infrastructure connection and existing/ possible services by road (specifications: categories of goods, frequency, transport time, quantity, type of trucks, transport time to the destinations, constraints, and bottlenecks);

(3) existing and status of the maritime infrastructure connections, and

(4) existing port infrastructure.

Next, an analysis of rail/road/maritime service level connectivity of Danube ports, based on the service level of the hinterland and maritime connections of the ports has been carried out.

Specific attention has been paid to transport time and costs, size of the shipment, permitted load on various segments of hinterland infrastructure connections.

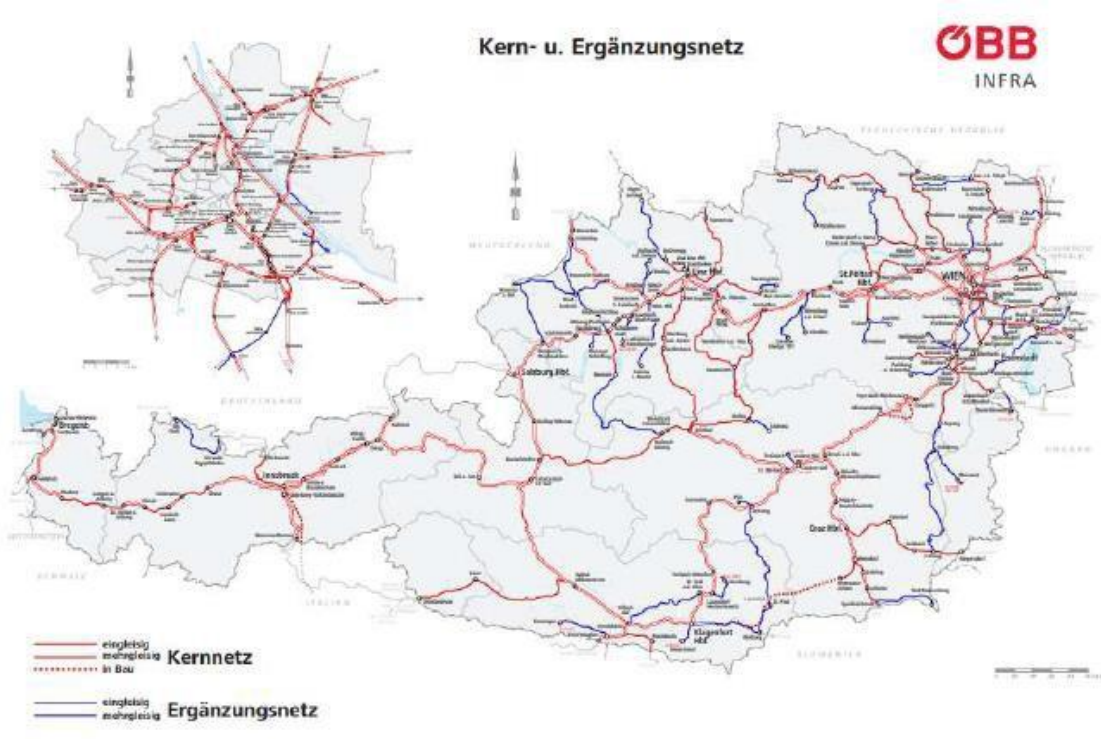
4 Existing and status of the rail infrastructure connection and existing/possible services on the rail

4.1 Identification and presentation of the existing rail network connections to the ports

AUSTRIA

The Austrian railway network has a total construction length of 5.733 kilometers and an operating length of 5.615 kilometers (data 31.12.2019). Single-track lines account for 3.518 km (overall available length) and 3.411 km (operational length). 5.353 km (overall available length) and 5.244 km (operating length) comply with the European standard gauge (1.435 mm), 380 km (overall length) and 371 km (operating length) are narrow-gauge lines.[2]

Figure 2: Route network of the ÖBB Infrastruktur AG with route lengths as of January 2020 (km)[3]



[2] http://pic.statistik.at/web_de/statistiken/index.html

[3] A more detailed overview is available in the ÖBB !Netzzustandsbericht 2019"
https://infrastruktur.oebb.at/de/unternehmen/zahlen-daten-fakten/netzzustandsbericht.pdf

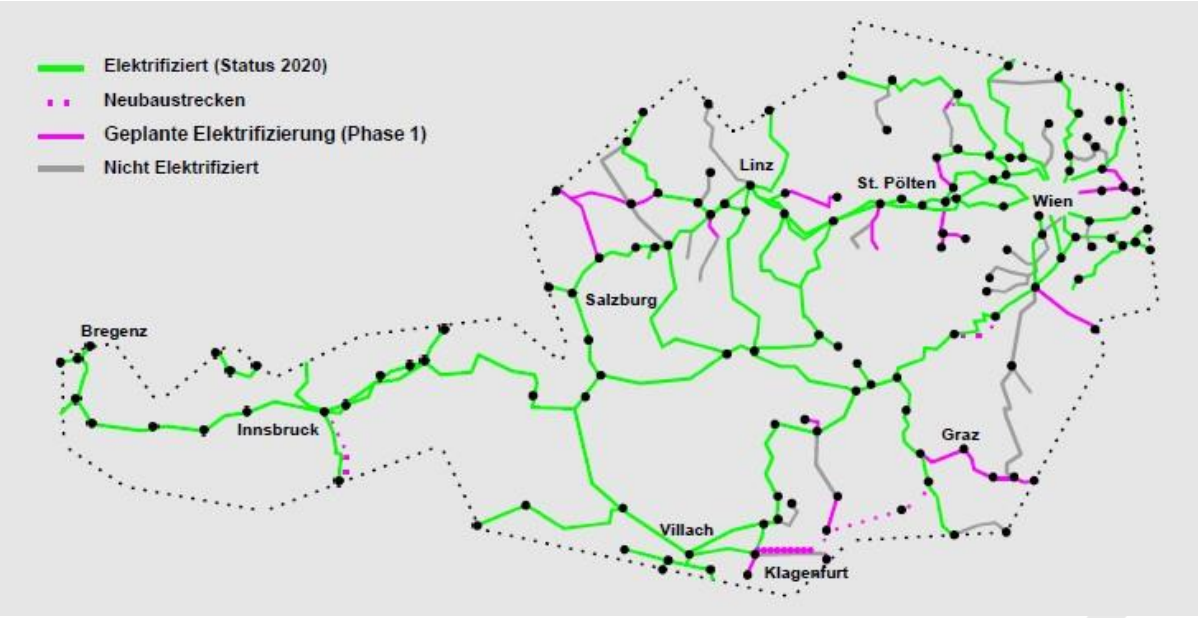
red = core network; red line = single-track; red double line = multi-tracks; red dotted line = under construction; blue =complementary network; blue line = single-track; blue double line = multi-tracks

86% of the Austrian railway network is owned and operated by the ÖBB-Infrastruktur AG (Austrian Federal Railways), 14% by regional and private railways. ÖBB-Infrastruktur AG is a 100% subsidiary. of ÖBB-Holding AG. The Republic of Austria holds 100% of the shares in the Company, and the Federal Ministry of Transport, Innovation and Technology (BMVIT - Bundesministerium für Verkehr, Innovation und Technologie) manages the shares.[4]

70,35% of the total available lines are electrified, including the main lines along the TEN-T corridors, whereas 98,32% of all double-track rails are currently electrified.

The new master plan for the Austrian Federal Railways ÖBB envisages investing 17.5 billion euros in the expansion and modernization of the rail infrastructure over the next six years 2021 – 2026. This is the highest ever allocated sum for investments in the railway network. 500 kilometers of the railway line should be electrified by 2030. The aim is to achieve full electrification of all domestic railway lines by 2035. Then, according to the planning, rail traffic in the ÖBB network will be completely CO2-neutral.

Figure 3: Electrification strategy of the OEBB 2021 - 2030[5]



green = electrified (status 2020); violet dotted line = new railway lines;violet line = planned electrification (phase 1); grey = not electrified

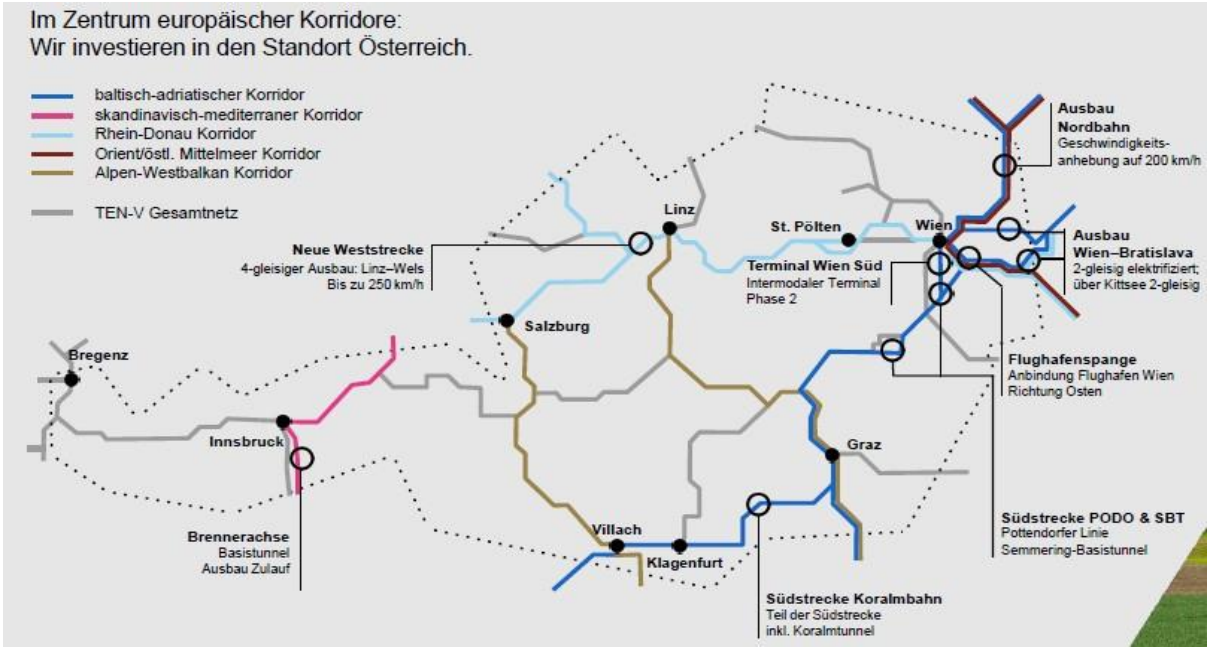
The 1,435 mm standard gauge railway infrastructure is given in Austria. 5.353 km (overall length) and

[4] Here and in following https://konzern.oebb.at/de/

[5] Master plan ÖBB 2021-2026, https://www.unsereoebb.at/de/Rahmenplan-2021-2026

5.244 km (operational length) corresponded to the European Standard gauge (1,435 mm) and 380 km (overall length) and 371 km (operational length) were narrow-gauge lines. The minimum line speed of 100 km/h is everywhere achieved. The majority of the country's network is non- compliant regarding the train length of ≥740m.[6]

Figure 4: Extension of European Connection – Investment projects 2021 – 2026 along the TEN-T corridors[7]



More than 1.100 km of the Austrian railway network (>22%) managed by the ÖBB are situated along the four Core Network Corridors crossing Austria.[8]

Projects for the development of the TEN-T network segments in Austria 2021-2026 foresee:

- extension of the Northern Railway "Nordbahn" – increase in train speed to 200km/h (Baltic Adriatic Corridor and Orient – East Mediterranean Corridor)
- connection airport Wien – Bruck a. d. Leitha (Baltic Adriatic Corridor, Orient – East Mediterranean Corridor, Rhine-Danube Corridor)
- extension of the connection Vienna – Bratislava double-track, electrified; via Kittsee double-track(Baltic Adriatic Corridor and Rhine-Danube Corridor)
- extension of the Southern Line (Pottendorfer line, Semmering base tunnel, Koralm railway) (Baltic-Adriatic Corridor) *(Project value Pottendorfer line 360 Mio. euros, Completion date 2023; Project value Semmering base tunnel 3.364 Mio. euros, Completion date 2027; Project value Koralmbahn 5.456 Mio. euros, Completion date 2025)*

[6] Review of the 2020 Work Plans of the four TEN-T corridors passing Austria

[7] Master plan ÖBB 2021-2026, https://www.unsereoebb.at/de/Rahmenplan-2021-2026

[8] Here and in following https://konzern.oebb.at/en/

- four-track extension of the Western Line Linz-Wels with an increase in train speed up to 250km/h(Rhine-Danube Corridor) *(Project value 1.212 Mio. euros, Completion date 2027)*
- extension of the access route to the Brenner Base Tunnel *(Project value 4.631 Mio. euros, Completiondate 2028)*

Austria complies fully with the required 22.5 t axle load on all 4 TEN-T corridors.

The share of private railways in the rail freight traffic increased from 23,6% in 2015 to 31,8% in2019.

BULGARIA

Available connectivity via rail is a very important element in the development of a port in an economic sense. It can also raise the port's competitiveness in comparison to other ports in the area, especially if their own connectivity is underdeveloped.

Bulgarian ports are at different stages when it comes to their rail connection to the hinterland and to the national railway network. The seaports in Burgas and Varna have a comparatively better developed rail infrastructure within the territory of the port itself, as well as its connectivity to the national network, than the Danube river ports, since most of the cargo passes through and gets processed in them.

That being said, all of the Bulgarian ports can certainly benefit from a renovation and modernization of their rail infrastructure.

The ports in Bulgaria, which handle agricultural goods, are listed below along with their supporting rail connections. The data provided is the latest available and it lays out the current status-quo in a way, which would allow for the ports' need for infrastructural investments to be accurately defined and planned.

It is important to note that although Port of Varna and Port of Burgas are not part of the Danube region ports, they are essential in the processing and transportation of agricultural goods in terms of both import and export.

Port of Varna

Figure 5: Port of Varna

Source: (https://port-varna.bg)

Port of Varna is a public transport port of national importance and a developed multimodal center, where there is a connection between several different types of transport, railway being one of them. Port of Varna is divided into Port East and Port West. The state-owned company Port Varna EAD manages both port terminals and acts as port operator.

Port East functions as a multipurpose port terminal, processing various types of cargo – general, dry bulk, liquid bulk and ro-ro cargo, as well as containerized cargo. The port terminal is known as the "grain door of the Republic of Bulgaria" since it processes the most cereal/grain products in comparison to all other Bulgarian ports and has the infrastructure and equipment to specifically facilitate the handling of agricultural goods.

At the same time, Port West is currently the most modern and perspective port terminal on the northern Bulgarian seashore. It has modern technological lines for the processing and transshipment of containers, general cargo, dry bulk and liquid cargo. During the last few years, the port's facilities have also successfully been used for the export of cereals.

All warehouses in both port terminals are connected to the national railway system.

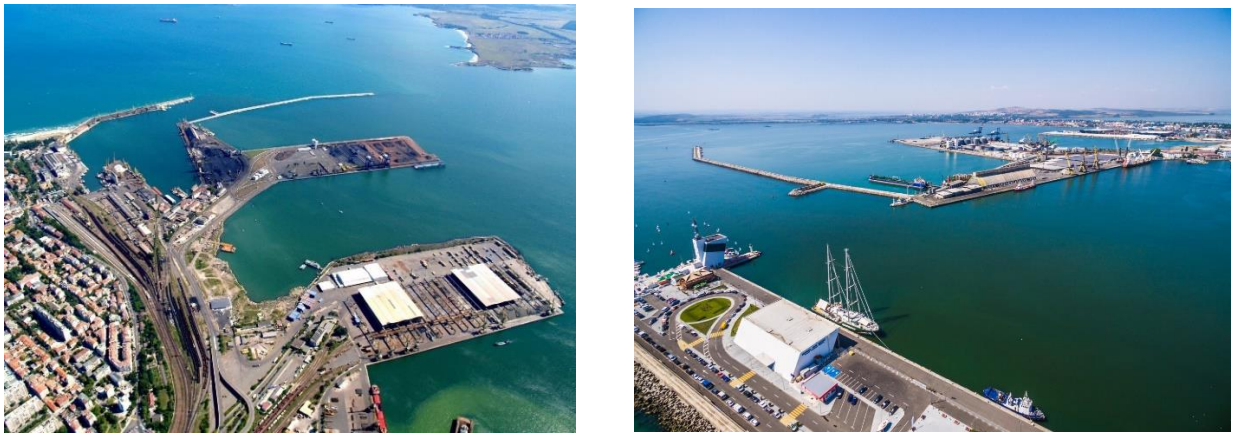
Network structure – On the territory of the port, there are railway tracks, connecting the port with the country's railway network (the Varna railway station is the link between the port and the national railway network). The railway network of Port East has a total length of 14 855 m. and 43 railway arrows, while the one at Port West has a length of 31 675 m. and 76 railway arrows. The railway network in the Varna port includes loading/unloading terminals, side railway tracks for garaging, wagon scales, as well as other maritime and internal port facilities, related to the railway activities. The total usable length of the loading/unloading terminals at Port East is 3900 m. and at Port West – 5400 m. There are 4 side railway tracks for garaging with a total length of 1000 m. in Port East, while Port West has 13 side railways for garaging, with a length of 4400 m. Both Port East and Port West also have railway ramps for loading and unloading activities. The total length of the ramps in Port East are 350 m., while in Port West they are 400 m.

- **Type of rail** – the railway is 49 kg/m1 and the transfer table is CT-4.
- **Electrified or not** – there is no relevant information
- **Single track or double track** - there is no relevant information
- **Maximum train length** - there is no relevant information
- **Maximum train load** - there is no relevant information
- **Maximum speed** - there is no relevant information
- **Restrictions** – the port allows for accessibility to its railway structure only to those railway carriers, with which the port has signed contracts. Currently there are two such companies – BDZ Freight Services EOOD and Bulgarian Railway Company AD. Companies, which would like to use wagons to transport their cargo, need to inform the railway carrier and the port 48 hours in advance about how many wagons they will need and where exactly within the port they would want the goods to be delivered.

  The port's rail infrastructure allows for trains and railway wagons to access it 24h/day from Monday to Sunday with the exception of official holidays, when access will be allowed only if a preliminary request has been submitted.

Port of Burgas

Figure 6: Port of Burgas



Source: (https://port-burgas.bg/ and https://www.maritime.bg/66782/)

The Port of Burgas is the second biggest in Bulgaria, behind Port of Varna. It is a public transport port of national importance and is divided into three separate ports – East 1, East 2 and West. The state-owned company Port Burgas EAD is the port operator for East 1, while the private company BMF Port Burgas is the port operator for East 2 and West.

While there is no data on the total surface area of the port, port terminal East 2 has an area of 419 468 m^2, while West is 641 499 m^2.

The existing port facilities in terminal East 1 make it possible to handle virtually all types of dry bulk and general cargo. Terminal East 2 has the necessary equipment to handle different kinds of general, dry bulk and liquid cargo. Terminal West can handle the same categories of cargo as East 2, plus containers. There is also a cold storage warehouse on its territory, where the port operator can store foodstuffs that do not require specific temperature regime. The cold storage warehouse has been certified by the Bulgarian Food Safety Agency.

Port of Burgas is comfortably situated in such a way that it has easy access to the national road and railway infrastructure. Burgas is the final point of the railway line Sofia-Plovdiv-Burgas and, being part of the Trans-European transport corridor VIII and TRACECA (Transport corridor Europe-Caucasus-Asia), it effectively connects Central and Eastern Europe with Asia and the Middle East.

- **Network structure** – The railway network on the port's territory services both port operators, all cargo carriers and other stakeholders, which use the port's services. The built railway tracks allow access to all areas and warehouses of the port.
  The port has two entrances – one on the eastern side and one on the western side. The eastern entrance is used by the administration and plays no part in servicing the cargo traffic in the port. The railway wagons get access to the port through the western entrance. Through the built railways, which run parallel to the northern border of the port, the cargo can be delivered to port terminals East 1 and East 2.

The railway infrastructure in port East 1 consists of industrial railway tracks with an overall length of 8100 meters and railway ramps with a total length of 419 meters. There is no available information on the railway length at the other two port terminals.

- **Type of rail** – there is no available information about the type of rails in the port
- **Electrified or not** – Not electrified in all three ports (East 1, East 2 and West)
- **Single track or double track** – most of the tracks are single, but there are parts where the tracks are double
- **Maximum train length** – the maximum allowed length of a train entering the Burgas railway station is 580 m. and that is also what is allowed in the East 2 and West ports.
- **Maximum train load** – the maximum allowed train load on the port's territory is 20 tons/axle at 0 ppm slope
- **Maximum speed** – the maximum train speed on the port's territory is 15 km/h
- **Restrictions** – Trains are not allowed at the territory of the port, only railway wagons, which are navigated by the maneuvering operator. The railway infrastructure is operational each day from 6 AM until 10 PM and if it's necessary – 24 hours a day.

Port of Ruse

Figure 7: Port Ruse-East and Port Tutrakan

Source (http://www.port-ruse-bg.com/)

Source: (https://www.pan.bg/)

Port of Ruse is the largest port on the Bulgarian part of the Danube - a multimodal transport hub, which serves as a junction between three different types of transport: waterway, road and railway. It is a public transport port of national importance, and it is managed by the state-owned port operator Port Ruse EAD. Port of Ruse is positioned along the Pan-European transport corridors №VII and №IX it is also part of TRACECA (a transport corridor connecting Central Asia and the Caucasus region with Eastern Europe) and it includes the following cargo terminals – Ruse-East and Tutrakan. The port also includes a terminal in Silistra, which is only used for passengers. These two cargo terminals are used for the processing of various cargo, including agricultural goods (mainly cereals and bulk chemicals and fertilizers).

Ruse-East is situated at km. 490-489 and Tutrakan – at km. 433 on the Danube.

In recent years, the terminal in Tutrakan does not regularly handle cargo and has been largely inactive. Practically all cargo passes through terminal Ruse-East.

- **Network structure** - **Terminal Ruse-East** is directly connected to the national railway network via a direct link to the Ruse-sever railway station. The length of the rail along the quay is 2354 meters. The port has the capacity to handle block trains along the quay, as well as in the port area, with a maximum length of 400 m. There are 6 rail sidings for loading and unloading operations. The terminal has the following railway tracks on its territory:
    - 1st and 2nd East-1 track – 416 m. length each, serviced by 3 portal cranes
    - 3rd and 4th East-1 track – 400 m. length each, serviced by 2 portal cranes
    - 1st and 2nd East-2 track – 345 m. length each, services by 3 portal cranes
    - The 3rd East-2 railway track is not fully built yet and the 4th East-2 track is 220 m. long.

There are also 2 railway weighbridges with 2 scales, which are property of national company "Railway Infrastructure". Bulgarian Ports Infrastructure Company (BPICo), on the other hand, owns the railway tracks, as well as all the other infrastructure not only in Port of Ruse, but in all other ports in Bulgaria as well.

The terminal of Tutrakan is not accessible by rail.

- **Type of rail** – the rail has a standard track gauge of 1435 mm and the construction gauge is 1-CM1
- **Electrified or not** – The tracks in all terminals are not electrified.
- **Single track or double track** – double track
- **Maximum train length** – 400 m.
- **Maximum train load** – the allowed load is 22 tons/axle
- **Maximum speed** – a train's maximum allowed speed within the port's territory is 10 km/h
- **Restrictions** – the work schedule for terminal Ruse-East is 8 AM to 7:30 PM, Monday to Sunday.

Port of Lom

Figure 8: Port of Lom

Source: (http://www.portinvest.bg)

Port of Lom consists of two separate terminals – Lom and Oryahovo. It is the second largest river port in Bulgaria after Port of Ruse. Port of Lom spans on a surface area of 371 129 m2 and close to 7000 m2 of that territory is still not developed. Terminal Lom is situated on km. 743-742 in the Montana region, while terminal Oryahovo is situated on km. 678-677 in the Vratsa region. Both port terminals are specialized in handling different types of cargo – bulk (dry and liquid) and general, as well as passengers.

Network structure – Terminal Lom has one railway entrance, while Oryahovo does not have any. The industrial railway branch in the Lom terminal has 12 railway tracks with an overall length of 11 925 m. and part of it consists of the following sections:

- White quay – contains two railway tracks with a useful length of 320 m. each
- Limana - contains two railway tracks with a useful length of 310 m. each
- West quay - contains four railway tracks with a useful length of 320 m. each
- East quay - contains four railway tracks with a useful length of 320 m. each

The connection with the Lom railway station (and through it - with the railway network in the hinterland and the rest of the country) is done via railroad switch 33 from railway track 11.

- **Type of rail** - there is no available information about the type of rails in the port
- **Electrified or not** – the railway network within the port is not electrified
- **Single track or double track** – there are only single tracks on the port's territory
- **Maximum train length** – defined by the length of the track
- **Maximum train load** – the maximum train load is 1800 tons or 22 tons/axle
- **Maximum speed** – the maximum allowed speed on the port's territory is 7-10 km/h

Restrictions – the base breaking distance is 150 meters. The servicing of the main industrial railway branch is performed only by a Series 52 shunting locomotive. The working hours of the railway installation and equipment is between 8 AM and 6 PM.

Port of Vidin

Figure 9: Port Vidin South and Port Vidin North

Source: (http://www.brp.bg/vidin/)

Source: (http://skmportvidin.eu)

The Port of Vidin is a port for public transport of national importance. It consists of terminals North, Center and South. Terminal Center is only used for passengers, while cargo can be transported through the other two terminals – North and South. Both cargo ports process agricultural goods, mainly cereals such as corn, wheat and barley, as well as fodder.

Port terminal North is situated at km. 793.600 to 793 and has a surface area of 120 000 m^2. Port operator for this port terminal is the privately owned company Bulgarian River Shipping J.S.Co. The terminal is certified for handling general cargo (containers, metals, machinery, equipment, out-of-gauge and heavy cargo, etc.), dry bulk cargo (cereals, inert materials, wood, coal, etc.), non-hazardous liquid bulk cargo (vegetable and animal oils, liquid chemical products etc.).

The main advantage of the Port Vidin North is its strategic geographical location - a transport node, formed by the intersection of Pan-European transport corridor №IV and transport corridor №VII and, at the same time, the shortest route to Greece, North Macedonia and Serbia. From here, the road to the Middle East passes along Corridor №IV and Corridor №VII.

At the same time, port terminal South is situated at km. 785.200 to 785 and spans over 48 000 m^2. Its port operator is SKM Port Vidin JSC – a private company. The terminal is designed for receiving and storing dry bulk, general cargo and containers.

Both port terminals are situated close to Danube Bridge 2 (New Europe Bridge), connecting the city of Vidin with the Romanian city of Calafat.

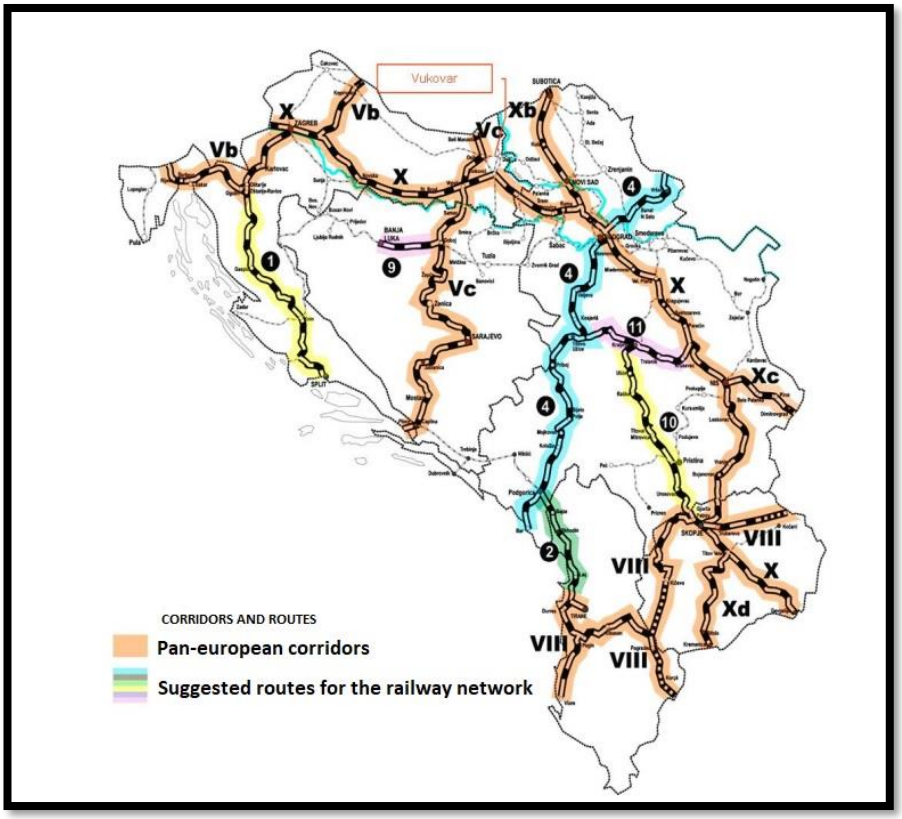
Port Vidin North has a modern infrastructure, connecting it to the national railway system. Port terminal Vidin South is not connected to the railway network and is not accessible via railway.

- **Network structure** – there are two railway tracks entering Vidin North, which are a deviation from the tracks going to the ferry terminal nearby. The two tracks have a combined length of 400 m., while the overall length of the industrial railway line in Vidin-North is 1232 m. The port has a connection with the Vidin railway station through railway switch №8 and with the ferry through railway switch №304. There is also a shunting locomotive on the territory of the port for any necessary shunting activities.
  Port terminal Vidin-South is not connected to the railway network.
- **Type of rail** – there is no relevant information on the type of rail on the port's territory
- **Electrified or not** - there is no relevant information on whether the railway in the port is electrified
- **Single track or double track** - there is no relevant information
- **Maximum train length** - there is no relevant information
- **Maximum train load** - there is no relevant information
- **Maximum speed** - there is no relevant information
- **Restrictions** – the railway on the territory of the port works every day from 8 AM until 6 PM. The railway can also be operable during official holidays, but only if a request was submitted in advance and it was agreed by the port authority. Shunting activities are not allowed with a Series 55-00 locomotive.

CROATIA

The favorable geographical position of the County enabled the rapid development of railway traffic and the development of Vinkovci as a passenger and freight hub. However, Vinkovci still have not reached pre-war importance despite progress and investment in infrastructure reconstruction.

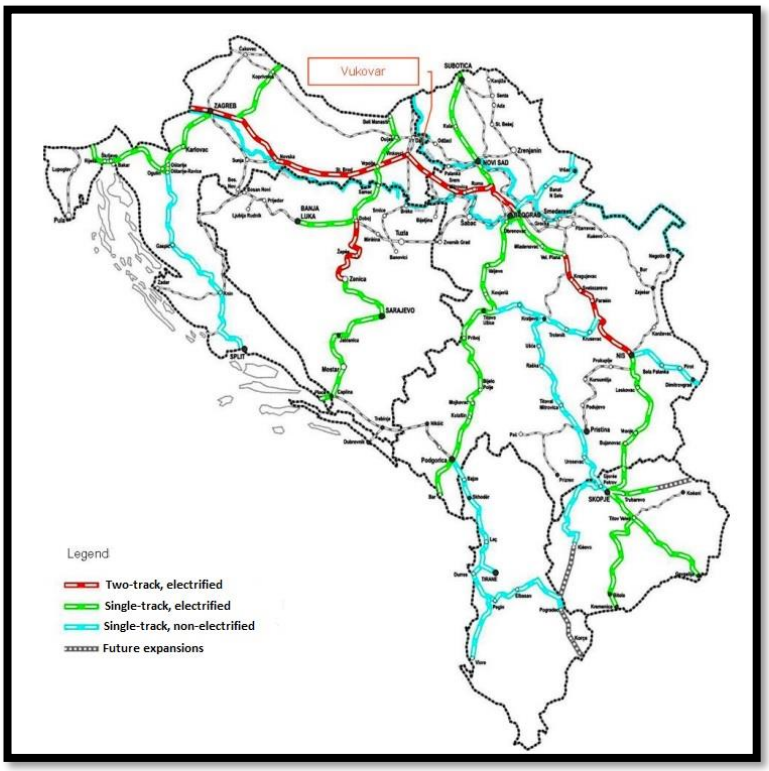
Figure 10: Corridors and railway network Croatia



The European railway corridor X passes through the county. Considering the fact that significant investment in the reconstruction of the railway on the route of the corridor are planned, further growth in traffic is expected as well as strengthening of the county as a railway and logistics hub. This is deemed necessary in order to be able to contribute to the stronger integration of the railway and the use of the Danube for the transport of goods, i.e., intermodal forms of transport. It should also be noted about the existence of a RO-LA terminal (terminal for transport of truck tractors on railway wagons) in Spačva, which was opened by Croatian Railways in 2007. With the opening of the renovated Vinkovci - Osijek railway in 2008, rail transport quality further improved. Currently, railway traffic in the county is taking place on seven routes. Since there is no data on the share of railways in public transport on at the county level, it is difficult to assess the actual role of railways in total transport on that area. Nevertheless, it can be said with certainty that the railway is a significant factor in overall traffic of

goods and passengers in the county, together with its comparative advantages - safety, comfort, speed, environmental friendliness and price.

Figure 11: Current railroad network Croatia



The railway network shows the best construction work done along the Corridor X. Electrified, the double - track infrastructure of the track has a capacity of 250 trains (freight and passenger trains), which can be increased to 350 trains using better signaling and control techniques. The capacity of the electrified, single-track rail infrastructure is 60 trains per day, a by improving signaling technique, 100 trains per day could be achieved.

From the observed countries in the region, Croatia has the best equipped network of rails. Port of Vukovar, which has its own rail infrastructure within the port area (tension rails 3,000 meters long), and because of its proximity with very important railways of corridors X and Vc excellent form a geographical position every port dream of. The access lines are still crying out for modernization.

HUNGARY

Adony

The port of Adony is connected on rail to the national and international network. Five industrial siding tracks link Adony I and II terminals to the network via the Pusztaszabolcs main line.

Dunaújváros

The port of Dunaújváros is also connected on rail to the national and international network. There are industrial siding tracks, which are not electrified due to the crane tower.

Figure 12: Port of Dunaújváros

Source: hfip.hu

Paks

The port of Paks is located to the north from the railway station. Tracks pass the port on the west, but they are not connected with the port area. Maximum axle load on the line is 210 kN. built speed limit is 80 km per hour, but the actual speed limit is 60 km/h.

Baja

Baja-Dunapart station is a service place without traffic personnel, on the Bátaszék-Kiskunhalas (No. 154), single-track, normal track gauge, non-electrified main line between Baja and Pörböly stations. The port of Baja is connected to the Kiskunhalas-Bátaszék line 154.

ROMANIA

Port of Constanta

Port of Constanta is considered the maritime gateway to Eastern Europe, due to the capacity for handling freight flows and to the existing hinterland that covers not only Romania, but also Bulgaria, Republic of Moldova, Hungary, Austria, Serbia and also other countries.
The advantage of the Port of Constanta is due to the geographic position and of the good hinterland connections by IWW on the Danube and Danube – Black Sea channel, road and rail.
Constanța Port is the main Romanian port, being located at the intersection of the trade routes that connect the markets of the landlocked countries of Central and Eastern Europe with Transcaucasia, Central Asia and the Far East. Together with the two satellite ports, Midia Port, located 25 km north of Constanta, and Mangalia, Port located 38 km south, it forms a port complex, under the management of Compania Națională Administrația Porturilor Maritime S.A. Constanța (C.N. A.P.M.).

The main competitive advantages that Constanta Port has are the following:

- It is the largest port in the Black Sea in terms of surface (approximately 4,000 hectares) and has the largest natural depths (8-19 m);
- It benefits from connections with all modes of transport: rail, road, river, providing the premises for the development of intermodal transport in the area;
- It provides facilities for the operation of all types of goods, including modern facilities for the operation of passenger ships;
- Since January 1, 2007, Constanta Port has become a Free Zone.

Table 1: Brief presentation of the characteristics of the ports

Total surface [ha]	North area of Constanța Port	South area of Constanț Porta	Mangalia	Midia
Total surface [ha], of which:	817	3.109	189,6	823,9
Land [ha]	495	818	32,9	223,8
Water [ha]	322	2.291	156,7	600,1
No of berths	82	74	2	13
Maximum depth [m] - designed	14	19	10	10

The port land and the infrastructure elements of the three seaports (aquatories, hydrotechnical constructions intended for the berth of ships and/or related to ports, access channels, roadstead areas, etc.) are the property of the Romanian State being placed in the administration of the C.N. A.P.M.. The port land is rented by C.N. A.P.M. to private operators carrying out various commercial activities in the

port area, related to the shipping activities, such as: loading/unloading of ships, storage, stacking, docking, sorting, palletizing, containerizing, bunkering, agency activities, etc.
Therefore, in the area of the three seaports, the commercial function is performed by private operators while CN APM fulfils the administrative and regulatory function of the commercial activity.

The main sources of income of C.N. A.P.M. are those of the tariffs levied from the Maritime and fluvial vessels that use the managed ports (38.02%) and those derived from the rental of immovable property to private operators (31.15%).

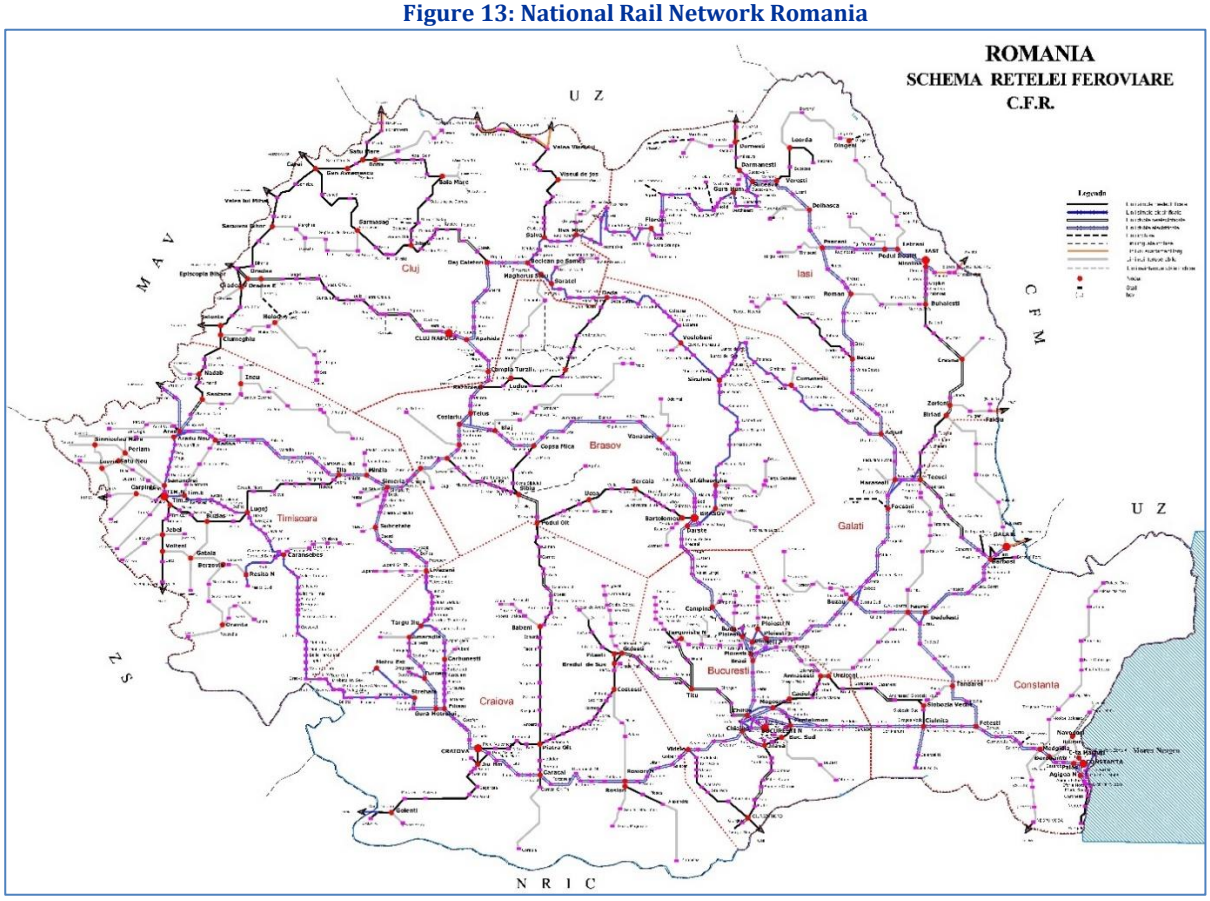
Each port terminal has direct access to the railway system, the total length of the railway lines in the port reaching about 300 km.

From the point of view of the integrated port organization, Constanţa port is structured into the following port units, which operate in the freight traffic on the railway:

- Constanta Old Port;
- Constanta New Port;
- Constanta South Port – fluvial-Maritime area (North of the Danube - Black Sea Canal);
- Constanta South Port - Agigea (south of the Danube - Black Sea Canal).

Access to Constanta Old Port and Constanţa New Port is made possible via a double line from the Palas station, which enters the port at Gate 6 C.F.

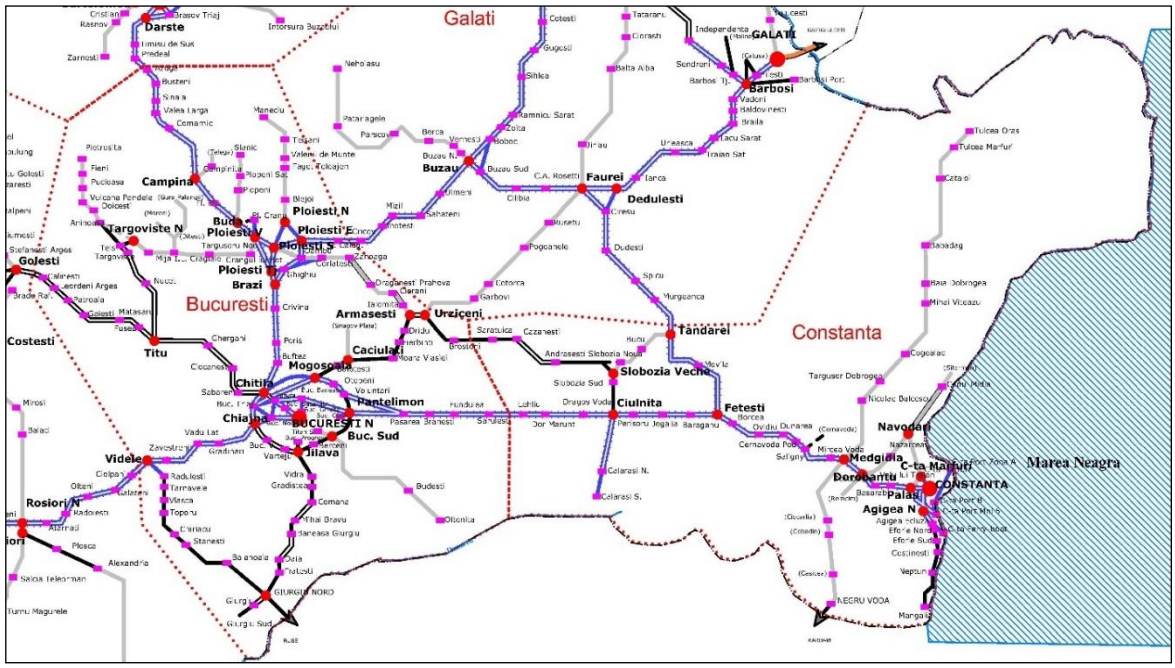
Figure 13: National Rail Network Romania



Source: http://www.cfr.ro

Rail connections of Constanta Port are shown below.

Figure 14: Rail network connecting Constanţa, Midia and Mangalia ports with the hinterland



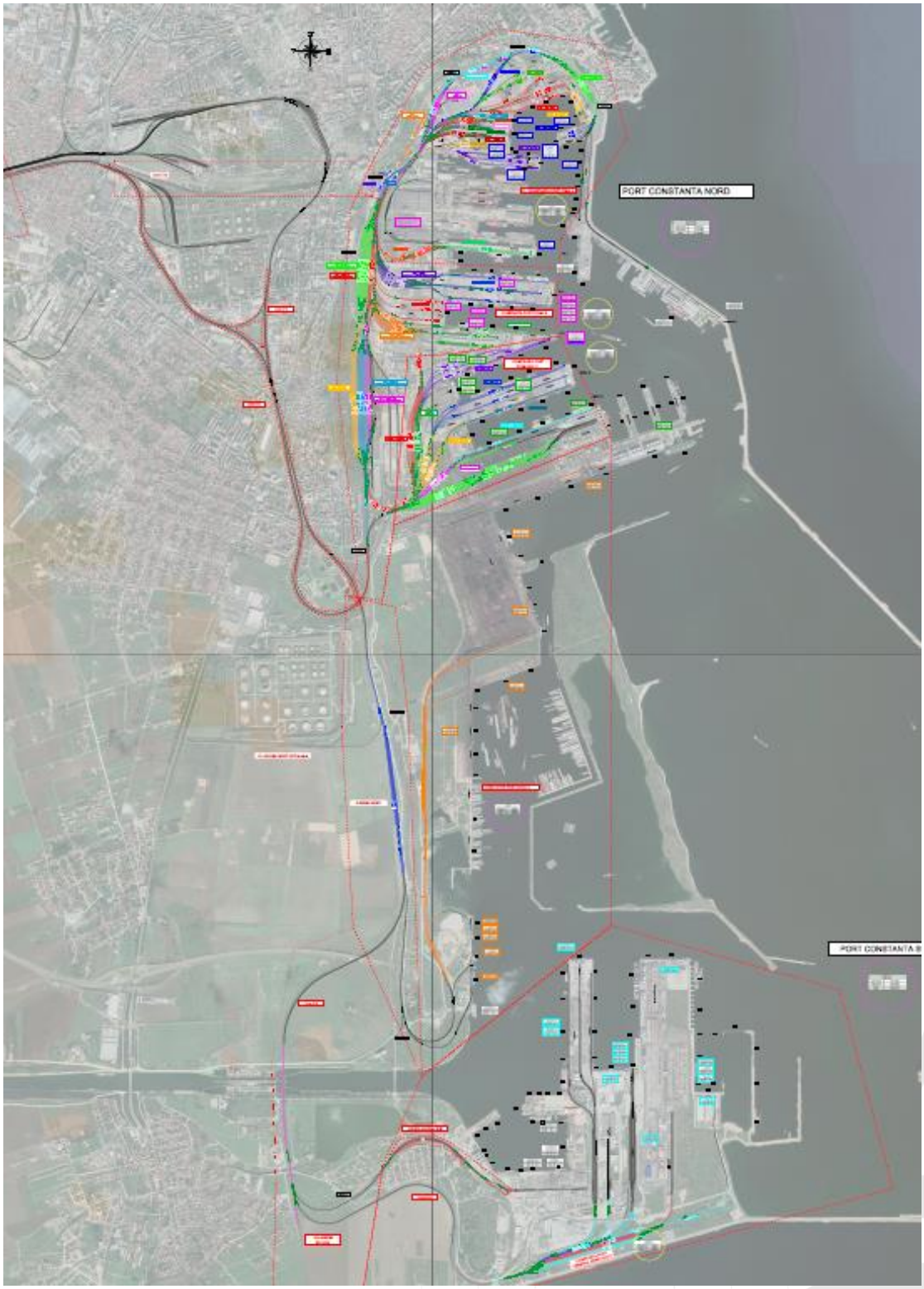
Source: http://www.cfr.ro

The lines c.f. which serve the port area of Constanta Port are schematically represented in the figure below. They connect the rail stations from the port area and the national railway network. These are:

- line 814 - double electrified on the sections Palas - Post C-ţa Vii - C-ta Port Zone B
- line 814B - double electrified on the sections Palas - Post C-ţa Vii- C-ta Port Mol V
- line 814C - simple electrified Agigea Nord Oil Terminal - Agigea Nord
- the electrified double line Agigea Nord - Constanţa Port Area C
- line 813 - double electrified on the sections Constanţa - Agigea Nord and Agigea Nord - Agigea Ecluză
- line 813B - simple electrified Agigea Lock - Constanţa Port FerryBoat
- simple non-electrified line AgigeaEcluză - Gr. Of Agigea Sud lines (maneuvering activity)

The double line 816 Palas - C-ta Port Zone A is closed, the double line tunnel of 490 m through which it passed, as well as the line c.f. requiring rehabilitation. This line has not been electrified and the tunnel has no double line electrification gauge.

Figure 15: Rail network Port of Constanta



The maximum speed of the freight trains is, according to the Freight Train Livret of the 2019/2020 freight trains, of 80 km / h on the line c.f. Valu lui Traian - Palas - Constanţa and 50 km / h on the lines c.f. 813.813B, 814.814B, 814C.

The technical speed of freight trains is:

- 21.6 km / h for freight trains running on the lines Palas - Port Constanta Zone B and Palas - Port Constanta Mol V
- 21.1 km / h for freight trains running on the lines Valu lui Traian –Palas –Agigea Nord Oil Terminal
- 19.1 km / h for freight trains running on the lines Valu lui Traian –Palas - Agigea Nord- C-ţa Port Terminal Ferry-Boat

The rail freight stations serving the Port of Constanta are the following:

• C-ta Port Zone A (CPZA)
• C-ta Port Zone B (CPZB)
• Constanţa Port Mol V (CPMol 5)
which are part of the North Constanta Port, and
• Agigea Nord
• Constanţa Port Zone C (CPZC)
• H.m. Agigea Lock
• Constanţa Port Terminal FerryBoat (CPTerminal Ferry-Boat)
which are part of the Port of Constanţa Sud.

An important role for the railway activity of the Port of Constanţa is played by the rail stations Valu lui Traian and Palas, with the role of relieving the receiving groups from the stations from the port, by the large train stations waiting for seagoing ships to arrive at berths. Their big drawback is that they do not have enough lines for all the trains that have to wait to enter the loading-unloading fronts from the berths.

Port of Galati

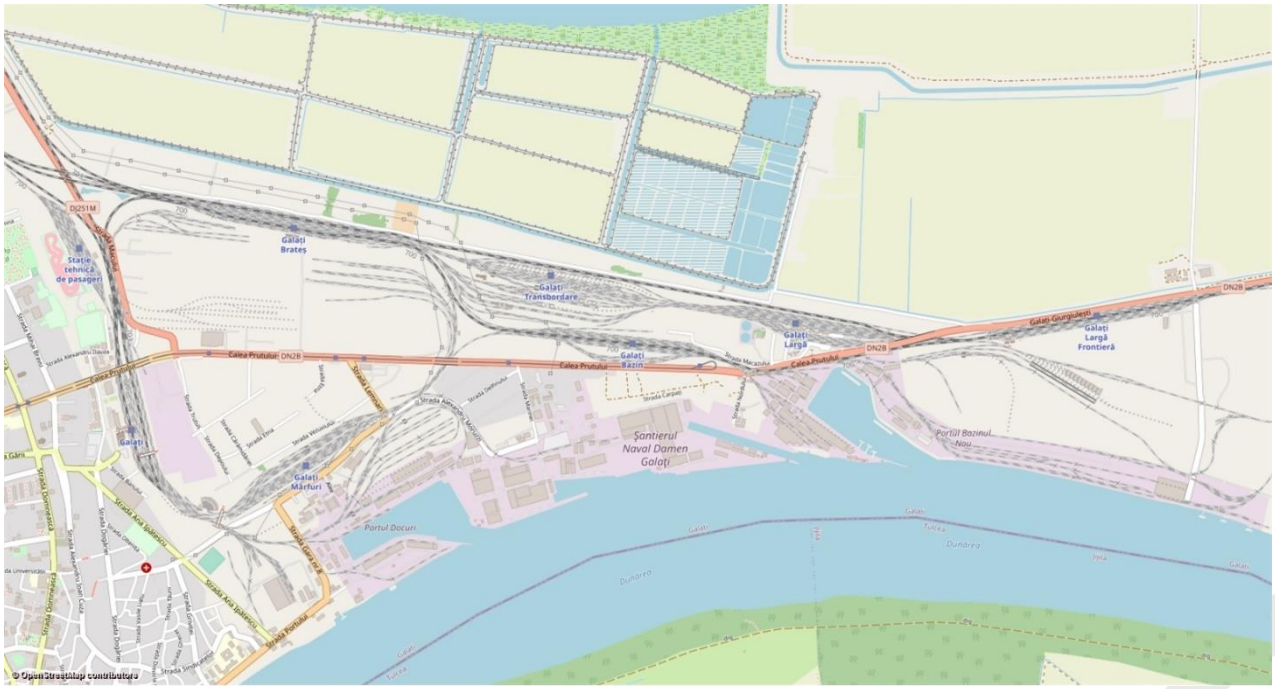
The Galati port is the largest sea-river port, respectively the second largest port in Romania, with access to the Danube maritime sector and the Black Sea through the Sulina Chanell and the Danube - Black Sea Chanell. Galati Port is located on the left bank of the Danube, from Km 157 to km 144+900, is managed by the National Company Maritime Danube Ports Administration SA Galati; has a total of 56 operating berths. We mention that the access to the Port of Galati can be done by river and sea vessels (max. 15,000 DWT). However, the capacity and draught of ships admitted to operation and which may reach the port are conditioned by the minimum depth of the Danube recorded at Sulina Channel.

The port operator operating in the Bazinul Nou Port, respectively Port Bazinul Nou SA (**PBN)**, has some port equipment for the operation of ships and cargo (eg. four 30-50 tonne car cranes, 23 forklifts, 2 self-loading trucks) but does not have facilities for the operation of intermodal flows, such as special cargo handling cranes, cranes for handling operations of the type of those used for ship-to-shore operations (STS) and those used for the used for transshipment of loading units between rail and road (RMG), these following to be achieved through the implementation of the Project Galați Multimodal Platform (the" Project").

The Project aims the development of a multimodal platform with a capacity of 150,000 TEU/year in the port of Bazinul Nou (from the Galati port), is being implemented with a completion deadline of 2023, the first year of operation 2024.

The picture below shows the rail and road connections of the Port of Galati.

Figure 16: Rail and road connection Port of Galati



Main characteristics of the Port of Galati are:

Total area: 864,131 sqm;

Number of port basins: 2 (Docks), (New Basin)

Quay length: vertical = 4,675 m; walled = 2,390 m;

Number of operating berths: 56;

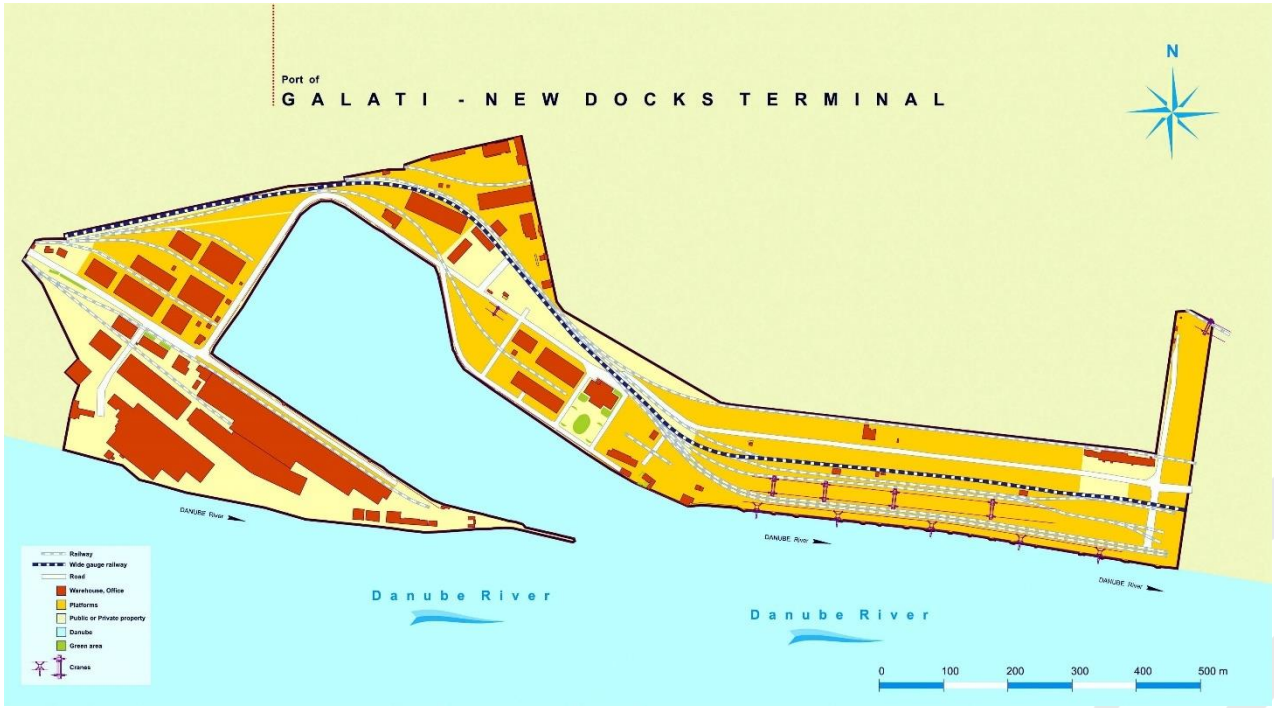
Facilities for parking ships during the winter;

Railway connection: length = 12,348m (European gauge);

Wide gauge railway - along the operating berths;
Connection with the national road system;
Secure parking for trucks;
Goods storage facilities (open platforms and closed warehouses);
Port equipment for ship operations;
Silo for cereals - 30.000 to
Ship waste management: household waste, wastewater and bilge water;
Bunkering facilities;
Ship maintenance facilities;
Container terminal;
Oil terminal;
"DAMEN" shipyard;

Port Bazinul Nou

Figure 17: Organisation Port Bazinul Nou



Source: https://apdmgalati.ro/portul-galati/

Railway - has a length of 6,474 meters, divided as follows:

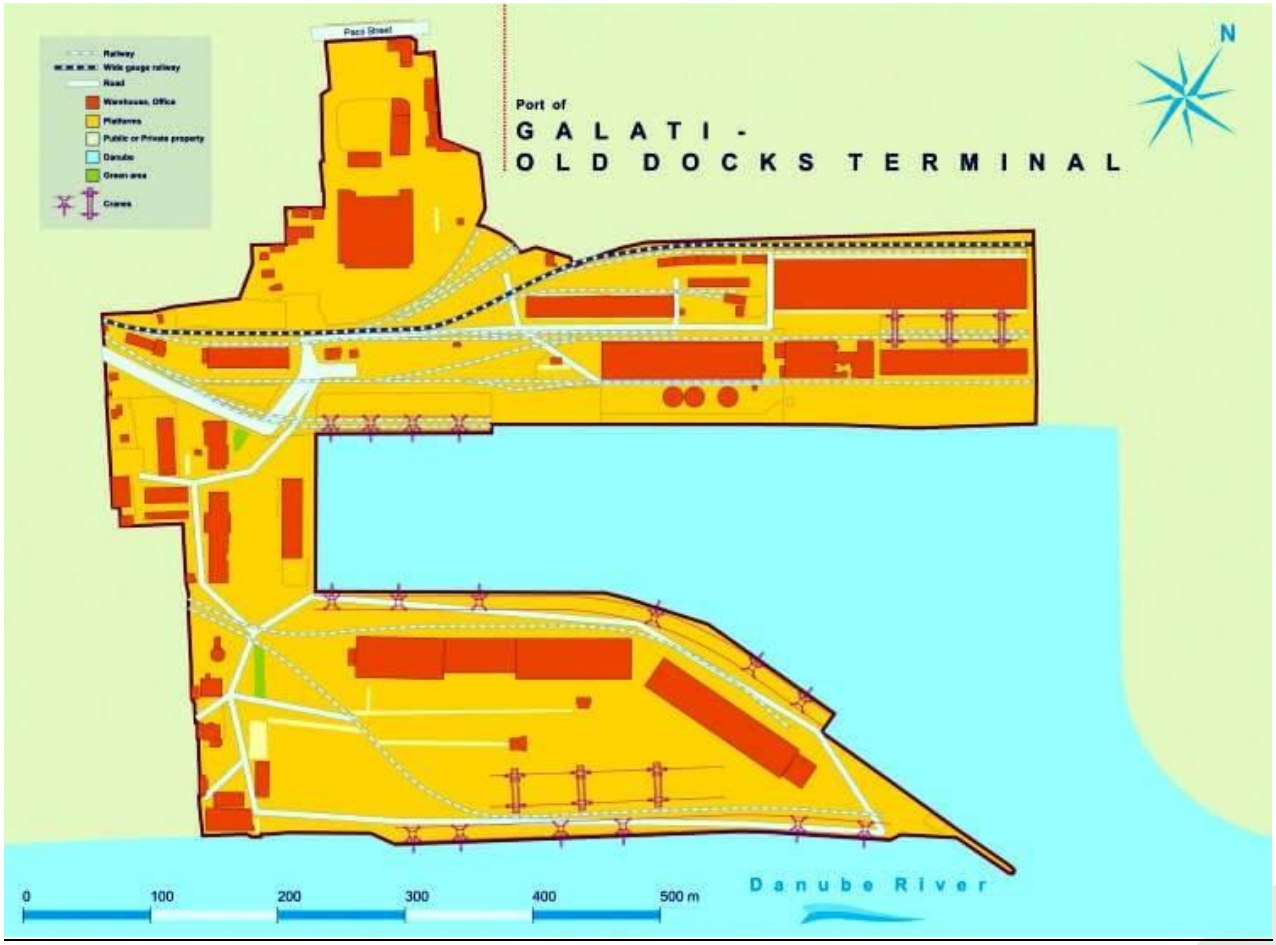
1,717 meters of railway track for reception / delivery

4,257 meters front for loading / unloading

500 meters of wide railway for loading / unloading C.S.I. The handling of the wagons inside the port is performed using its own locomotive.

Docuri SA

Figure 18: Organisation Port Docuri SA



Source: https://apdmgalati.ro/portul-galati/

Railway - has a length of 2,619 meters, divided as follows:

- 1,313 meters railway track for reception / delivery
- 1,206 meters front for loading / unloading;
- 100 meters of wide railway for loading / unloading wagons from C.S.I. The handling of the wagons inside the port is performed using its own locomotive.

Port Mineralier

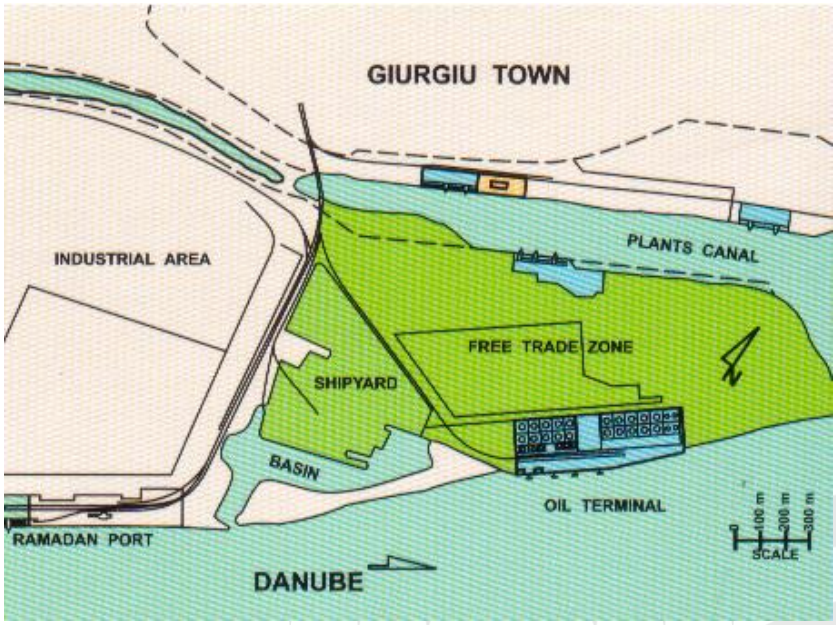
Figure 19: Organisation Port Mineralier

It has rail network, the port is dedicated to the Steel factory of Galati.

Giurgiu

Located in the city of Giurgiu Km 489 - Km 497 on the Danube left bank. The surface of the port territory managed by CN APDF SA GIURGIU is 389,565 sqm.

Figure 20: Organisation Port of Giurgiu



The length of the walled / vertical / natural shore quays under the administration of CN APDF SA Giurgiu is 1,742 m.
The port is of river type, allowing the mooring of barges up to max. 2000 t;

Giurgiu port is developed in three locations as follows:
- Ramadan sector - with mooring functions on the Danube in length of approx. 750 ml;
- Plant Canal - where mooring fronts with a total length of 740 ml are arranged. Towards Cioroiu Island there is a berth for gravel products;
- Veriga Basin - where there is an important shipyard with a synchro-lift for ships of 5000 t, reinforcement docks, production and repair halls, equipment, etc. Currently
GIURGIU PORT COMPLEX (Average an operating capacity of 1,500,000 tons / year)

GIURGIU RAMADAN PORT (Operating capacity 435,000 tons / year)
Mooring front 1500 ml (15 berths), as follows:
- 250 ml (2 berths) operational front for goods
  – silo 6000 to;
  - 1 gantry crane of 5tf ; 1 gantry crane of 16tf
- 500 ml (5 berths) mooring passenger ships and tugs
- 100 ml (one berth) mooring ships crossing the Danube (RO-RO)
- 150 ml (2 berths) stationary ships
- 400 ml (4 berths) for vertical quay operation (Giurgiu Free Zone)
- 100 ml (one berth) grain operation (loading - unloading) at vertical quay

COMMERCIAL PORT CANALUL PLANTELOR - GIURGIU (Operating capacity 1,320,000 to / year)
Mooring front 1390 ml (14 berths), as follows:
- 170 ml (2 berths) vertical quay operating front
- 200 ml (2 berths) quay operational front perished at the grain silo
- 170 ml (2 berths) operational front walled quay products ballast
- 850 ml (8 berths) stationary ship front at natural shore
- 2 gantry cranes of 5tf ; 3 gantry cranes of 16tf

Rail shall be rehabilitated in order to secure the connection with the rail national network.

Drobeta Turnu Severin

Located in the city of Drobeta Turnu Severin - on Km 927 - Km 933 + 300, Danube, left bank.
The surface of the port territory is 139,442.11 sqm.
The length of the walled / vertical / natural shore quays is 1920 m.

The port has three basins having the following surface of the port territory :
Passenger Port Dr. Tr. Severin 45,934.55 sqm
Commercial Port Dr. Tr. Severin 72,662.42 sqm
Port Dr. Tr. Severin - Ramp oversized parts 20,845.14 sqm

Passenger port - Km 927 - Km 931
700 ml operational front (8 berths), as follows:

- 250 ml (3 berths) passengers;
- 250 ml (3 berths) waiting;
- 200 ml (2 berths) bunkerage;

Commercial port: Km 932 - Km 933 + 150
Operating front - 700 ml (7 berths), of which:
- 300 ml (3 berths) goods;
- 400 ml (4 berths) waiting.
- 1 gantry crane of 5tf; 2 gantry crane of 16tf

Operating capacity 1,200,000 to / year
Oversized parts ramp: km 933 + 150 - km 933 + 300

Calafat
Located in the city of Calafat on- Km 793 - Km 796, Danube, left bank. The surface of the port territory is 51,218 sqm.
The length of the walled / vertical / natural bank quays is 700 m.

An RO-RO ship terminal is arranged in the port for car and passenger traffic across the Danube Port front: - 700 ml, of which 550 ml operational front, as follows:
-100 ml (1 dana) passengers;
- 350 ml (1 berth) of goods;
- 50 ml (RO-RO berth);
- 50 ml (pontoon ramp for mooring ferry boats).
- 2 gantry crane of 5tf - 2 floating cranes
Operating capacity 350,000 to / year.

SERBIA

The total structural length of the standard-gauge lines on the territory of Serbia network amounts 3.735,5 km, out of which 3.441,1 km of single-track and 294,4 km of double-track lines. 1.759 km of are the main tracks, 1251 regional, 538 km local and 187 km manipulative tracks. Totalling of km of 1.278,4 km of open track have been electrified, together with the main through tracks (985,0 km of single-track and 288,7 km of double-track lines). Maximum design speed is 120 km/h.

All above data relate to standard-gauge 1435 mm tracks.

General network information is given in Table no 2.

Table 2: Structural length of the lines within the network

Total network length	**3.735,5 km**
Single-track lines	3.441,1 km
Double track lines	294,4 km (7,88 %)
Narrow-gauge lines	22,5 km
Non-electrified lines	2.457,1 km
Electrified lines	1.278,4 km

The carrying capacity of the railway is between 12 and 22,5 tons per axle, as the maximum carrying capacity is 22,5 tons to a total of 1.886 mileages, or about 50 distant lines, which is limited capacity in case of need for increase in railway traffic.

"Infrastructure of Serbian Railways" JSC is a joint stock company for the management of public railway infrastructure, founded by the Republic of Serbia. Management of railway infrastructure is an activity of general interest.

„Infrastructure of Serbian Railways" - JSC is a full member of RailNetEurope association from 2016. RailNetEurope association (hereinafter RNE) was established in January 2004 by virtue of an agreement between 12 Infrastructure Managers from the entire Europe, and their number is constantly rising. Through its members, RNE operates over 230.000 km long railway lines, including the important ferry lines, and cooperates with more than 120 railway undertakings in international traffic and with more than 300 railway undertakings that, for the time being, operate only in the domestic traffic of the members.

"Infrastructure of Serbian Railways" JSC, in cooperation with Ministry of transport, construction and infrastructure, participates in the initiative for forming and inclusion of new RFC 10 Alpine –West Balkan into the network of railway corridors (figure no 10).

Figure 21: Alpine-Western Balkan rail freight corridor

The railway network of the Republic of Serbia is connected with the railway networks of the following seven countries: Croatia, Hungary, Romania, Bulgaria, North Macedonia, Montenegro and Bosnia and Herzegovina. Traffic may be organized via ten border crossings (one of them is under the control of UNMIK railways).

Serbian railway network borders with the neighbouring railway networks are the following border stations: Subotica, Horgoš, Kikinda, Vršac, Bogojevo, Šid, Brasina, Preševo, General Jankovic, Vrbnica and Dimitrovgrad.

The track gauge remains unchanged at crossing the state borders.

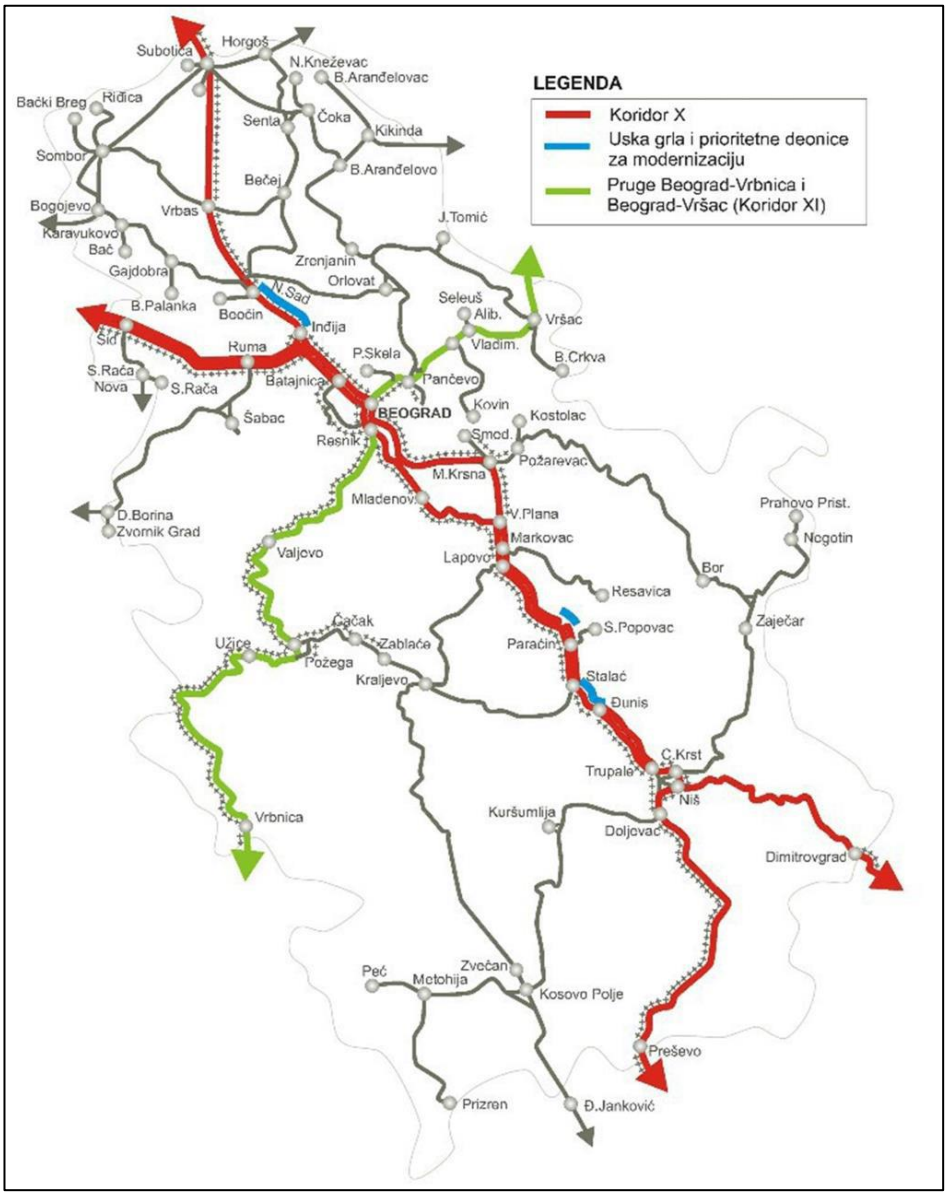
The type of traction is changed only at the border crossing with Bulgaria, in the station Dimitrovgrad on the railway line Niš- Dimitrovgrad - State border.

Corridor X with its branches – Xb (Belgrade–Budapest) and Xc (Nis–Sofia), represents the most significant road-railway route on the territory of the Republic of Serbia. It was established as a part of the Southeast multi-modal axis, linking Austria/Hungary, Slovenia/Croatia, the Republic of Serbia and Bulgaria/Macedonia/Greece and covers 760 km of railway lines in the Republic of Serbia.

Pan-European Corridor X stretching from Salzburg in Austria to Thessaloniki in Greece goes through the infrastructure network of "Infrastructure of Serbian Railways" JSC. On the territory of the Republic of Serbia, on the network of "Infrastructure of Serbian Railways" JSC, Corridor X includes the following railway lines from Sid to Preševo:

- Belgrade – Šid – State border,
- Belgrade – Mladenovac – Niš,
- (Belgrade) – Rakovica – Jajinci – Mala Krsna - Velika Plana,
- Nis – Preševo – State border.
- The following branches connect to the primary route of the Corridor:
- Xb, (Budapest) – Novi Sad – Belgrade (the railway line (Belgrade) - Stara Pazova – Subotica), and
- Xc, Niš – Dimitrovgrad – (Sofia – Istanbul) (the railway line Niš – Dimitrovgrad – State border.

Figure 22: Railway Corridor X in Serbia



The goal is to improve the railway lines on Corridor X throughout Serbia by reconstructing the existing tracks and constructing the second track on the single-track sections in order to enable all corridor tracks for modern double track traffic and train speeds of 160 km/h.

The following types of terminals are distinguished: stations and transport forwarding, terminals for intermodal freight transport, port terminals.

Combined transport on railway network can be performed at terminals for combined transport and at port terminals.

Inland waterways port facilities connected to railway activities. The following ports are connected to public railway network: Belgrade, Novi Sad, Smederevo, Pančevo, Prahovo, Senta, Sremska Mitrovica and Šabac.

Port of Bogojevo

The port of Bogojevo is located on the left bank of the Danube from km 1366,73 to km 1367,42. The port is 40 km away from the E75 highway, in the direction Belgrade - Budapest, and it is not connected to the national railway network.

This port is located at a distance of 4 km from the village Bogojevo and 34 km downstream from the town of Apatin. The location of the port in Bogojevo has an extremely favourable position, both in relation to the settlement of Bogojevo and business entities in the West Bačka District (City of Sombor and the municipalities of Apatin, Odžaci and Kula), and in relation to the wider area- Mali Iđoš in the North Bačka District, as well as the Municipality of Vrbas in the South Bačka District).

Total port area is 150,000 m^2, it has a covered storage area and it is equipped with a gantry crane, with the max. lifting capacity of 20 tonnes, and a conveyor belt.

Bogojevo is an open type of port with aquatory of 12 m deep. Total quay length is 210m, out of which vertical quay is approximately long 90m. Two vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 6 vessels. On the filled plateau behind the operational shore, a grain silo, a dryer, closed and open warehouses, a truck scale weighing system, an administrative building and gates were built.

The port has silo of 30,000 tonnes and 10,000m2 of covered storage space available for port users. The main types of cargo handled in port are grains, chemical fertilizers, gravel and sand.

Figure 23: Port of Bogojevo

Mid-Term Perspective Assessment

In the port of Bogojevo there is no connection to the national railway network. Within the built capacities of the traffic infrastructure in the port zone, there is a manipulative railway no. 403, Bogojevo - Danube bank, with 3 industrial tracks in the port area.

It is planned that the industrial tracks that are being pulled out of the Bogojevo station, which is located on the main line no. 110, Subotica - Bogojevo - state border - (Erdut) and regional railway no. 207, Novi Sad - Odzaci - Bogojevo, across the manipulative railway no. 403, Bogojevo - Danube bank, provide access by rail to port terminals and facilities on the waterway.

It is necessary to reconstruct the manipulative railway from Bogojevo station to the entrance to the port area and segments of existing industrial tracks (to silos, operational shores), as well as the construction of new tracks initiated by dispositions of new terminals (tracks to container terminal, general and liquid cargo terminals).

Port of Bačka Palanka

The port of Bačka Palanka is located on the left bank of the Danube River, km 1,295 in the agrarian area of South Bačka.

Total port area is 740,000 m^2, it has an open and covered storage area, it's equipped with a gantry crane, with a max. lifting capacity of 12 tonnes, a mobile crane with a 9-tonne capacity, a floating crane with a 6 tonne capacity, a conveyor belt, pneumatic equipment and a Ro/Ro-ramp.

Total quay length is 322m, all of which is the vertical quay. Three vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 12 vessels.

The depth of water in the port basin ranges from 3.93m to 8.86m. The average size of the vessels reloaded in the harbour is 90m in length, 11m in width, with a capacity of 1,500 tonnes and freeboard of 2.5m. The port handles dry bulk and break bulk cargo. Storage facilities consists in 8,260 m2 of open spaces and 650 m2 closed spaces.

Figure 24: Port of Bačka Palanka

Port of Backa Palanka is characterized by an excellent strategic position thanks to the connection with Pan-European Corridor 7 (a river and canal system of the Rhine-Main-Danube Canal), which connects it with the countries from the North Sea to the Black Sea. The strategic position is contributed to by the immediate vicinity of the Novi Sad-Osijek-Sombor main road, closeness of the Belgrade-Subotica highway at a distance of 45km and the Belgrade-Zagreb highway, which is 30km away, as well as the railroad track which is just 5km from the port.

Mid-Term Perspective Assessment

The port is not connected to the national railway network but is distanced about 5 km from the regional railway Backa Palanka – Gajdobra whichis connected with the Belgrade-Subotica railway and further with the Budapest.

According to the port development plans, it is planned that the industrial track for the port of Bačka Palanka starts from the open track of the railway Gajdobra – Bačka Palanka, in front of the level crossing with the main road (before the overpass from the direction of Gajdobra). The industrial track is brought to the port via a marshalling yard, which is located before the protective embankment of the port complex in Bačka Palanka.

The main track for connection to the port will be built with the use of TYPE 49 rails and with the basic spatial elements - (track radius of min 180m) and safety systems for breaking and turning.

The railway within the port of Bačka Palanka is spatially configured in the form of one access to two peripheral (connected) industrial tracks, i.e. with only one main track that serves all planned facilities.

Port of Prahovo

The port of Prahovo is located on the km 861, right bank of the Danube river. The port covers surface of approximately 6,7 ha. Port of Prahovo is an open type port with maximum available draft maintained at 4 meters. Total quay length is 677m, out of which vertical quay is approximately long 320m. Six vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 60 vessels.

Port of Prahovo has the following facilities and devices: conveyor belt, pneumatic equipment, Ro/Ro-ramp and 6 gantry cranes of 40 tonnes lifting capacity per each. When it comes to storage facilities, there is an open storage area, covered storage area and customs warehouse.

Northward, the Danube connects Prahovo to the countries of the Danube basin, all the way to Germany. Through the Rhine-Main- Danube Canal it is connected to Rotterdam and the North Sea, as well as Mannheim, one of the most important transport hubs and the centre of the European chemical industry.

Towards the east, Prahovo is connected by the Danube to the Black Sea and the Port of Constanta, an important international hub for maritime traffic.

Figure 25: Port of Prahovo

The port of Prahovo is located on the km 861, right bank of the Danube. The port is connected to the hinterland by roads and railways.

There is a well-developed rail infrastructure with several industrial tracks within the port, and the whole existing complex is connected to the Serbian Railways system and the international rail network.

The Prahovo industrial complex is also connected by rail to the Bor smelting basin, a producer of cathodic copper and an important producer of sulphuric acid, a basic raw material for many branches of the chemical industry.

The 971 m long industrial and railway track is connecting the port with the national railway network. The port is arranged with three parallel tracks, which gives the possibility of simultaneous processing of 160 wagons. Port of Prahovo has a connection with two railway sections: Crveni Krst-Zaječar-Prahovo pristanište section and Bor teretna-Prahovo pristanište section. Crveni Krst-Zaječar-Prahovo pristanište section connects port with Bulgaria, while Bor teretna-Prahovo pristanište section connects port with Belgrade and further with Hungary.

The location of the public railway infrastructure, according to the Plan of Detailed Regulation of the Port of Prahovo:

- Regional single-track non-electrified railway (Niš) - Crveni Krst-Zaječar-Prahovo pristanište in the length of about 1.04 km (from km 184 + 042 to km 185 + 079). On this line is organized public passenger and freight traffic;
- Railway station Prahovo Pristanište in km 184 + 577, with 11 station tracks and 10 industrial tracks, open for transport of passengers and things.

According to the assessment of the condition of the traffic infrastructure, the condition of the tracks of the railways in the Timok region is not satisfactory, which is indicated by the fact that the allowed speeds range from 40 km / h to 80 km / h, and that the lines are not electrified.

Mid-Term Perspective Assessment

In line with the Strategy for the development of Waterborne transportation of the Republic of Serbia, expansion of the port of Prahovo will include revitalization of existing and construction of new port infrastructure, as well as the construction of additional storage capacity and improvement of railway and road infrastructure.

According to the development plans of "Serbian Railway Infrastructure" a.d. and in accordance with the Spatial Plan of the Republic of Serbia ("Official Gazette of RS", No. 88/10), revitalization, modernization and electrification of the existing single-track railway (Nis) - Red Cross - Zajecar - Prahovo port is planned This regional railway is very important for faster development of Prahovo as an industrial center.

At km 0 + 355.70, where the new road intersects with the railway tracks, the construction of a leveled intersection is planned, which will be done by the construction of a new AB bridge - overpass. A free profile which is 5.8 m high is provided under the bridge. The width of the free profile perpendicular to the tracks is 14.1m.

Since the condition of the railway tracks within the port area is not satisfactory, overhaul and modernization are planned, which will significantly increase the transport capacity.

The plan envisions the introduction of a new track that will serve warehouses in the hinterland of the port area.

If possible, the necessary safety distances between industrial tracks, plot boundaries and other infrastructure corridors must be observed. In addition to the tracks behind the silo, it is possible to envisage another track, so that the existing one would be used for loading and would not disrupt the transport of other cargo.

SLOVAKIA

Port of Bratislava

Port of Bratislava is the second biggest railway node in Slovakia. Railway track, which is located in the port, is owned by SPaP, a.s., major port operator and private company independent to VPAS (port authority). It is connected to ŽSR (Railways of the Slovak republic) railway at railway station Bratislava ÚNS (Central Freight Station). The construction length of all siding tracks is 28 828,6 meters, including 69 turnouts. The siding is predominantly electrified, with the siding and track no. 101, 102, 103, 104 and 105 are under the traction line. The total length of traction line is 5 500 m, the other part of siding is not electrified.

The railway infrastructure of the port can be divided into the following integral parts:

- connecting rail between the Port area and ŽST Bratislava ÚNS,
- a track group 100, which represents an entry / exit group to / from the port,
- railroad groups in Winter port: the main flow of the Danube, the North and South basin,

- railroad groups in the Winter port.

Port infrastructure coverage of the port is good, but in many segments, it is required to modernize it. The connection to the public railway transport network as well as the connection to roads outside the Port Bratislava is shown in the following figure.

Figure 26: Connection the Public Transport Network (port of Bratislava)

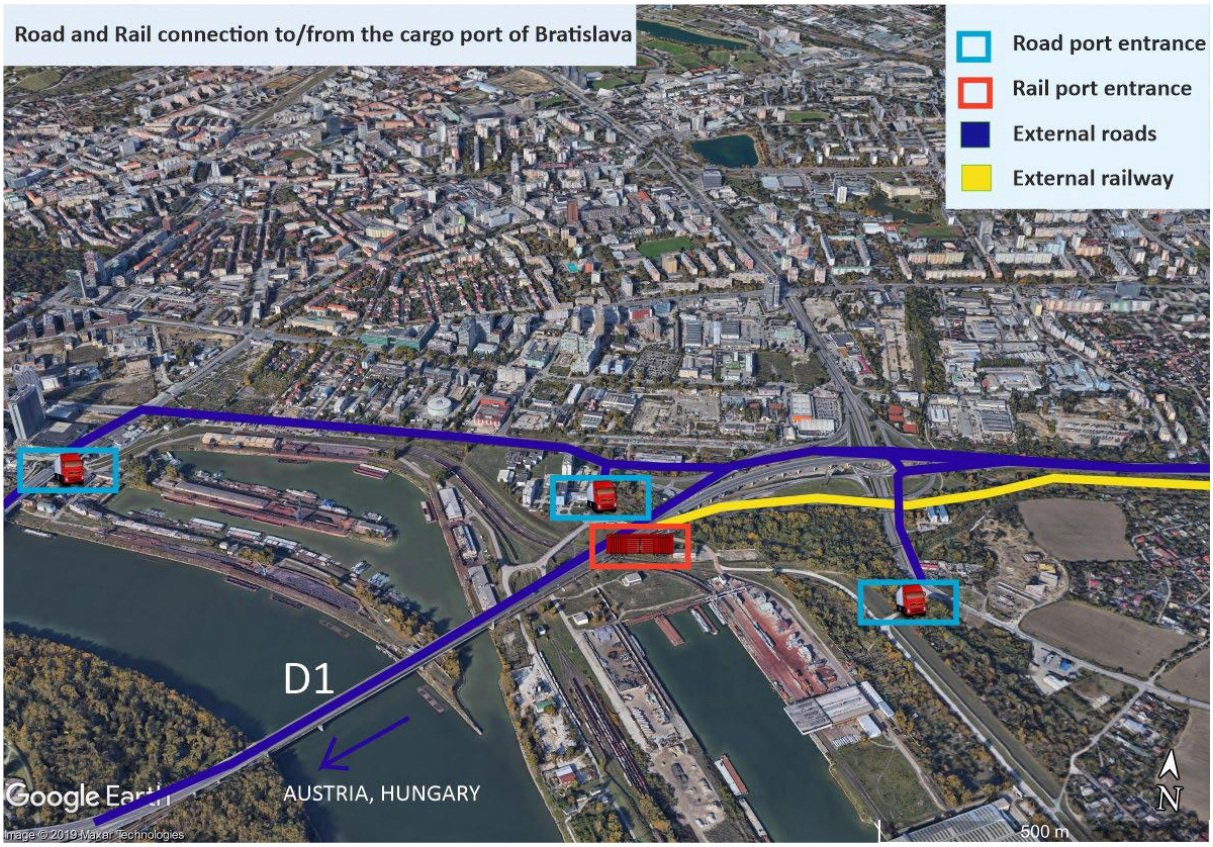


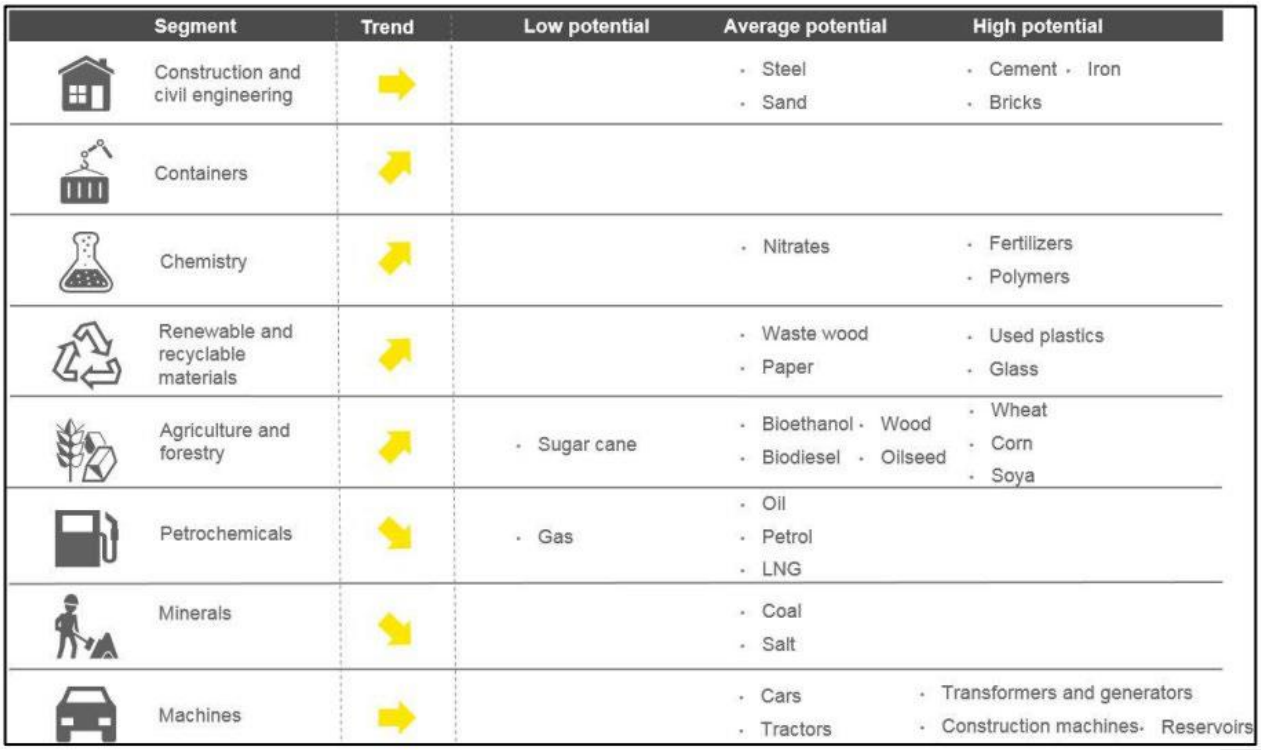
Figure 27: Rail Infrastructure Capacity for Bulk Cargo (port of Bratislava)

Parameter	Description	Value	Units
NT	Maximum number of trains per day	7	No.
TRL	Maximum capacity per train	2 440	t
WD	Number of working days per year	300	days
Annual rail capacity	NT x TRL x WD	5 124 000	t/years

Figure 28: Rail Infrastructure Capacity for Containers (port of Bratislava)

Parameter	Description	Value	Units
NT	Maximum number of trains per day	3	No.
TRL	Maximum capacity per train	80	TEU
WD	Number of working days per year	300	days
Annual rail capacity	TEUs = NT x TRL x WD	72 236,8	TEUs/year

Figure 29: Potential by Segments and Commodities (port of Bratislava)



Port of Komárno

Currently, the Public Port of Komárno is linked to the railway network by a siding, at track no. 131 Komárno Bratislava and no. 135 Komárno – Nové Zámky. These are standard gauge tracks, not electrified. The situation diagram with a connection to the railway network in the city of Komárno is shown below. The entrance is located on the western edge of the port near the Bratislava Gate – Bastion No. I near the intersection of the streets Dunajské nábrežie and Hviezdna. The total length of the rails at the VP Komárno area is 13.85 km.

The railway line at the Komárno railway station is of class D with maximum unit train load of 2,200 tonnes. It follows that the unit train can contain a maximum of 55 carriages at carrying capacity of 40–50 tonnes/carriage. The siding in the area is maintained by the SPaP, a. s. company, while the siding is

operated and unit trains outfitted by the Železničná spoločnosť Cargo Slovakia, a. s. company (ZSSK Cargo) (Railway Company Cargo Slovakia). For operational reasons, there is no restriction on transshipment due to the capacity of the railway connection. The railway connection is of good quality and operationally satisfactory.

Figure 30: Connection to the Railway Network (port of Komárno)

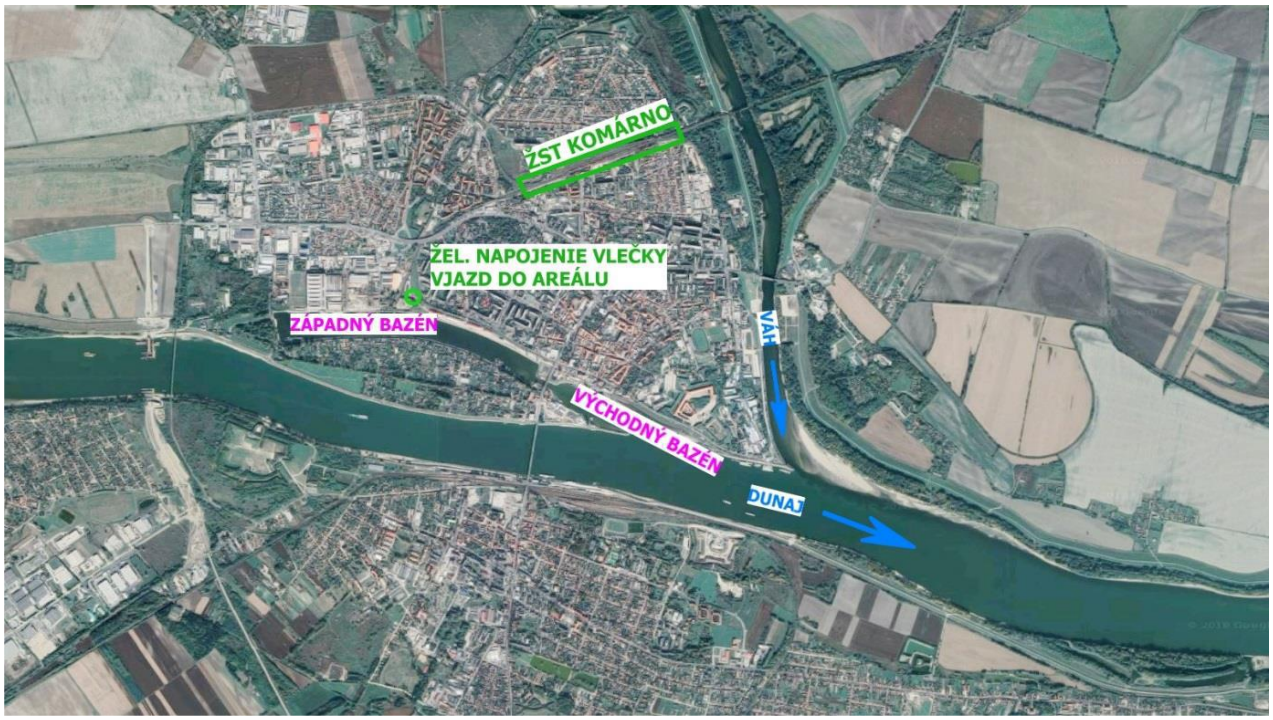


Figure 31: Rail capacity (port of Komárno)

Parameter	Description	Value	Units	Remarks
NT	Maximum number of trains per day	1,5	number	*This should be based on the availability of rail infrastructure and the operational modalities*
TRL	Maximum capacity per train	1 600	t	*This should be based on operators' experience. Our calculations contains that train capacity is equal to the capacity of 1 boat i.e. 1600 tonnes, although the railway line in the Komárno railway station is classified as Class D with a maximum load of 2200 tonnes. It follows that a one train contains max. 55 wagons with load capacity of 40 - 50 tons / wagon.*
WD	Number of working days per year	213	days	
Annual rail capacity	Cap. = NT x TRL x WD	510 000	t/year	

Figure 32: Rail Lengths in the Port Area – Current Condition (port of Komárno)

rail no.	length (m)	rail no.	length (m)
1	1 145	15	598
3	1 006	17	566
3a	238	19	526
5	679	21	986
7	635	23	628
9	1 422	2	1 663
11	1 377	4	1 719
13	657		
total length of rails (km)			**13,85**

UKRAINE

Information is based on the research conducted for D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo.

Reni port

- Type of rail: Maritime transhipment and export. Freight station.
- Not electrified
- Double track
- Maximum train length: 740 m
- Maximum train load: >= 22.5 t
- Maximum speed: 100 km/h
- Restrictions: After dismantling in 1997 the section of the Artsyz - Basarabeasca road connecting Odessa, Chornomorsk, Belgorod-Dnestrovsky with the port of Reni, freight rail traffic stopped. In 1999, sections of the railway in Ukraine at the Reni and Bolgrad stations were transferred to Ukrzaliznytsia and are currently isolated from the rest of the Ukrainian railway network (D_T2.2.1).
- Network structure: The Reni port's railways are connected with the railways of the Reni station and have a railway connection Reni-Galati, Reni-Chisinau, Reni - railway stations of Ukraine. Ukraine has an isolated section of the railway near the port of Reni and the Bolgrad station - on the highway from the Moldavian station - Besarabka to the Romanian station – Galati (D_T2.2.1).

Izmail port

- Type of rail: Maritime transhipment and export. Freight station. Passenger station

- Electrified from Odessa to Belgorod-Dniestrovsky, diesel from Belgorod-Dniestrovsky to Izmail
- Double track
- Maximum train length: 740 m
- Maximum train load: >= 22.5 t
- Maximum speed: 100 km/h
- Network structure: Izmail is a large transport junction see where sea, river, railway, road routes converge, and is located at the junction of the borders of Ukraine, Romania and Moldova and at the intersection of Pan-European transport corridors VII and IX.

Port of Ust-Dunaisk

The port has no railway connection

4.2 Identification and presentation of the existing rail services

AUSTRIA

Port of Vienna - Albern

The port of Albern is one of the three basins in the Port of Vienna. It stretches over 780.000 m^2. In the port of Albern are handled building materials, agricultural and steel products. There are five large grain silos on the site with a capacity of 90.000 tons. Albern is the most important grain handling location in Eastern Austria. Albern has a direct link to the central marshalling yard.

Figure 33: Port AlberN[9]

The Port of Vienna with its 3 basins is the largest trimodal logistics centre in Austria, connecting road, rail and water transportation.

The Port of Vienna is connected through freight rail tracks to the Austrian railway network. The rail access to the port is possible through the connection to shunting stations Donaukaibahnhof (3 km, through Donauuferbahn) and Kledering (8km, through Winterhafenbrücke) and the main Austrian railway network. All rail connections have minimum three railway tracks.

Rail connections

- Total length of railway siding: 50.000 m
- Maximum train length: 650 m
- Loading tracks: Terminal 1: 4 x 650 m, Terminal 2: 3x (2 x 560 m, 1 x 250 m), Terminal 3: 1 x 650 m
- Maximum of trains attended to in parallel: 7
- Hubs in Austria - Port of Vienna-Freudenau: 3

[9] https://www.hafen-wien.com/en/company/locations/72/Albern-harbour

Most agricultural freight is transported by trucks and rail from the area around Vienna and is shipped out all over Europe.[10] The area around Vienna is made up by the three federal states Vienna, Lower Austria and Burgenland, which are responsible for 45% of the Austrian GDP. The Vienna region is ranked as Centra Europe leading economic region.

Main transport destinations/origins are[11]:

Hub function: Pre-carriage from Rotterdam, Hamburg/Bremerhaven to Turkey, Romania, Greece, Hungary, Slovakia. Destination to Duisburg, Hamburg, Rotterdam (10 trains/week), Bremerhaven, Triest, Koper, Antwerpen, Vienna Region, Ruhr Area, Eastern Europe, Turkey.

Gateway function: Origin from Rotterdam, Hamburg/Bremerhaven to Turkey, and many more**.** Destination from Rotterdam (10 trains/week), Hamburg/Bremerhaven to Turkey.

The intermodal container trains ensure the flow of goods to and from the major international port cities. 2020 there were 110 trains weekly handled in the container terminal.

Also, the trailer business was rebuilt in 2020. Entire truck semitrailers are packed onto the train and transported to the destination. In 2019 WienCont started with 2 round trips (4 trains) to and from Rotterdam per week, 2020 they doubled to 8 trains.[12]

There is a new collaboration between the Port of Vienna and the company Helrom, aiming to raise the number of trailers on rail. Currently, there are three round trips a week between Germany and Austria with mostly non-craneable trailers that can be loaded without handling equipment due to a unique technology. With the help of swivel technology integrated in the wagon, the trailers can be transferred directly from the wagon to the waiting truck towing vehicle. In one year 2020-2021, approx. 3,500 trailers were loaded in Vienna Freudenau and transported by rail.[13]

[10] Logistics for Vienna, Wien Holding's Logistic Companies 2012
[11] Port of Vienna-Freudenau, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html
[12] https://www.wien.gv.at/politik/international/aktivitaeten/hafen-2020.html
[13] https://www.ots.at/presseaussendung/OTS_20210826_OTS0078/hafen-wien-startet-kooperation-mit-trailer-innovator-helrom

Figure 34: Transshippment of the trailer directly on the truck towing vehicle[14]

Port of Ennshafen

The Ennshafen port is a trimodal transhipment centre and one of the two Austrian core nodes on the Rhine-Danube Network Corridor. Most agricultural goods loaded at the Port of Ennshafen are fertilizers. The unloaded freight is made up of agricultural products as well as of food and animal feed.

Figure 35: Port of Ennshafen[15]

[14] https://binnenschifffahrt-online.de/2021/08/haefen-wasserstrassen/21767/hafen-wien-will-trailer-auf- die-schiene-bringen/

[15] https://www.viadonau.org/wirtschaft/donaulogistik/angebotsseite/haefen-und-terminals

The Ennshafen port features two shunting yards and a feeder line, with a high-quality connection to the railway system.

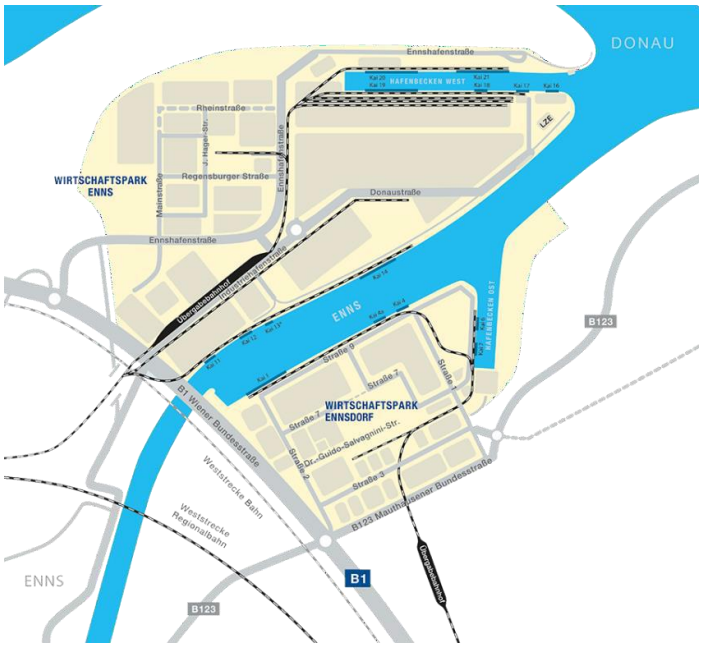
In 2019, the rail infrastructure in the port area was upgraded through the expansion of the high-voltage power supply, a new rail siding and a track extension at the container terminal.[16]

Rail connections (Container terminal)

- Total length of railway siding: 3 km
- Maximum train length: 750 m
- Loading tracks: 4

Maximum of trains attended to in parallel: 4

Figure 36: Map of quay facilities[17]



Container terminal

At the Container terminal in Ennshafen block trains are dispatched to all major European ports and commercial centres. The terminal is positioned as a gateway and extended port for the large seaports in Northern and Western as well as Southern Europe.

- Capacity: 500.000 TEU
- Covered area: 275.000 m^2
- Number of tracks in the terminal: 10, each 720 m long (for block trains)

[16] https://oevz.com/en/ennshafen-growing-turnover-in-all-segments-in-2019/

[17] https://www.ennshafen.at/wp-content/uploads/2019/01/Ennshafen_Ansiedler_Lageplan.png

- Inexpensive rail access directly to the terminal
- Transfer station: currently six tracks, each 690 m long, three more tracks

At the container terminal 5 railtracks in block train length are operated with two shunting locomotives. The railtracks are covered by two gantry cranes with a daily dispatch and arrival of more than 300 railcars. The container terminal operates 8.000m of railtracks for dispatch and parking of block trains and single railcars.

Block train transports are carried out to the European north, west and south ports, Hamburg, Bremerhaven, Rotterdam, Trieste and Koper. The location in Enns is strongly connected to the maritime traffic axes to the seaports, up to 15 trains to the seaports are dispatched and received daily.[18]

The sea ports of Trieste and Koper are served daily by Enns as part of an A / C connection.

Special services available at the Port Ennshafen are an LED lighting system, unique in Europe, which enables the shunting personnel to carry out the train entry and handling more efficiently, safely and with reduced emissions.

Another service is the dynamic axle load weighing for all outgoing trains. The chargeable service is offered to RUs and serves to make the train journey even safer over long distances. The weighing system can prevent the train from being overloaded.

The container terminal in Ennshafen is also the first terminal in Austria to offer optical recording of all incoming and outgoing trains using video surveillance, by a state-of-the-art OCR system.[19]

Port of Krems

Figure 37: Port of Krems[20]

[18] https://www.ct-enns.at/de/verkehrsanbindung/ganzzugs-und-einzelwagenverkehre/

[19] https://www.ct-enns.at/cte-leistungen/ganzzugssteuerung/

[20] https://www.viadonau.org/wirtschaft/donaulogistik/angebotsseite/haefen-und-terminals

The port of Krens is connected to the international rail network via the port railway. The Kremser Hafen- und Industriebahn Ges.m.b.H. (HIB) is the owner of the tracks from the transfer station in Krems-Landersdorf to the port of Krems. HIB moves the wagons between the transfer station and the trimodal terminal at the port of Krems.

The trimodal terminal is operated by METRANS (Danubia) Krems GmbH and has following infrastructure:

Figure 38: Terminal operated by Metrans Krems[21]

Rail (terminal) infrastructure

- Total length of railway siding: 8.000 m
- Maximum length of complete block trains: 680 m
- Loading tracks: 4
- Maximum of trains attended to in parallel: 2

Hub Function: There is a train connection 5 times per week – in each direction – to/from Hamburg, Bremerhaven, Koper, Rotterdam, Duisburg and the whole METRANS Network *(for both pre-carriage and onward).*

Gateway Function: There is a train connection 3 times per week – in each direction – to/from Hamburg, Bremerhaven, Koper, Rotterdam, Duisburg and the whole METRANS Network *(for both origin and destination transport).*

Services[22]

- Weighbridge
- Container cleaning, maintenance, repair facility, stuffing and stripping
- Customs office
- Dangerous goods handling and preparation facilities

[21] https://www.metrans.at/terminal-krems-and-der-donau

[22] Port of Krems - Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology, Dec. 2020

- Quality control
- Tank container cleaning
- Unaccompanied combined transport – Maintenance facilities, transshipment

Port of Linz

The Port of Linz is the largest port on the upper section of the Danube, covering a total area of 150.000 m^2 and a water surface of 450.000 m^2, divided between the trading port (236.000m^2) and the tank port (217.000 m^2). The trimodal container terminal covers an area of 120.000 m^2.[23]

Figure 39: Port of Linz[24]

The Port of Linz together with the subsidiary Österreichische Donaulager GmbH manage a warehouse on 115.000 m^2 covered storage space.

There is a feeder line connecting the port area to the public railway network and the other means of transport. Every year, more than 2 million t of goods are transported on this railway line with a total rail length of 37 km and 100.000 movements of the carriages.

Rail connection

- Total length of railway siding: 37.000 m
- Maximum train length: 630 m
- Loading tracks: 4
- Maximum of trains treated in parallel: 2

The multimodal terminal at the Port of Linz has no capacity to handle block-trains.

[23] Here and in following https://www.linzag.at/portal/de/businesskunden/logistik/hafen_1#

[24] https://www.viadonau.org/wirtschaft/donaulogistik/angebotsseite/haefen-und-terminals

Hub Function: There is a train connection with destination to Rotterdam, Hamburg, Bremerhaven, and ports in South-Europe.

Gateway Function: connection for several shuttle trains, destination Rotterdam, Hamburg/Bremerhaven.[25]

The Port of Linz is a centrally located logistics hub offering following handling amenities: container terminal (cleaning, maintenance, repair, stuffing and stripping), commercial and tanker port with the required handling equipment, warehouses and piece good storage, temperature-controlled storage, and storage of hazardous substances as well as towage services. Further services are customs office, veterinary inspection office and services for unaccompanied combined transport.

BULGARIA

Port of Varna

Rail transportation arrives at the port on a daily basis. Since all quays of the port are connected to the railway network, the conditions are excellent for the realization of combined transport. Port of Varna has partnered with national company BDZ in terms of providing relevant rail services for its customers, which include:

- transshipment of cargo from ship onto rail wagons and vice versa
- transportation of all types of conventional, liquid and dangerous cargo
- container transport
- combined RO-LA transport
- transport of perishable goods and cargo under temperature mode INTERFRIGO
- specialized block trains and transport of intermodal transport units (UTI)
- weighing a rail wagon or tank wagon when empty/full

The list is not exhaustive and covers only part of the services the port offers to trains and rail wagons entering and staying at the port territory.

Although there is no comprehensive list of the exact companies, which use the services of the port some of them were identified during the desk research.

Large part of the exported goods through Port of Varna are agricultural products such as wheat and corn and barley. Therefore, some of the main clients of Port of Varna are the large companies in the agricultural sector, which produce and trade in cereals. Since Varna is close to "the granary of Bulgaria" (like Dobrogea region is known as), many companies which are based there, use the port when they export their grain abroad.

One of identified customers is the company Farm Sense AD, which has six grain depots in North-eastern Bulgaria with an overall capacity of 200 000 tons. The company buys cereals from producers from all over the country and then sells it in other countries in the EU, as well as third countries. Their main exports are wheat, corn, barley and rapeseed.

[25] Hubs in Austria: Linz Stadthafen CCT; Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

Another company, which often uses the port's services, is Cargill Bulgaria EOOD. The company is based in Sofia, but also has an office in Varna, from where the sea transport of their agricultural commodities is managed. The company's main activity is the purchasing and subsequent reselling of cereals and oilseeds and it holds the first place in Bulgaria in this sector in terms of revenue. Cargill Bulgaria is currently the American company's main hub for operations in Europe, the Middle East and Africa.

Port of Burgas

Railway wagons arrive at the port daily, according to the annual schedule of the Burgas railway station. The railway wagons arriving at the port are of different type – tank wagons, opened and closed train wagons, container wagons, Hbbinss etc.

It is important to note that after the loading/unloading operations with the rail wagon are finished, together with the additional servicing, the wagon must be removed from the working rail and subsequently – taken out of the port territory within 6 hours after the end of its servicing.

BMF Port Burgas, the port operator of ports East 2 and West, has a partnership agreement with Port Rail OOD. The company has set up a locomotive deport on the territory of the ports for current repairs and technical inspections of locomotives by qualified specialists. The depot is equipped with two repair channels, which allow inspection and repair of the mechanical part of a traction rolling stock. Two hoists are positioned in the repair depot with a load capacity of 2.5 tons each, as well as eight jacks with a capacity of 40 tons for installation and dismantling of large aggregates.

Some of the main clients, who have used the port's services in 2020, are companies from the metal production and metallurgy sectors, food producers and wholesalers. In addition, transport and logistics companies are also using the port's services extensively.

The main customer of Port of Burgas in 2019 was Neochim AD – a producer and trader of mineral fertilizers, as well as inorganic and organic chemical products. The company is based in Dimitrovgrad (200 km from Burgas) and had almost 14% of the share in the port's entire revenue for the year.

The biggest agricultural customer for Port of Burgas is Topaz Mel OOD (based in Sofia, but the production facilities are in the Burgas region) – the largest mill complex in Bulgaria. The company's overall silo capacity is 120 000 tons and it has three mills, which can process 900 tons of grain in 24 hours. The company produces and sells different types of flour, bran, semolina etc.

Port of Ruse

The main cargo terminal of Port of Ruse - Ruse-east, can handle block trains in the port area. According to published information, Ruse-east actually handles block trains with containers and trailers. This terminal has the necessary machinery and equipment for transshipment of intermodal units.

Major customers in the port are:

- Forwarding companies – acting as mediators between end users, ports, ships owners, auto- and railway companies;
- Direct exporters and importers – industrial companies that produce and export goods and materials or that consume materials and goods;
- Ship owners, ship agents – taking care for organization of the river transport;

- Control bodies – inspections, border and customs control, etc.
- Depending on the port terminal, the customers are:
- Ruse-east – great variety of clients and cargo types – agricultural goods (mainly cereals and fertilizers), metals, coal etc.;
- Tutrakan – port of local importance with zero cargo volumes for the last years.

The main final destinations for import cargoes transshipped on rail, which pass through the port of Ruse, are Plovdiv (324 km from Ruse) and Senovo (50 km).

The main export shipments arriving at the port on rail are originating in Burgas (280 km) and Senovo.

The main customers of the port using the inland railway transport are KCM AD (mining, production and trading of concentrates, non-ferrous metals and alloys), Kaolin EAD (production of kaolin for the ceramics industry and different brands of silica sand for the glass, paper, foundry and construction industries) and Promet Steel EAD (production of a wide range of hot-rolled steel sections of ordinary and special steel).

Port of Lom

Trains and cargo arrive at the port daily. There are a few types of rail wagons, which are used for cargo transportation to and from the port – Eaos-type open cargo wagon with 4 axle, Res-type platform wagon with 4 axle, Fals-type self-unloading wagon with 4 axle for the transportation of coal.

The vast majority of the port's clients are companies from Bulgaria, which comprise more than 98% of the overall client base. The rest of the companies are from Hungary, Switzerland and Ukraine (data for 2020). In 2019 the port also had clients from Romania and Germany. In terms of field of activity, the port's clients are mainly forwarding and industrial companies, which import/export production and materials. That includes importers of coal for both industrial and domestic use, importers of metal articles and fertilizers, as well as exporters of cereal.

In terms of the revenue generated by the various kinds of services the port offers, the largest share (70% for 2020) comes from the transshipment of cargo.

Port of Lom does not publish the list of its clients, although the port operator's annual activity report states that during the months after the beginning of the pandemic in 2020, their clients' base has not changed much neither in terms of numbers, nor in terms of their geographical location.

Port of Vidin

There is a lack of information regarding the quantity and frequency of the cargo transported by train to and from the port. Information about the customers of the port is also not publicly available. However, the main types of customers are direct users – importers and exporters, as well as indirect users – forwarding companies.

There are some constraints, which are an obstacle for the port when it comes to taking full advantage of its favorable geographical location. The connectivity with the hinterland is missing, especially the railway connectivity for terminal South, which is basically nonexistent. There are currently no plans

to develop a rail connection for port terminal Vidin South, which would connect it to the national railway network and facilitate the transportation of cargo.

CROATIA

The single-track railway M601 Vinkovci - Vukovar is separated from the railway at the Vinkovci station line M104 Novska - Tovarnik - SB - (Šid), and at the station Vukovar it is connected with the industrial track with Vukovar port on the Danube River. In this way, the railway M601 Vinkovci - Vukovar connects the railway traffic direction of Corridor RH1 (former X. Pan-European Corridor) and VII. Pan-European transport corridor (waterway Danube) in the territory of the Republic of Croatia.

At the Vukovar-Borovo naselje station on the M601 line, continues the railway line of importance for the regional traffic R104 - Vukovar-Borovo Naselje - Dalj - Erdut - SB. At the exit from Vukovar station, it continued on railway of importance for local traffic Vukovar - Stari Vukovar (out of traffic since 1991). From Vukovar station, the industrial track leads to the Port of Vukovar on the Danube River.
On the railway line M601, the maximum permitted speed (according to the Technical Conditions of the Construction Infrastructure timetable 2013/14) is 50 km/h, with occasional restrictions of 20 km/h and 40 km/h. The railroad is not electrified. Signal security and telecommunication devices were destroyed during the war and have not been rebuilt. During the war, some buildings in the railway belt were destroyed and damaged, which were recorded in the cadastral operatives, but in nature they do not exist today.

The traffic takes place at the station distance. The railway stopping line is 700 m. The M601 line at Vukovar station passes through the area of the port facilities of the Port of Vukovar. It is necessary to delimit the track capacities and land between the Port of Vukovar and Vukovar Station.

The single - track railway M601 Vinkovci - Vukovar has the status of another railway for international traffic and connects the railway Corridor RH1 (SB - Savski Marof - Zagreb - Dugo Selo - Novska - Vinkovci - Tovarnik - SB) and VII. pan-European transport corridor (waterway on the Danube) on the territory of the Croatian Republic. The railway will be electrified by an electric traction system of 25 kV, 50 Hz. All railway crossings with roads (except for two decommissioned LCPs) will remain level and will be provided with light and sound signals. The railway will be capable of Vmax = 120 km/h (with existing restrictions at the exit from Vinkovci station (speed 50 km/h) and Vukovar Borovo Naselje (speed 95 km/h) and in the area of Vukovar station (speed 40-80 km/h).

HUNGARY

Nationwide rail loading and unloading in inland ports is 10% compared to transhipments in between other modes. In Dunaújváros it is even less. Types of trains are usually Tadgs and Eas. Cargo trains from Hungarian Danube ports go to Germany, The Netherlands, and even to Koper and Rieka. In case of low water level, bad navigation conditions on the Lower Danube, cargo trains go even to Constanta.

Adony

Adony Logistics has a 100-ton railway scale added to the industrial track network.

Handling of goods arriving by rail is as follows. Each wagon arriving to the port is weighed on a railway scale. After diassembly, the wagons are towed to the unloading location in the correct order. At the unloading point, the goods are released from the wagon into the hopper in a controlled manner, from where a belt system loads the goods into the ship.

Dunaújváros

One of the largest flow scales in Europe, with a throughput of 300 tons per hour certifies the current weight of the goods. Rail services are open for 24 hours a day on weekdays.

Paks

Directly by the train station warehouses are available for storing a large quantity of grains. The most common goods loaded in the port of Paks is grain and sometimes wood. Transshipment does not bother traffic since there are more parallel tracks on this line.

As in the port there is only loading activity, therefore regarding rail services, outgoing traffic is the only relevant service. Freight traffic arriving on rail is vanishingly small compared to all cargo transport: not more than 4-5% annually.

Baja

According to The Intermodal Development of the Port of Baja, recent rail traffic is volatile. Quantity of goods transported annually by rail is between 35,000 and 50,000 tons. The decisive part of the railway traffic is grain and logs sent by Gemenci Erdő és Vadgazdaság Zrt. (Gemenc Forestry). The port is a multimodal logistic center equipped for loading and unloading to road and water. These modes account for a much larger share of loading.

The level of transshipment form rail to road and from road to rail is negligible compared to road-ship loading, approx. 13,000 tons annually. The table below summarizes transshipments between certain modes.

Table 3: Transhipments between road/rail/IWW in the port of Baja

	rail-IWW/road		IWW/road-rail		PCS	TON
	pcs	ton	pcs	ton		
2013	473	15,620	462	34,742	935	50,362
2014	321	12,260	331	26,238	652	38,498
2015	369	17,225	362	23,882	731	41,107

Source: The Intermodal Development of the Port of Baja, public tender

ROMANIA

Port of Constanta

Rail services are secured by CFR Marfa, the state owned company, and by various private operators outside the Port area. In the port area the rail services are secured by rail operators who have a licence to operate within the port area.

The railway infrastructure facilitates allows the handling full block train in the port area as well as along the quay. Therefore, conditions for round-the-clock train services and every day shuttle trains are available. Unfortunately, the rail connections of the port to the hinterland lacks development and maintenance works within the Romanian rail network. The commercial speed is very low 20km/hour and as a result lacks predictability and efficiency affecting the attractivity of Constanta Port.

A list of active port operators for year 2018 is presented below.

Table 4: Active rail operators Constanta Port

CN CFR SA
CARGOTRANS VAGON SA
CER-FERSPED
CFR MARFA
CONSTANTIN GRUP SRL
DB CARGO ROMANIA
Express Forwarding
GP Rail Cargo (M)
GRUP FEROVIAR ROMAN SA
LTE RAIL ROMANIA
MMV RAIL ROMANIA
Rail Cargo Romania SRL (M)
TRANSFEROVIAR GRUP SA (M)
Tehnotrans Feroviar SRL
Tim Rail Cargo
UNICOM TRANZIT
VIA TERRA SPEDITION SRL
Vest Trans Rail SRL (M)

The rail freight flows from and to the port are presented in the table below for the year 2018.

Table 5: Rail freight flows from and to Constanta Port, 2018

Station in the port	*From the port, tonnes/year*	*To the port, tonnes/year*
Agigea Ecluza	680	251,223
Agigea Nord Oil	741,481	
Agigea Nord	478,037	332,000
Constanta Port Zona B	1,173,343	4,952,619
Constanta Port MOL 5	132,815	418,895
FERRY BOAT	742,411	2,909,625
TOTAL	**3,268,767**	**8,864,362**

It is not an established frequency of the freight trains, as it related to the demand from various port operators or forwarders.

Currently the rail accessibility in the port is not optimised, as there are observed delays and long time for freight trains accessing the port. An overview of thew current access time by rail is presented below.

The record of stationing at the level of 2018 and 2019 shows that trains arriving in Port B, regardless of the final station serving the port operator Port B, Port A or Mol V, stop on average over 1000 minutes on the receiving lines, and in Port Terminal Ferry-Boat station they park on average 700 minutes.

In the table below are presented delays by port station.

Statistics of late arrival minutes in 2019:

Table 6: Statistics of late arrival minutes Constanta Port, 2019

Rail station.	Delay at arrival, min	No of delayed trains	No of total trains	Mintes delay / no of delayed trains	Mintes delay / no of total trains
C-ţa Port Zona B	1641642	3304	5475	497	300
C-ţa Port Mol V	113987	515	1095	221	104
Agigea Nord	244271	941	3428	260	39
Agigea Ecluză	34378	252	2883	136	12
C-ţa Port Terminal Ferry- Boat	877445	2183	4015	402	219

It follows from these statistics that:

- 44% of arriving trains are delayed
- total duration of arrival delays: 6.1 years
- average delay time: 176 min / train
- average delay time: 403 min / delayed train

Galati

Rail services are secured on both standard European gage and large rail gauge lines, depending of the demand.

Giurgiu

Rail connection does not exist.

Drobeta Turnu Severin

Road and rail connections of the port are shown in the figure below.

Figure 40: Road and rail connections Port Drobeta Turnu Severin

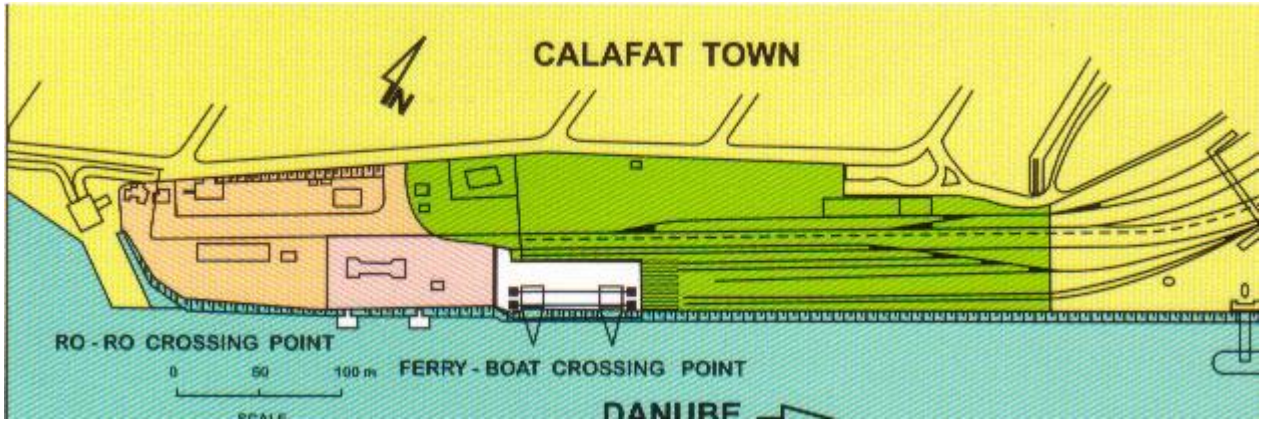
It is observed that the port has quite good rail connections, but new rail connections to the main rail network are desired for the Western side of the port. Access by rail is thus possible to Bucharest (323

Km) and further to Constanta Port, and Timisoara (210 Km). From the national rail network access is secured to all destinations in Romania and in other countries.

Calafat

Boundaries of the port / place of operation are Km 793 - Km 796, Danube, left bank.

Figure 41: Organization Port Calafat



The surface of the port territory administered by CN-APDF-SA GIURGIU is 51218 sqm.

The length of the walled / vertical / natural bank quays under the administration of CN APDF SA Giurgiu is 700 m.

The port has a well-developed railway system connected to the national network by the Calafat - Craiova line (107 Km).

SERBIA

According to the Statistical Office of the Republic of Serbia, 11.5 million tons of goods were transported on Serbian railway network, in 2019, totaling more than 2.86 billion ton-kilometers. Table 7 below shows the volume of goods transported for years 2019-2020, broken down by type of traffic.

Table 7: Serbian rail freight market, key performance indicators, 2019-2020.[26]

Transport goods	2019	2020	2020/2019
Transported goods thousand tons	**11506**	**10499**	**91.3**
Domestic transport	3337	3062	91.8
Export	2775	2743	98.8
Import	2891	2301	79.6
Transit	2503	2393	95.6
Ton kilometers, million	**2864**	**2746**	**95.9**
Domestic transport	519	546	105.2
Export	553	523	94.6
Import	586	513	87.5
Transit	1206	1164	96.5

In 2018, 12.3 million tons of goods were transported on Serbian railway network, totaling more than 3.19 billion ton-kilometers. International traffic contributed about 80%. Table no 8 below shows the volume of goods transported in 2018, broken down by type of goods.

Table 8: Goods transported by rail in Serbia 2018

Type of goods	**000 tons**	**%**
Containers	1,374	11.5
Empty wagons	2,073	17.3
Cereals, products of the milling industry, grains, seeds and fruits	344	2.9
Oil and its derivatives	799	6.7
Vehicles	124	1

[26] Statistical Office of the Republic of Serbia, Statistics of Transport and Communication, Number 166 Year LXXI, 25/06/2021

Metals	2,010	16.8
Bulk cargo, ore and	2,864	23.9
Chemicals	1,489	12.4
Sugar, residues and waste from the food industry, etc.	375	3.1
Wood, cellulose, paper	284	2.4
Building Materials	99	0.8
Others	128	1.1
Total 12,602	**11,962**	**100**

In 2018, the most frequently transported types of cargo were bulk cargo, ore and minerals (23,9%), followed by metal products (16,8%).

Unfortunately, there are no contemporary intermodal terminals in Serbia, but rather few bimodal container-handling terminals. Although, containers can be handled in some of the Serbian Railways marshaling stations as well as in the inland waterway ports on the Sava and Danube rivers. Currently only four terminals in Serbia have regular railway connections with the seaports in the region and are dedicated to the container handling on the daily basis.

The terminals are located in Belgrade, Dobanovci, Sremska Mitrovica and Pančevo: ŽIT Beograd, NELT Dobanovci, LEGET Sremska Mitrovica and DUNAV Pančevo.

ŽIT terminal in Belgrade represents the oldest road-rail terminal in Serbia. It is currently at the new location in the shipping park (park B) of the Belgrade railway station, the marshalling yard in Železnik. Although the new location now has only two tracks, ŽIT continued to service international container lines. In its current state, it can accommodate up to 4 trains a day. Currently, there is a problem with storage capacities, which handles only up to 1400 containers.

According to the estimates of the ŽIT terminal, the existing container terminal covers about 40% of the total number of containers transported by rail, which represents about 15% of all containers coming to Serbia. The terminal has the regular liner service with the ports Rijeka, Kopar and Bar. The distance of the port of Bar from the ŽIT terminal measured on the railway infrastructure is only 476 km, which makes this port the closest port to this container terminal.

NELT terminal is the central distribution and logistics center of the company NELT located in Dobanovci, near Belgrade. The terminal is connected by rail to all European ports and land terminals. The terminal is located 6 km of the intersection of the highways E-75 and E-70 and 10 km from the

Airport Nikola Tesla. It offers regular weekly railway transport of containers to and from the ports of Rijeka and Pireus. [27]

LEGET terminal is located in the Port of Sremska Mitrovica (75 km from Belgrade). It provides regular railway service to and from the port of Rijeka, several times a week. Considering that the terminal is located on the Sava river, theoretically it is possible to tranship containers to the inland waterway vessels, however, it is not a standard service. The terminal handles between 10.000 and 15.000 containers a year. [28]

DUNAV terminal is located in the Port of Pancevo. It started with its service in 2020. It is the first three modal terminal in Serbia. Its advantage in comparison to other terminals is its good traffic-geographical position, given that it is located at the intersection of two Pan-European corridors, Rhine-Main-Danube and road-railway corridor X, as well as at a distance of only 14 km from Belgrade. The current annual capacity of the terminal is 8,000 TEU with the possibility of expansion. [29]

The bottlenecks identified are the low speed on the existing railway infrastructure and the short length of the electrified line. The installed safety system has been in operation for over 40 years, which means that the devices are technologically outdated, and it is very difficult to find adequate spare parts. Due to the size of the network and the amount of necessary investment projects are listed according to their priority

SLOVAKIA

All transportation, services and dispatch for both ports is being handled by SPaP, port operator by request.

UKRAINE

Reni port

There are 6 port operators in the Reni seaport, which have the equipment necessary for unloading grain and other agricultural bulk cargo. Loading and unloading capacities in the port allow unloading 120-150 wagons per day. 3 port operators on three railway fronts are loading 50-60 wagons per day of grain. 100 wagons - in big bags are unloaded at the 2nd and 3rd fronts by three port operators, by portal cranes.

Speaking about main bottlenecks and issues with regards to Reni port railway connections it has to be mentioned that the performance of the port during the last 5 years remains unchanged. Volumes of cargo in comparison with the indicators of cargo handling of the last century are considerably reduced. One of the issues is high rail transportation tariffs to/from Reni port due to an absence of railroad access from the port to the rest of Ukrainian territory. Thus, goods are transported through the territories of Transnistria and the Republic of Moldova, which increases the rail tariff on average of $ 5 per ton.

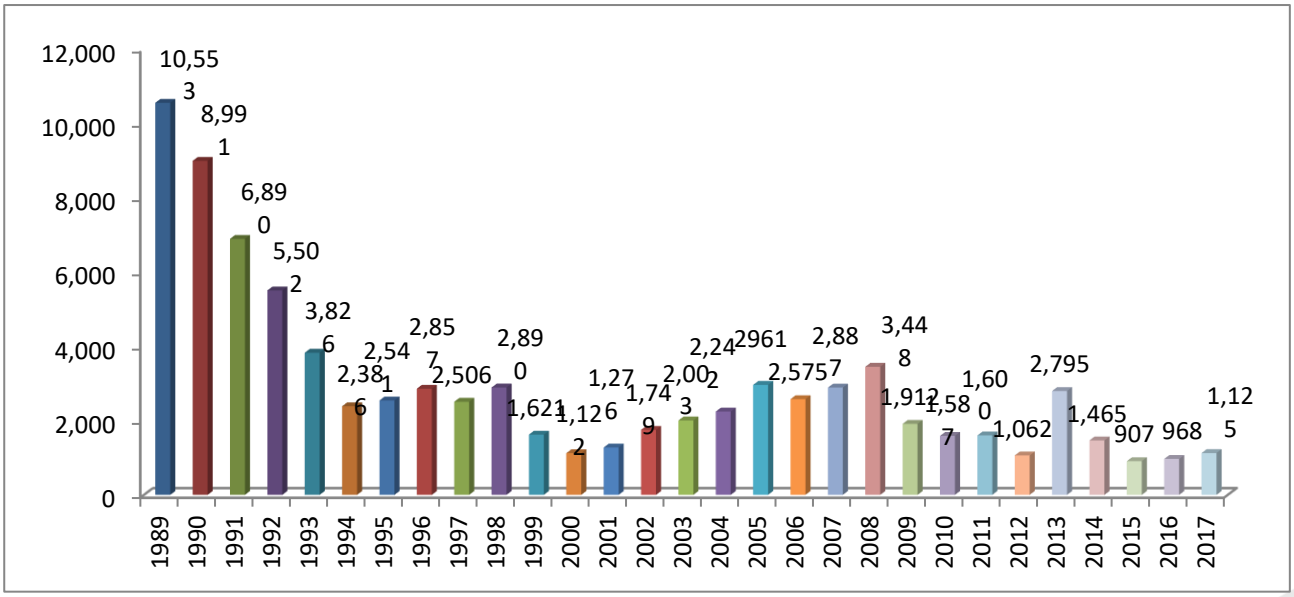
[27] Intermodalni terminal | NELT

[28] Container transport Leget (Container transport Leget)

[29] Novi intermodalni terminal na Luci Dunav u Pančevu - Dry Port Terminals - logistikaitransport.com

The railway station of the first category «Reni-Nalivna» and the station of the second category «Reni-Main» of Odessa railway service Reni Sea Port terminal operators, including SE «Reni Commercial Sea Port». At present time, there is no direct connection of the Reni station with the railway stations of the rest of Ukraine. All rail transportations are carried out through Moldavian stations of State Enterprise "Railways of Moldova", such as Novosavitcaia - Etulia, by crossings of the borders of Kuchurgan (Ukraine) - Novosavitcaia (Moldova), and Etulia (Moldova) - Frykatsei (Ukraine), as well as through unrecognized state - Transnistria. Through the border crossing of Giurgiulesti (Moldova) - Reni (Ukraine), connections are provided by Moldavian and Romanian rail. This has a significant negative impact on the tariff rates of transportation and negatively affects the volume of cargo handling in the port of Reni, namely because bad logistical connection with Ukraine. As shown in Fig. 3, the decrease in freight turnover began in the period of USSR disestablishment and during the last 30 years it has decreased by almost 90%.

Figure 42: Turnover of Reni port for the period of 1989 – 2017



Izmail port

This port is served by one railway station with three railway entrances and connections with the Izmail - Odessa railway.

The total length of the railway from Odessa to Izmail is 287 kilometres, makes it technically possible to provide an average speed, taking into account stops and restrictions, not less than 70 km/h. From Odessa to Belgorod-Dnestrovsky the track is electrified, then to Izmail the trains are driven by diesel locomotives assigned to the locomotive depot at the Odessa-Sortirovochnaya station, with undergoing maintenance in the turnaround depot at Artsyz station.

Station in Artsyz is a junction on the railway line towards Izmail. There is a locomotive depot, where mainline and shunting diesel locomotives are based, serving an almost 200-kilometer section of the non-electrified railway from Belgorod-Dnestrovsky to Izmail with a dead-end branch to Berezino. The locomotive depot serves all diesel locomotives operating on the non-electrified section between Belgorod-Dnestrovsky and Izmail. This is about 10-12 mainline diesel locomotives and about 15 of shunting ones. In Soviet times, freight trains went through the Artsiz station towards the ports of Izmail and Reni, now it is mainly intermediate in the direction of cargo transportation towards the port of Izmail. In 1997, a section of the railway between Besarabka and Berezino was dismantled, the volume of traffic dropped sharply and the local locomotive depot became only "turnover".

Currently, the station is served by only one passenger train - "Kiev - Izmail". The restoration of the railway to Besarabka will open up a number of economic and geopolitical advantages for Ukraine and Moldova. Currently disassembled line between Berezino and Besarabka is supposed to be restored. Main agricultural cargoes delivered by railroad to/from Izmail are vegetable oil, sunflower seeds, granulated, agricultural products (grain group), salt.

Port of Ust-Dunaisk

The port has no railway connection.

4.3 Conclusions on the existing rail infrastructure connections

AUSTRIA

Generally, the rail infrastructure connections within Austria, to the trade markets and along the TEN-T corridors is very well developed. The standard gauge railway infrastructure is given and the minimum line speed of 100 km/h is everywhere achieved. Austria complies fully with the required 22.5 t axle load. 70,35% of the total available lines are electrified, including the main lines along the TEN-T corridors, whereas 98,32% of all double-track rails are currently electrified. The majority of the country's network is non-compliant regarding the train length of ≥740m.[30] Austria has a well-developed network of transport hubs connecting road and rail. The connection to the 4 main intermodal ports is excellent.

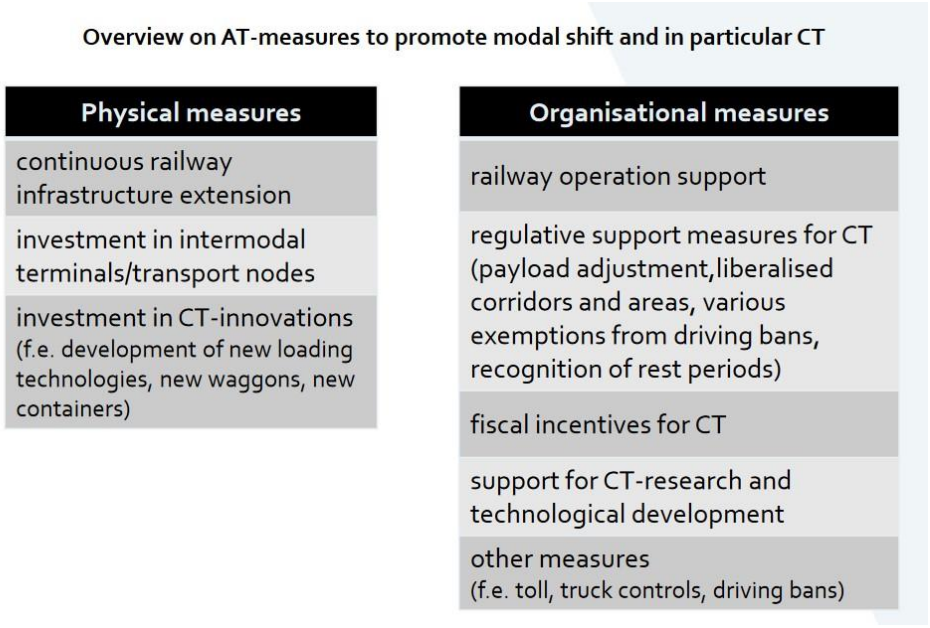
The rail connections of the four ports with their hinterland and catchment areas are also well developed with no special bottlenecks.

The rail infrastructure within the four ports ensures a good shift from rail to ship. There are rail freight stations connecting to the railway network, railtracks in block train length, optimal railway sidings and tracks for loading/unloading. Usually, more trains can be attended to in parallel, which raises the logistics efficiency. The connections to the destinations in the European north and south ports for both pre-carriage and onward are very satisfactory and subject to continuous development.

Generally, the Austrian transport policy is driven by a model shift strategy, from road to rail. By 2025, 40% of freight transport should be done by rail. One important focus is set on the harmonised deployment of ERTMS/ECTS, which is still very undeveloped. 17.5 billion euros will be allocated in the expansion and modernization of the rail infrastructure over the next six years 2021 – 2026.

[30] Review of the 2020 Work Plans of the four TEN-T corridors passing Austria

Figure 43: Measures regarding rail infrastructure to promote modal shift & CT[31]



BULGARIA

On the basis of the performed in-depth analysis of different aspects of the railway transport, gaps have been identified between the current transport needs and the existing infrastructure. There are not enough connections of seaports, inland waterway ports and airports with the national railway network, in terms of increasing the potential for the development of intermodality. Regarding the railway infrastructure, the integration of the national railway network with the European railway system is not deep enough and there is a need of bringing the technical characteristics of the main railway directions in accordance with the requirements of Art. 39 of Regulation (EU) 1315/2013. There is a significant difference between the designed and the actual operating speed on the main railways - an indicator for the real condition of the railway. The maximum allowed load for individual sections of the railway is limited to 22 t/axle. The average technical speed of the trains is one of the lowest in Europe. Even though they are projected to move at a certain speed, often there is need to decrease it significantly, in order to ensure traffic safety.

Certain conclusions can be drawn from the information presented about the railway infrastructure in the ports and the general connections to the hinterland. All available information points to a lack of

[31] Support measures for Combined Transport in Austria WP.24, Intermodal Transport and Logistics, Forum on sustainable transport connectivity 2019, https://unece.org/DAM/trans/doc/2019/wp24/IV.11_Austria_Presentation_Combined_Transport_Support_Measures_in_AT_2019.pdf

railway electrification within the port's territory. At the same time, all railway connections from the cities where the ports are, to the hinterland, are electrified. There are 54 traction substations on the territory of Bulgaria, covering and supplying electricity to 4717 of the total 6460 km of expanded railways (data for 2018).

Most of the railways within the ports are single track, but there are some sections, which consist of double tracks. The maximum length of a train entering the ports is generally defined by the length of the railway tracks and varies from port to port. There is a speed limit between 7-15 km/h for trains and railway compositions moving within the ports. The railways outside the ports, which are part of both the core and comprehensive TEN-T network, have been built many years ago and they don't allow for speeds in excess of 100 km/h to be reached. Although the tracks in the main railway network have been designed for an average speed of 108.7 km/h, it is generally not recommended for trains to reach speeds above 91.6 km/h on average, because of safety reasons.

The tracks generally follow the requirement of enduring a load of 22.5 t/axle. Some of the ports do not allow for locomotives to enter their territories - only railway wagons, which are navigated by the manoeuvring operator. The railways in the ports and their supplementing infrastructure generally are not operational 24 hours/day, but instead have set working hours.

CROATIA

Existing railroad infrastructure enables port's everyday business flow smoothly but with certain limiting factors. These factors include lack of railroad infrastructure as well as lack of modernization incentives.

Approximately 60% of cargo transshipped in port of Vukovar is being transported via railroad connections. That amount of transportation by rail corresponds to a quantity of nearly 13,000 heavy trucks per year less on the roads around city of Vukovar. Port has three of its own tracks of 420, 445 and 483 meters long. They are located beneath the cranes and allow direct transshipment from ships to train and vice versa. For the purpose of manipulation on their own tracks, the Port of Vukovar has its own shunting locomotive and own trained machine and maneuvering staff. It can be seen from the above that the railway infrastructure is crucial for the work of the Port of Vukovar. Therefore, in the reconstruction of the tracks, 2.5 million kuna has been invested in the port itself in last couple of decades, and it is planned to invest another 2.5 million kuna soon. In the project of electrification of the Vinkovci – Vukovar line. another 500 million kunas is being invested.

One has to take into consideration the fact that Vukovar's port development hugely benefits the whole country, thus major capital investments in reconstruction and electrification are planned which would in turn ensure proper conditions for significant traffic growth as well as helping the county with positioning itself as a strong logistic and multimodal hub.

HUNGARY

The table below summarizes the rail infrastructure connection of agricultural ports and their existing services on the rail.

Table 9: Rail infrastructure connection of agricultural ports and their existing services on the rail

Port	Network infrastructure	Type of rail	Electrified or not	Single or double track	Max train length	Max train load	Max speed	Restrictions
Adony Logisztikai Központ Kft.	main line: Pusztaszabolcs, station: Adony 5 tracks within the port 2*50 tons weigh bridge	industrial siding, 1,82 km	not electrified	single	30 wagons	60-65 tons / wagon	20 km / h	no public information
Centroport Kft. (Dunaújváros)	Pusztaszabolcs – Dunaújváros – Paks line 42	industrial, siding, 1,1 km	not electrified	double track under portal cranes	6-12 wagons	60-65 tons / wagon	20 km / h	6-12 wagons can be loaded at once, due to the length of tracks
SYGNUS Kikötő Kft. (Paks)	• no rail track in the port area • tracks pass the port area on the west							
Bajai OKK Kft.	line: Bátaszék – Kiskunhalas (no. 154), sidetrack no 304 sidings: I.: 275 m II.: 275 m III.: 312 m IV.: 100 m	industrial siding	not electrified	single	350 m	210 kN	20 km/h to, 5 km/h in the port	1 train allowed to / at the loading place

Source: self-edited based on hfip.h

ROMANIA

Constanta Port

Rail connections ensure the access by rail to all destinations in Romania and abroad. However, rail accessibility shall be improved as currently delays for trains accessing the port are quite high. The feasibility study on improving the railway connections and access time to the Port of Constanta is ongoing.

Once rail accessibility is improved, it is expected that traffic from road will be attracted on the hinterland connections of the port.

Galati Port

Galati port has good rail connections that make possible rail transport on standard European gauge and also on large gauge for Republic of Moldova and Ukraine. This is an advantage for rail – inland waterway transport in both directions.

The on-going project, Project Galați Multimodal Platform aims the development of a multimodal platform with a capacity of 150,000 TEU/year in the port of Bazinul Nou (from the Galati port), is being implemented with a completion deadline of 2023, the first year of operation 2024.

Currently, the port infrastructure and its facilities are in an inadequate technical state. The substantial upgrading of existing infrastructure will eliminate bottlenecks in two ways.

Firstly, the port infrastructure will be upgraded, contributing to: (1) the increase of the efficiency of handling modern ships with higher capacities and the increase of the safety and security conditions; and (2) facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauge (1435 and 1520 mm) into the terminal's operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova.

The access in the port platform is performed directly from the European road E87 (on the road) and from CFR triage through a railway line. The upgrade of the existing public road infrastructure (by building a highway passage and a roundabout) is performed in order to streamline road traffic on the E87.

The implementation of the intermodal and IT & C facilities will enhance the capacity, efficiency, safety and security of the port operations. The upgrade of the terminal will provide a sustainable alternative to the road transport between the Central Europe and the Black Sea region, especially Turkey and Greece.
Currently, most freight transport on these routes is made by road. The efficient combination of the modes of shipping, river, rail and road will open up new possibilities for the multimodal services

Considering the draught limitations, it was taken into account the optimum scenario with a ship of 300 TEU, respectively of 8,000-9,000 dwt, considering all the containers loaded at capacity (an average of 28-30 tons/TEU).

In practice, the port-container ships transport both loaded and empty containers, generating an

average of approximately 15 tons/TEU that would conduct to the possibility of the transportation of a higher number of TEUU/ship. Depending on the proportion of empty and loaded TEU, the ships that will enter within the terminal can have a transportation capacity between 300 and 500 TEU, the proportion empty/loaded being determined by the container line considering the weight and the maximum accepted draught mentioned above.

From the Traffic Study, the estimated potential is as follows:

Table 10: Estimated potential Project Galați Multimodal Platform

Potential	**2024**	**2032**	**2037**	**2042**
TEU's international OD relations	47871	144513	178429	216133
TEU's Moldavia RO, Republic of Moldavia, Ukraine (containers already from 2017)	18276	55172	68120	82515
TEU's Moldavia RO, Republic of Moldavia, Ukraine (non containers in 2017, 30% of the total in containers in the future)	11133	33608	41495	50263
Total TEU's	**77280**	**233293**	**288044**	**348911**

Giurgiu

Until about 8 years ago, a container terminal operated in the Giurgiu free zone. With the disconnection of the railway line that connects the Free Zone with the national network, the container terminal ceased its activity.

Rail connection needs to be reestablished, and rail network shall be rehabilitated in this respect, in order to make the connection to the national rail network, and to the main rail connection from Romania to Bulgaria. Enhancing the rail accessibility would have the effect of taking over freight traffic from road, in relation especially with Constanta Port.

Drobeta Turnu Severin

Drobeta Turnu Severin Eastern part of the port is connected to the national rail network. A new connection is desired for the Western part of the port in order to enhance the use of inland waterway – rail transport.

Calafat

The port has a good connection to the national rail network, however it has been understood that the connecting rail lines need to be rehabilitated.

SERBIA

The port of Bogojevo and port Bačka Palanka are not connected to the national railway network. Plans for the expansion of these two ports should include railway infrastructure, as well as their connection to the national railway network. Links could be made at the relatively close distance, in Bogojevo only 2,5km and in Backa Palanka 5km.

The port of Prahovo is connected to the national railways. There is a well-developed rail infrastructure with several industrial tracks within the port, and the whole existing complex is connected to the Serbian Railways system and the international rail network. The port is arranged with three parallel tracks, which gives the possibility of simultaneous processing of 160 wagons. Port of Prahovo has a connection with two railway sections: Crveni Krst-Zaječar-Prahovo pristanište section and Bor teretna-Prahovo pristanište section. Crveni Krst-Zaječar-Prahovo pristanište section connects port with Bulgaria, while Bor teretna-Prahovo pristanište section connects port with Belgrade and further with Hungary. Though, reconstruction of port railway tracks should be considered, alongside with the ongoing projects of revitalisation of national railway magistral sections which are accessing port

SLOVAKIA

Both port, port of Bratislava and port of Komárno were constructed to serve the purpose of hubs for intense transshipment what required sufficient connections to railway. However, decades of underfunding and only the most necessary maintenance result in the need for significant investment in order to develop ports in future. Both ports, Bratislava and Komárno are part of TEN-T Core Network, but the fact that rails inside ports are owned by private company restricts access to public / EU funding opportunities. For current level of transshipment provided, railways inside the port area serve their purpose. Increase of use of railways inside port is directly linked to:

- Container and iron transshipment in port of Bratislava
- Agricultural production transshipment in port of Komárno.

UKRAINE

Taking into account aforementioned it has to be concluded that electrification for railways is needed. Using diesel as a fuel for railway transportation makes the cost of transportation very high. It is making not only cargo, but also passenger transportation unprofitable.

The railway in the south of the Odessa region is "dead-end". It ends at the stations in Izmail and Berezino - there are no further routes. The "dead end" of the current main line to Izmail is understandable - it ends in a port city on the banks of the Danube. There is also a section of the railway near Reni, but this line runs from the border with Moldova to the border with Romania.

This is a reason for a drop in freight traffic of agricultural and other cargoes by rail. On the section between Artsyz and Izmail usually 3-4 freight trains per day follow in each direction. If to compare this with the frequency of freight transportation by rail on the main lines connecting Odessa and the neighboring ports of Chornomorsk and Yuzhnyi the difference will be clear as there are around 60-70 trains passing per day in one direction or another. Thus, an improvement of energy efficiency (electrification) of the railway in Odessa region from Belgorod-Dnestrovsky to Izmail is needed. At a significant part of the stations between Artsyz and Izmail, no work is being carried out at all or almost no work on loading or unloading wagons - and such stations are used only as siding.

The situation with the railway in Reni arose due to the passage of the railway to this largest port on the Danube, partly through the territory of Moldova - starting from the junction station Basarabeasca (Bessarabskaya), since the rails were laid there since 1877, without taking into account the future state border. As a result, the port of Reni found itself in a transport "blockade" and operates with a minimum load.

Electrification of the railway is an efficient way to solve railway problems in Ukrainian DR. This will give not only gain in the cost efficiency of transportation due to the transfer to electric traction. This will also make it possible to slightly increase the speed of the trains.

Taking into account good practice example of the expertise of the PJSC "Ukrzaliznytsia" in the implementation of projects for the electrification of railways from Dolynska to Mykolayiv and from Kovel through Izov to the border with Poland, which is supposed to be financed by European Bank of Reconstruction and Development and European Investement Bank.

The first phase of this project is the electrification of the section from Dolynska to Mykolayiv, which will provide electrification of the railway from the central and eastern industrial regions of Ukraine to the port of Mykolayiv. The second phase of the project is the electrification of the Mykolayiv - Kolosivka section, which will provide a more efficient connection between Mykolayiv and Odessa and the western regions of Ukraine through the Pomoshnaya - Balta - Podolsk branch.

The electrification of the Dolynska - Mykolayiv section, which is part of the Trans-European Transport Network (TEN-T) corridor within Ukraine, will allow PJSC "Ukrzaliznytsia" to increase its capabilities in the transportation of export cargo, such as grain, ore cargo, fuel and others, to the ports of Mykolayiv. Transportation in electrified directions will result in decrease in cost and increase in throughput, for Ukraine it means an improvement of its environmental performance, unloading and better preserving highways.

5 Existing and status of the road infrastructure connection and existing/possible services on the road

5.1 Identification and presentation of the existing road network connections to the ports

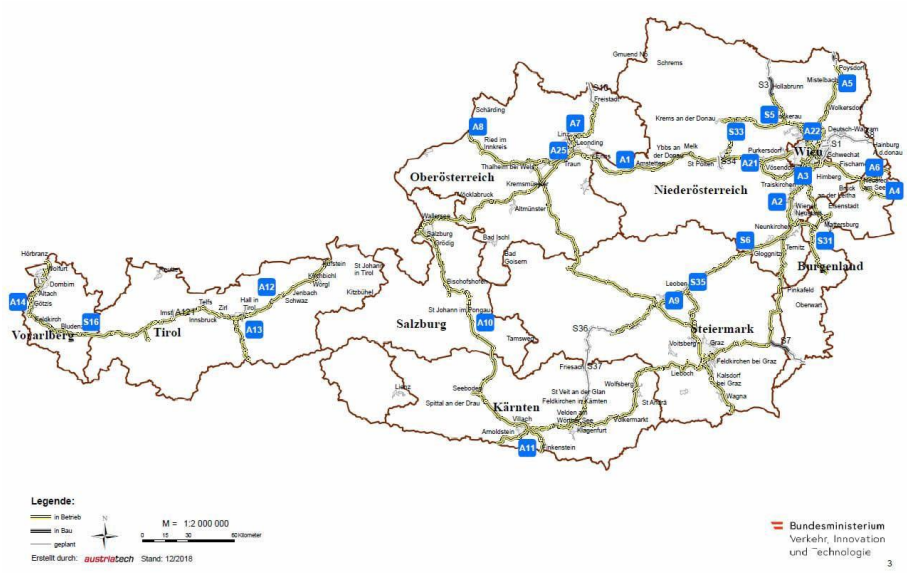
AUSTRIA

As of 2019, the total length of the national road network in Austria was of 127.497,93 kilometres. The motorway network comprises 1.748,552 kilometres, the expressway network covers 493,380 kilometres.[32]

In Austria there are currently 19 motorways (A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, A12, A13, A14, A21, A22, A23, A2 and A26) as well as 17 expressways (S1, S2, S3, S4, S5, S6, S7, S8, S10, S16, S18, S31, S33, S34, S35, S36, S37).[33]

- A1, A8, A12 and A14 are directly connected to the border to Germany;
- A2 and A13 are directly connected to the border to Italy;
- A3, A4 and S7 are directly connected to the border to Hungary;
- A6 is directly connected to the border to Slovakia;
- A5, S3 and S10 are directly connected to the border to the Czech Republic;
- A9 and A11 are directly connected to the border to Slovenia.

Figure 44: Overview of the expressway and highway network in Austria (1.12.2019)[34]



Responsible for Austria's motorways and expressways is the federal agency ASFINAG

[32] https://www.statistik.at

[33] https://www.asfinag.at/

[34] Designed by AustriaTech https://www.austriatech.at in collaboration with the Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology https://www.bmk.gv.at/

(https://www.asfinag.at). According to own company reports, ASFINAG invested 2019 around 1,2 billion euros in maintenance, construction and improvement of Austrian motorways and expressways.

An overview of the conducted works can be seen in the following graph:

Figure 45: Overview of the infrastructure investment programme of ASFINAG in 2019[35]

(grey = existing network 2019; blue = major improvements/extensions 2019;

orange = major tunnel safety projects 2019; red = new constructions and large projects 2019;yellow = new constructions and large projects to be started after 2019)

The investment programme for 2020 amounted further 1 billion euros. Around 500 million euros were used for new constructions and extensions, whereas 500 million euros were invested in maintenance works.[36] The most important ones are:

- maintenance works of the A23 in Vienna;
- construction of a third lane on the A4 (Fischamend to Bruck West);
- expansion of the Linz Voestbrücke (A7) by two bypass bridges;
- widening of the S 31 Burgenland expressway (Mattersburg to Weppersdorf);
- further construction works at the second tube for the Karawankentunnel (A11) between Austria and Slovenia;
- construction works for the new Danube bridge, the first section of the A26 Linz motorway, and for the S7 Fürstenfeld expressway (Riegersdorf to Dobersdorf).

The full list of projects to start 2021 can be found here.

[35] https://www.asfinag.at

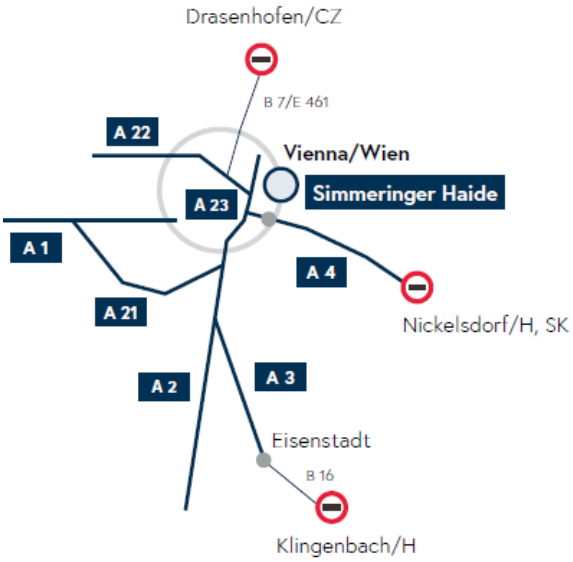
[36] Here and in following https://www.asfinag.at

Port of Vienna – Albern

As the largest trimodal hub in Austria, the Port of Vienna with its three basins connects a well-developed road network to rail and inland waterways.

The connection via road between Port of Vienna and other freight terminals includes B14 Freudenauer Hafenstraße along the port and the high level road network S1 Wiener Außenring Schnellstraße and the highway connections 3 km of A 22/A 23 Südosttangente and up to 30 km ofthe Ost Autobahn (East Highway connection) A4. There are four road entrances to the port (including a passenger terminal), with eight road lanes in total.

Figure 46: Accessibility from the road connections[37]



Road infrastructure within the port

- Parking area: for 30 trucks
- Number of loading roads: 3
- Length of loading roads: 650 m

Port of Ennshafen

The port is situated near highway A1 (5 km) and has access to high level road network B 1, B 309a, B123.

In 2019, the road infrastructure in the port area was upgraded through the general renovation of the Ennshafenstraße. At the Container terminal, investments were made in additional parking areas for containers and two new access gates for large-volume

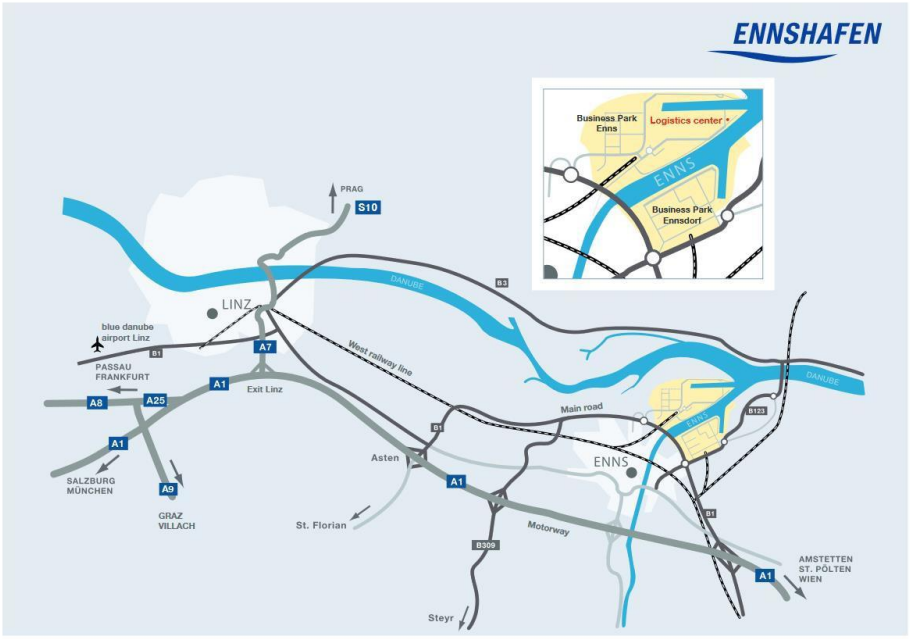
[37] Port of Vienna-Freudenau, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

trucks.[38]

Road infrastructure within the port (Container terminal)

- Number of loading roads: 1
- Length of loading roads: 750 m

Figure 47: Connection to road infrastructure of Ennshafen port[39]



Port of Krems

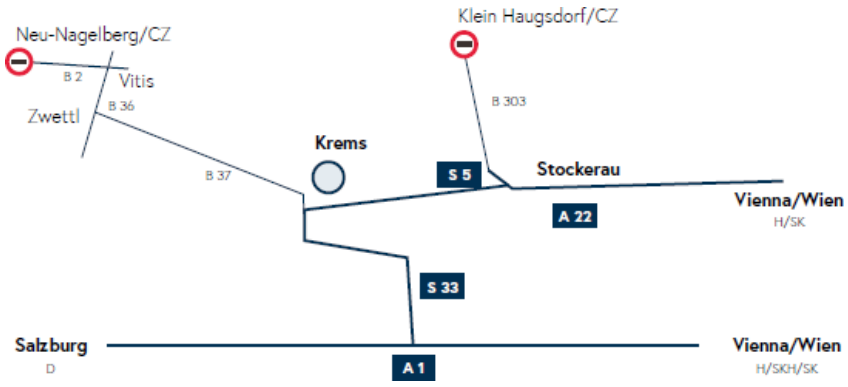
Road connections and infrastructure within the port:

- Access to high level road network: S 5, S 33
- Near highways (up to 30 km): A 22
- Parking area

[38] https://oevz.com/en/ennshafen-growing-turnover-in-all-segments-in-2019/

[39] https://www.ennshafen.at/wp-content/uploads/2019/07/Anfahrtsplan_Ennshafen_A4_englisch_neutral.pdf

Figure 48: Accessibility to port of Krems from the road connections[40]



Hub Function via road: There is a 150 km road radius for both pre-carriage and onward.

Gateway Function via road: There is a 150 km radius for both origin and destination transport.

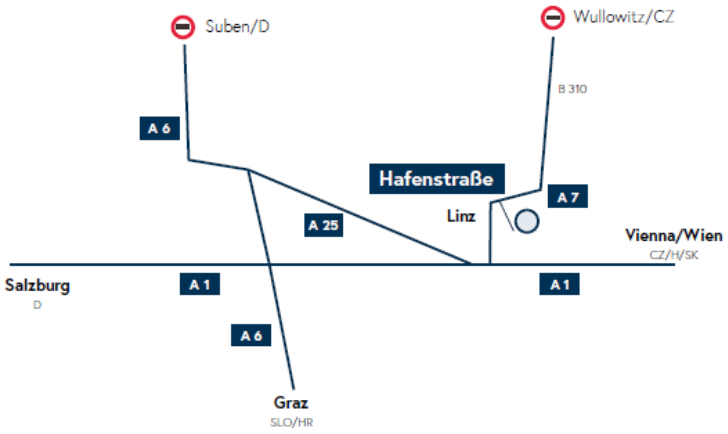
Port of Linz

Road connections and infrastructure within the port:

- Access to high level road network: B 3, B 125, B 129, B 1
- Near highways (up to 30 km): A 7 (2 km), A 1 (10 km)
- Parking area: 3 000 m^2
- Number of loading roads: 2
- Length of loading roads: 800 m

[40] Hubs in Austria - Port of Krems, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

Figure 49: Accessibility from the road connections[41]



BULGARIA

Road connectivity is the next aspect, which turns any given port to a multimodal center. Transportation of cargo by roads has some disadvantages in comparison to railway, but it also has a few advantages.

An advantage is the available infrastructure – there are simply far more roads than railways. The road network in any country is usually more developed and denser. In Bulgaria, roads have an overall length of 19 957 km, which is five times more than that of railways - 4029 km (data for 2020).

Roads in bad condition are a liability not only to the port's reputation, but they also prevent road carriers from efficiently doing their job of carrying cargo in and out of the port's territory.

The road connections between the Bulgarian ports and the national road network vary from one port to the next. Some of them are in bad condition and require renovation.

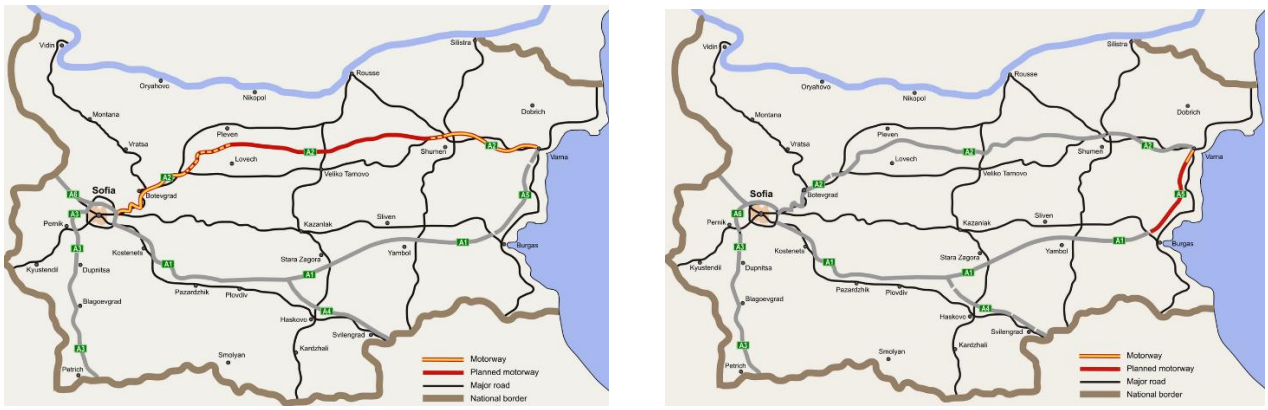
The information provided below lays out the current situation with the road connections ports have to the national road system.

Port of Varna

- **Network structure** – the Port of Varna is connected to the national road network. Port Varna East has a 6 km. long connection before reaching the Hemus motorway and a 2 km. long connection to Cherno More motorway. Port Varna West has a 5 km. long connection before reaching the Hemus motorway.

[41] Hubs in Austria: Linz Stadthafen CCT; Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

Figure 50: Hemus motorway (A2) and Cherno more motorway (A5)



Source: (https://www.wikipedia.org/)

- **Type of road** – regular asphalt-covered road
- **Number of lanes** – there is no available information regarding the number of lanes
- **Maximum speed** – the movement of road vehicles on the territory of the port cannot exceed a speed of 20 km/h and if they are passing through rails, work sites and along the quay – only 5 km/h.
- **Bottlenecks and restrictions** – parking is only allowed on specifically designated spots. It is forbidden for light vehicles to park in the zones near transshipment machines and equipment, near the quay wall and work sites. Road vehicles cannot stay overnight in the port's protected areas unless the port operator has granted them special permit, which was marked in the system for access control. Trucks cannot stay in the port's territory after they have finished with the loading/unloading activities without providing good reasoning. It is not allowed for the driver to remain in the vehicle during the execution of loading/unloading activities – he/she must be outside of the vehicle and the engine must be turned off.

Port of Burgas

The information below is related to the East-2 and West ports, whose port operator is BMF Port Burgas. There is no available data regarding the road infrastructure for port terminal East 1, whose port operator is Port Burgas EAD.

- **Network structure** – the total length of the roads on the territory of the two terminals is 6532 meters and is connected to the national road network
- **Type of road** – regular asphalted roads
- **Number of lanes** – there are both four-lane and two-lane roads on the territory of the port
- **Maximum speed** – the allowed speed within the territory of the terminals is 20 km/h, while the speed limit outside the terminals is 40 km/h.
- **Bottlenecks and restrictions** – In the case that, as a result of a conducted inspection, specialists of the port determine that the cargo vehicle is technically defective and/or does not meet the safety requirements in the port, the vehicle is not allowed to the territory of the port. In these cases, it is up to the customer to provide other vehicles (trucks), which are technically sound and compliant with the safety requirements in the port.

Port of Ruse

- **Network structure** – There are 2 road entrances to Port-East and another road entrance to the other cargo terminal from the complex – Tutrakan. The access of road transport in port terminal Ruse-East is carried out only through the checkpoint located at the eastern end. There is a specialized ro-ro terminal within Port Ruse-East, which has two parking areas with a capacity of 160 TIR. Recently, due to the low activity of the ro-ro terminal, the parking area has been used as storage for agricultural machines and equipment.
- **Type of road** – there are asphalt-covered roads on the port's territory
- **Number of lanes** – there are 2 lanes for truck traffic and 8 lanes for truck loading/unloading
- **Maximum speed** – the maximum allowed speed of cargo vehicles (mainly trucks) in the port, is 10 km/h
- **Bottlenecks and restrictions** – The lack of waiting space for vehicles forces them to occupy a large part of the road connection to the terminal and this creates serious problems. There is a plan to build such a site, where the vehicles can wait safely, without causing congestions. Trucks visiting the port for loading or discharging operations should wait at the dedicated parking area until invited to move to the cargo handling area. They are not allowed to approach the crane outreach area at the quay unless for loading or discharging operations. The drivers are not allowed to enter the truck's cabin during loading or discharging operations and they must keep a safe distance from the cargo handling area. Trucks visiting the port for customs clearance only may proceed from the check point to the customs office and vice versa and must not leave the dedicated parking area. All drivers must strictly obey the safety and security rules set by the port. Overloaded trucks exceeding the permissible gross vehicle mass (GVM) are not allowed to enter or exit the port for any purpose.

Port of Lom

- **Network structure** – The overall road length on the territory of the port is 1280 meters. Terminal Lom has two road entrances for heavy and light vehicles, while Oryahovo has only one. All roads have two lanes. The port is connected to international road E79 via a second-class road II-81 through the city of Montana.
- **Type of road** – the port has regular asphalt-covered roads
- **Number of lanes** – all roads on the port's territory consist of two lanes
- **Maximum speed** – the maximum allowed speed is limited to 7-10 km/h
- **Bottlenecks and restrictions** – port of Lom is not very well connected to the national road network. There is only one second-class road, connecting Lom to the city of Montana (and from there – to the core TEN-T network), which limits the ports connectivity to the hinterland.

Port of Vidin

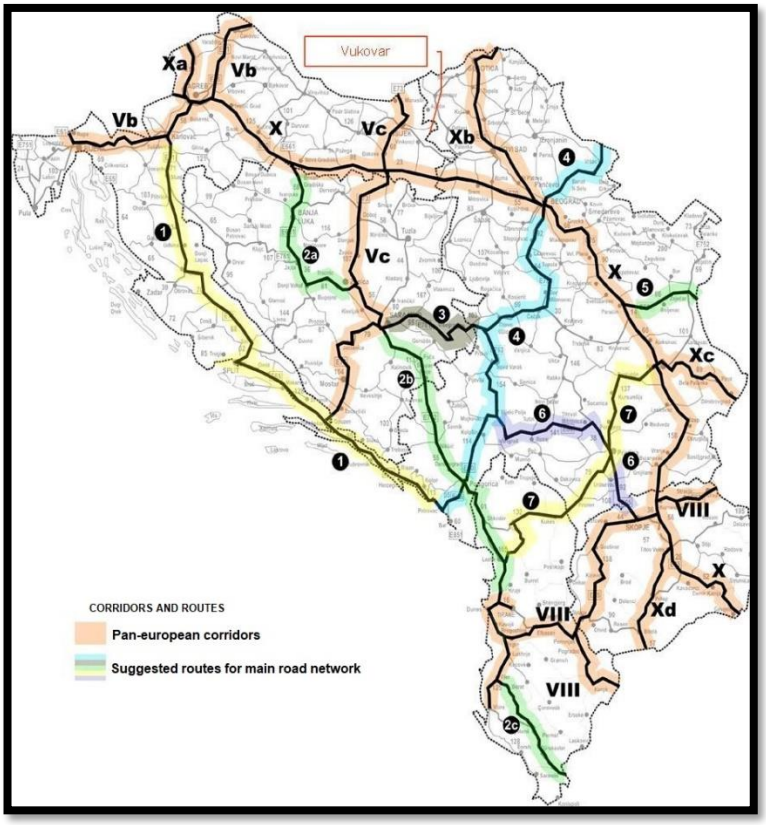
- **Network structure** – The road connection of Vidin-South to the national road network is through a deviation of the entry road into the city. Vidin-North is connected to the national road network through a deviation of international road E79, immediately before its entrance into Ferry complex – Vidin.
- **Type of road** – there is no relevant information
- **Number of lanes** - there is no relevant information
- **Maximum speed** - there is no relevant information

Bottlenecks and restrictions – the pavement on the territory of port terminal Vidin-South is old and worn out, which restricts the effectiveness of the cargo transportation in and out of the port with trucks via the road connection with the main national road network.

CROATIA

Road infrastructure was mostly developed until the Homeland War, when Vukovar-Srijem County was an important transport and logistics center. In the Vukovar – Srijem County area there are four exits of the A3 motorway (Babina Greda, Županja, Vrbanja and Lipovac).

Figure 51: Position of Vukovar in regards to main road corridors



Cities Ilok, Otok, Vinkovci, Vukovar and Županja are interconnected by state roads, while other populated places within the county are connected by local and county roads and also some of them with state roads. Due to the relocation of heavy freight traffic, faster flow of vehicles in transit and increase in traffic safety segment, bypasses are needed around the towns of Vinkovci, Vukovar and Ilok (e.g., corridor of the state road D2 passes through the center of the city of Vukovar).

The projects are currently being prepared while some of the construction projects have already started, and some sections have already been built and are in use within the operations performing on public road networks.[42] Corridor X has well-built highways. In addition, connections to the corridor X

[42] Institute for International Relations, Razvojna strategija Vukovarsko-srijemske županije, Hrast d.o.o., 2013.

are well-built federal roads, so along Corridor X one can speak of good transport network. Corridor Vc is also a motorway, so a high standard and quality is ensured here as well. The Port of Vukovar is located near the intersection of Corridor X and Corridor Vc and thus benefits from well-built road infrastructure.

HUNGARY

The closest north-west highway the presented ports are connected to is M6. It is almost parallel with the Danube. East-west road connections are provided by M8 bridge near Dunaújváros and M9 motorway between Paks and Baja. Hence, destinations from the biggest agricultural ports are the eastern and western regions of the country and neighbouring states.

Adony

Port of Adony lies 55 km to the south from Budapest, 45 km from highway M0 ring road on the right bank. The port is accessible from highway M6 and main road 6. The port has transport routes, loaders, storage areas, cargo areas, railway crossings and walkable pavements. Surfaces of roads have been provided with rainwater drainage.

Dunaújváros

The port of Dunaújváros is 3-4 km away from the M6 highway and 70 km from Budapest on the right riverbank. East-West connection is provided by M8 motorway and Danube Bridge that is 12 km away.

Paks

The port of Paks on the right riverbank is accessible on main road 6 and highway M6 reducing the distance from Budapest to one hour. Western Hungary is accessible by using the route between Dunaföldvár and Balaton. Connection to Eastern Hungary is ensured by the Danube bridges at Dunaföldvár and Szekszárd. Traffic has not been reduced much in Paks since highway M6 is open.
The connection of the existing port of Paks I to the road is ensured by a paved road. The inner, paved road of variable width is connected to a municipally operated road that is 6 meters wide and has 1-1-meter-wide sidewalks. Main road 6 lies 100 meters from the port, while M6 is 3-4 km away. Highway provides a connection to Budapest and Pécs, the capital of Baranya County.

Baja

The port of Baja is located on the left bank of the Danube, to the right from the city of Baja. The port's east-west connection is provided by main road 55, north-south connection is provided by main road 51. Main road 55 connects highway M6 in 20 km at Bátaszék, and links highway M5 at Szeged, 120 km away from Baja.
M9 motorway can be reached in 30 km on main road 51, while Budapest and the M0 motorway are 140 km away. Serbian border can be reached in 30 km on main road 51. The bypass road around the inner area of Baja connects the 51 and 55. The Danube Bridge on the main road is called Türr István Bridge. Port exploration IV. Károly quay was renovated in 2012 while Gránátos street was reconstructed in 2015.

ROMANIA

Port of Constanta

The ten gates of the Port of Constantza are very well connected with the national and European road network. The connection with the Pan-European Transport Corridor no. IV has a strategic importance, linking the Port of Constantza with the landlocked countries from Central and Eastern Europe.

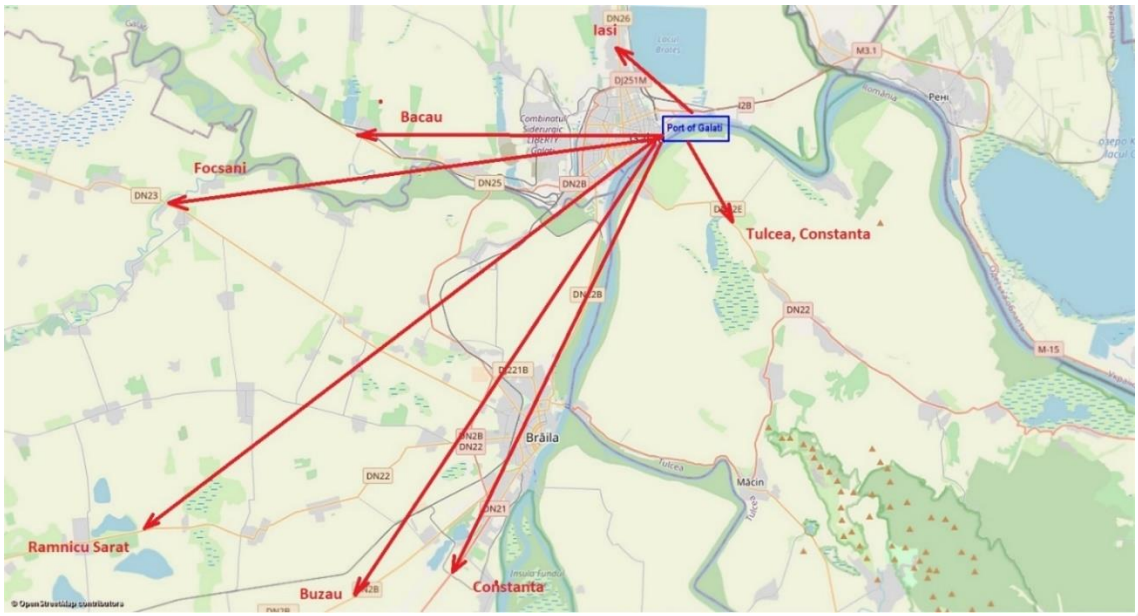
The construction of the A2 motorway between Bucharest and Constanta began in the communist era. The first section Fetesti - Cernavoda (about 18km) opened in 1987.

The total length of roads in the port amounts to 100 km. The A2 motorway, nicknamed The Sun's Motorway ("Autostrada Soarelui" in Romanian), is linking Bucharest to city port Constanta and has a lenght of 203 km.

Galati

Galati port is well connected to the national road network, with direct access on DN2B. The plot below shows the main road connections in Romania.

Figure 52: Road connections Port of Galati



The access to the Port of Constanta will be enhanced by the new bridge over the Danube in Braila, under construction.

All national roads are 2 lanes, thus the speed and capacity are under the motorway performance.

Giurgiu

Road connections of the Port pf Giurgiu are as follows:

- E 20 Bucuresti - Giurgiu - Russe
- DN 41 Giurgiu - Oltenita
- DN 5C Giurgiu - Zimnicea

Bucharest – Giurgiu road connection is a 4-lane express road, thus with a good capacity and access time.

Drobeta Turnu Severin

Road connections of Drobeta Turnu Severin port are as follows:

- DN 6 /E 94 Bucuresti - Dr.Tr.Severin (339 Km) - Timisoara (219 Km)
- DN 67 Dr.Tr.Severin - Targu Jiu (85 Km)
- DN 56A Dr.Tr.Severin - Calafat (103 Km)

All national roads are 2 lanes, thus the capacity and speed are under the motorway performance.

Calafat

The port is connected to the following national roads:

- DN 56 Calafat - Craiova (87 Km)
- DN 56A Calafat - Dr. Tr. Severin (103 Km)
- DN 55A Calafat - Bechet (95 Km)

It is mentioned that Craiova – Pitesti express road (4 lanes) is under construction, making the connection to A1 motorway Pitesti – Bucharest and further to A2 motorway Bucharest – Constanta.

SERBIA

Roads in Serbia are the backbone of its transportation system and an important part of the European road network.

Road network in Serbia has an approximate total length of 45.000 km, including approximately 800 km of highways, 5.000 km of first-level state roads, 11.000 km of second-level state roads and over 25.000 km of local roads.

On the territory Republic of Serbia there are 16.844 km of I and II category state roads:

I A category state roads (motorways) – 962 km (September 2019);

I B category state roads – 4.517 km;

II A category state roads – 7.903 km;

II B category state roads – 3.462 km.

Motorways are categorized as state roads, class IA, and are marked with one-digit numbers (the "A1", "A2", "A3"… are designations coming from "autoput", the Serbian word for motorway). Currently there are five motorways in Serbia: "A1", "A2", "A3" and "A4" – 962 km of motorways in total. Motorways in Serbia have three lanes in each direction (including the hard shoulder), signs are white-on-green, and the normal speed limit is 130 km per hour.

Over 300 kilometres of new motorways have been constructed in the last decade. In addition, there are another 260 km of expressway and motorways under construction including: A5 motorway (from

Pojate to Preljina), 30 km-long segment of A2 (between Čačak and Požega), 18 kilometres section between Kuzmin and Sremska Rača, and 21 kilometres between Ruma and Šabac. Further plans include construction of 768 km of expressway and motorways.

The following European routes pass through Serbia:

• **E65:** Rožaje (Montenegro) – Tutin – Mitrovica – Pristina – Elez Han (Kosovo) – Skopje (North Macedonia).

• **E70:** Slavonski Brod (Croatia) – Šid – Belgrade – Vršac – Timişoara (Romania).

section between Belgrade and border with Croatia is built to motorway standards.

• **E75:** Szeged (Hungary) – Subotica – Novi Sad – Beška Bridge – Belgrade – Niš – Leskovac – Vranje – Preševo – Kumanovo (North Macedonia).

section from border with Hungary to border with Northern Macedonia is built to motorway standards.

• **E80:** Rožaje (Montenegro) – Peć – Priština, Kosovo – Prokuplje – Niš – Niška Banja – Pirot – Dimitrovgrad – Sofia (Bulgaria).

section between Niš and border with Bulgaria is built to motorway standards.

• **E662:** Subotica – Sombor – Bezdan – Osijek (Croatia).

• **E761:** Sarajevo (Bosnia and Herzegovina) – Užice – Čačak – Kraljevo – Kruševac – Pojate – Paraćin – Zaječar.

section between Pojate and Paraćin is built to motorway standards and connected with E75.

• **E763:** Belgrade – Čačak – Nova Varoš – Bijelo Polje (Montenegro).

section between Belgrade and Preljina is built to motorway standards.

• **E771:** Drobeta-Turnu Severin (Romania) – Zaječar – Niš.

PE "Roads of Serbia" performs management of I and II category state roads in the Republic of Serbia. Roads are state property and therefore state roads management is an activity of general interest.

Road Corridor X

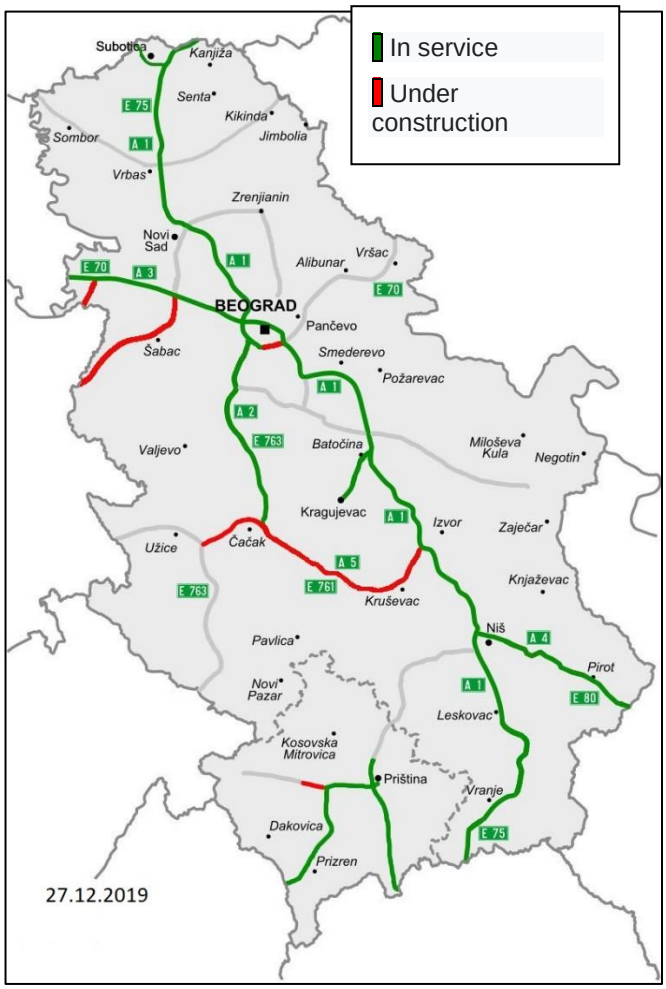
The total length of roads belonging to Corridor X running in the territory of the Republic of Serbia is 792 km.

Works on Corridor X running in the territory of the Republic Serbia are organized under 5 projects:

- Project North E-75 from border crossing Horgoš to Novi Sad, (including Y fork of 23,6 Km that runs from Kelebija towards Subotica South Loop,) of the length108 km.
- Project Main axel of Corridor X E-70 section from Belgrade –Junction Bubanj potok to border crossing with Croatia, of the length of 121,1 km. and E-75 from Belgrade –Junction Bubanj potok to Nis of the length of 237,0 km.
- Project South E-75, south fork from Nis to the border with The Republic of Macedonia, Grabovnica – Levosoje, of the length of 74 km;

- Project East E-80, from Nis to the border with The Republic of Bulgaria 86.9 km;
- Project Belgrade Bypass Ring road to detour transit traffic from Belgrade Municipal Center by connecting existing highways and highways under construction and international roads leading from Belgrade to borders with Hungary, Croatia, Montenegro, Bulgaria, Macedonia and Romania in the length of 47 km, including six interconnecting junctions.

Figure 53: Motorways network in Serbia[43]



Port of Bogojevo

The micro-location of the existing port of Bogojevo is defined by the exit to the water body of the international waterway of the Danube River, with the existing infrastructure and superstructure capacities on the mainland part of the port.

On the northeast side, the micro-location is limited by the existing state road IIA row No. 107, Sombor - Apatin - Bogojevo, while on the southeast side there is a road and next to it a railway bridge over the Danube, towards the Republic of Croatia. State road No. 107 is located on the embankment and the defensive line from the flood waters of the Danube. Right next to the road bridge is the border crossing

43 https://en.wikipedia.org/wiki/Motorways_in_Serbia

Bogojevo, with minimal capacities and facilities for control and transfer of passengers and freight vehicles. The northwest side of the site of the port of Bogojevo is limited by an uncategorized road and the border of the municipality of Odzaci with the municipality of Apatin (cadastral municipality Sonta).

The port complex is surrounded by the main road Bogojevo-Erdut in the east, regional road Bogojevo-Senta in the north and local road in the west. The port is connected with the regional road Bogojevo-Apatin-Sombor-Subotica, as well as with the section Bogojevo-Odžaci-Sombor of the main road No. 3, which passes through Serbia.

Across the road bridge the port is connected to the section of road No. 3 Erdut-Dalj-Osijek in Croatia. The main road corridor is the main road that turns from the bridge from Croatia to the narrower city zone of Bogojevo, enters the center as a city road and then exits again as a main road in the northeast direction towards Odžaci.
The port is connected with the regional road Bogojevo – Subotica-state border Kelebia. Port of Bogojevo is connected to Kelebija with road IB. Roads categorized as state roads, class IB are 4,481 km in total length and are marked with two-digit numbers. They have one lane at the each direction, signs are black-on-yellow and the normal speed limit is 80 km/h. Mentioned regional road is divided into 3 sections: Section Bogojevo-Srpski Miletić is road No. 17 (Total length of road No. 10.984 km), section Srpski Miletić-Subotica is road No. 12. (Total length of road No. 12 is 276km) and section Subotica-Kelebija is road No. 11 (Total length of road No. 11 is 23.677km).
The port is 40 km away from the E75 highway, in the direction Belgrade-Budapest.

Mid-Term Perspective Assessment

The existing port area, defined by the Regulation on the determination of the port area in Bogojevo ("Official Gazette of RS", No. 1/20), covers an area of 9.05 ha, while the development plan envisages the expansion of the port area by another 9.52 ha, which in total is 18.57 ha.
By expanding the capacity of the port in Bogojevo, it is planned to build new silos for grain and oilseeds, warehouses for mineral fertilizers and open and closed storage space for bulk cargo (gravel and sand) and piece goods. Due to the growing trend of container transport in international transport (primarily grain), it is planned to build a container terminal of smaller capacity.
Within the traffic infrastructure, the construction of industrial tracks and their connection with the public railway infrastructure is planned. Also, the construction of internal roads, manipulative surfaces and parking lots for trucks, tanks and cars is planned.
According to the development plans the existing route of the state road is retained and the new intersection is formed. New intersection means that the port connection and the service traffic network (with parking space) will be located directly next to the state road.
The new intersection (stationing km 37 + 251) is planned as a classic surface intersection with the intersection of traffic flows (type 3A - connection), with geometric design of the intersection in accordance with applicable standards and regulations governing the subject matter. The existing intersection (stationing km 37 + 559) is retained / redefined as a crossroads - surface intersection with intersection of traffic flows (type 3A - connection) as an entrance / exit, with the possibility of changing the type of intersection during the implementation of phase II - final planning solution), and the realization of which is conditioned by the changes in the planning documentation, which defines the traffic solution of Master Plan Bogojevo, in accordance with the valid technical regulations and standards.

Port of Bačka Palanka

The port of Bačka Palanka is 30 km away from the E70 highway, direction Belgrade-Zagreb, and 45 km from the E75 highway, direction Belgrade-Budapest. The route of the E70 highway is Slavonski Brod (Croatia) - Šid - Belgrade - Vrsac - Timisoara (Romania) and route of the E75 highway is Szeged (Hungary) – Subotica – Novi Sad – Beška Bridge – Belgrade – Nis – Leskovac – Vranje – Preševo – Kumanovo (North Macedonia).

There are two state roads near the Port of Bačka Palanka of IB class which extend to the borders of Bosnia and Herzegovina and Romania: state road No. 19 connecting Port Bačka Palanka with Bosnia and Herzegovina at Sremska Rača (Neštin-Erdevik-Kuzmin-Sremska Raca) and state road No. 12 connecting Port Bačka Palanka with Romania (Subotica - Sombor - Odžaci - Bačka Palanka - Novi Sad - Zrenjanin - Zitiste - Nova Crnja - state border with Romania –border crossing Srpska Crnja). The port of Bačka Palanka is connected to Romania (border Srpska Crnja) with road No. 12 and belongs to IB.

Section Bačka Palanka – Neštin (State Road No. 12) is unconstructed, while Neštin – Erdevik section is planned to be fully constructed – currently there are 7.262 km of unconstructed part of this section.

Also, one road No. 108 is connecting Port of Bačka Palanka with Croatia: - Bačka Topola - Kula - Despotovo - Silbas - Gajdobra - Bačka Palanka – state border with Croatia (border crossing Backa Palanka). This road belongs to IIA State roads, class IIA, which are marked with three-digit numbers, with the first digit being 1 or 2. The total length of these roads is 7781 km. Allowed axle load for trucks it is not conditioned based on the road category but based on the number of axles on truck. For trucks with one axle it is allowed to load 10 tonnes, for trucks with 2 axles 9 tonnes, due to that the allowed axle load is the same on roads IIA and IB.

An important direction of regional and inter-municipal connection on the territory of the municipality of Bačka Palanka (to which Port of Bačka Palanka belongs) are also state roads of the IIB class order:

- No. 306: Gajdobra - Čelarevo (state road of IIB class with label 306).
- other roads of IIB class with the following directions:
- Bačko Novo Selo - Bac - Ratkovo - Silbas - Bački Petrovac- Novi Sad (No. 111);
- Odžaci - Pivnice - Despotovo - Zmajevo - Sirig - Temerin – Žabalj (No. 112);
- (Croatian border) - Neštin - Susek - Beočin - Novi Sad (No. 119).

The existing crossing of road/railway infrastructure (bridge) with the corridor of the waterway E80 - Danube near Port of Bačka Palanka is the crossing Bačka Palanka -Ilok which is defined at km 1,297.

Mid-Term Perspective Assessment

The port of Bačka Palanka has a favourable spatial micro-location because it is directly connected to Corridor 10, i.e. with relevant traffic corridors in the vicinity of the E-75 highway (30-40km) and the E-70 highway (35km).

The port of Bačka Palanka is located in the south-eastern working zone within block 106 and it is currently connected to the environment via an access road - a collection road in the industrial zone. This traffic capacity connects port area with the state road of 2 rows - the main road Bačka Palanka - Novi Sad, which enables spatial connections with the environment and connects the port to network of roads of different hierarchical levels in Vojvodina. This access road, with its constant construction,

enables accessibility to all road transport structures, and in the future, it will be in the same function of accumulating its internal traffic in this area.

Port of Prahovo

Prahovo is connected by about 50 km of road to Vidin in Bulgaria, and Calafat in Romania, both of which are important road and rail hubs on European Corridor 4.
A 150km highway also connects it to European Corridor 10, which links Serbia to other European countries.
State road of class IIB No. 400 connects Port of Prahovo with the State road 35 - Dušanovac - Border with Romania near Kusjak.

Mid-Term Perspective Assessment

The concept of traffic separation at the location of the Port of Prahovo is based on the permanent route of the State Road IIB-400, Negotin - Radujevac - Prahovo - Samarinovac.
Two connections of the port road to the state road are planned. In accordance with the plans, the existing main access road will represent one connection, while the other connection is planned at the beginning of the second access road, at km 16 + 689.00 (on the right side in the direction of stationary growth) of the state road IIB order number 400.
The planned concept of road and network in the port area is based on the following principles:

- reconstruction along the existing routes of roads and street routes on the primary network, which will enable greater functionality of the primary network;
- fitting the traffic matrix into the spatial development of urban zones and wholes, i.e. the planned purpose of the areas;

planning of leveled intersections of road and railway traffic.

SLOVAKIA

Port of Bratislava

In the Winter port, asphalt and concrete road communications were built in 1965-1973. In Pálenisko basin, road communications were continuously built between 1983-1984 and 1990-1993. The current shape of road traffic is inadequate, since premise did not generate sufficient funds for the owner and maintenance was performed only in necessary / emergency cases. Maximum speed inside the port is limited to 30 km/h.

Figure 54: Port Communication in Winter port (port of Bratislava)

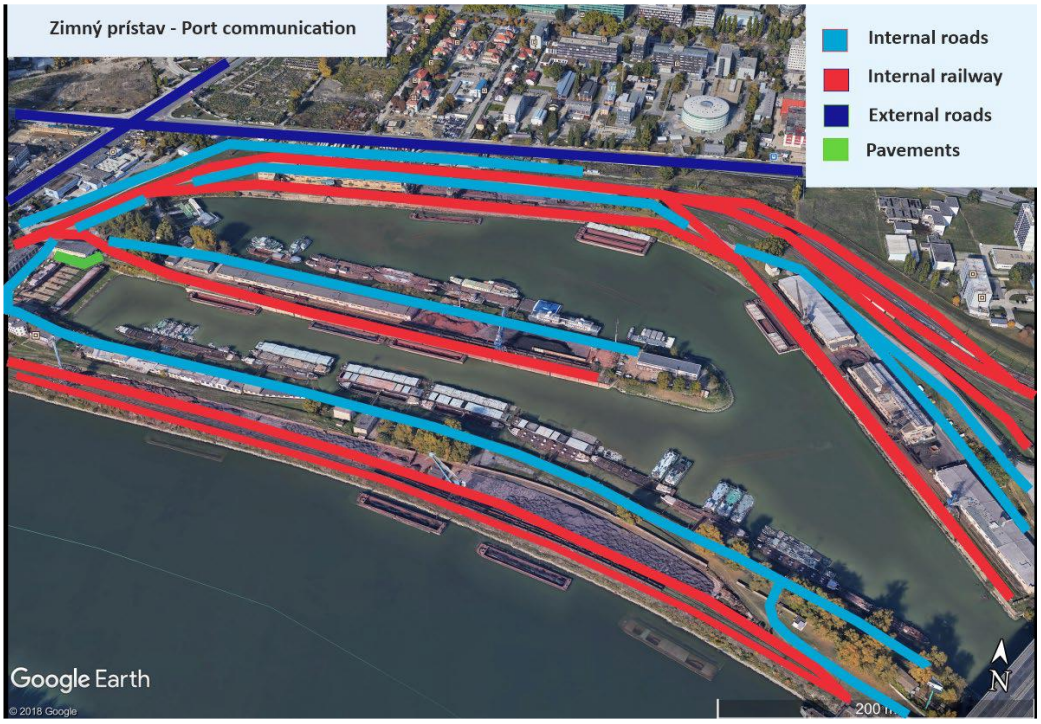


Figure 55: Port Communication in Pálenisko basin (port of Bratislava)

Figure 56: Road Infrastructure Capacity for Bulk Cargo (port of Bratislava)

Parameter	Description	Value	Units
NV	Maximum number of trucks per day	120	No.
TL	Maximum permissible mass of the combination (track and semi-trailer)	40	t
WD	Number of working days per year	300	days
Annual road capacity	NV x TL x WD	1 440 000	t/years

Figure 57: Road Infrastructure Capacity for Containers (port of Bratislava)

Parameter	Description	Value	Units
NV	Maximum number of trucks per day	120	No.
TL	Maximum load per truck	2	TEU
WD	Number of working days per year	300	days
Annual road capacity	TEUs = NV x TL x WD	72 000	TEUs/year

Port of Komárno

Komárno is located on the intersection of the I/63 and I/64 roads of class I., enabling the connection of the district City of Komárno with the regional City of Nitra (road I/64), the capital city of SR Bratislava (I/63), and creating a connection to Hungary onto the M1 road (approx. 10 km from the City of Komárno). The rest of the network in the addressed territory constitutes of class II. and class III.

roads and local thoroughfares. Directly in the City of Komárno, there is the Komárno – Komárom road border crossing point on road I/64. Operation on the crossing point is continuous. The border crossing point is between the states of Slovakia and Hungary, which belong into the Schengen Area, thereby setting the operation mode. Freight transport over the bridge across the Danube River is limited to 20 tonnes. Freight transport across the River Vah is limited to 25 tons. Maximum speed inside the port is limited to 30 km/h.

Transport connection of the City of Komárno with the rest of the territory of SR and the neighbouring states is secured by routes:

- In the east–west direction, it is route I/63 in the route of Bratislava – Komárno – Štúrovo, state border. Route I/63 in the stretch of Bratislava – Veľký Meder is part of the E575 European route, which starts in Bratislava, ends in Győr, and is approx. 100 kilometers long. Within Slovakia, it starts in Bratislava at the D1 crossroads (E 58, E 75, and E 571) with road no. 63 of class I. and continues through the cities of Šamorín, Dunajská Streda, and Veľký Meder, and from thereon along route I/13 to the Medveďov border crossing point. Route I/63 as E 575 does not go through the City of Komárno.
- In the north–south direction, it is route I/64 in the route of the state border of SR/HR – Komárno – Nové Zámky – Nitra – Topoľčany – borders of NR/TN (Nitra region and Trenčín region), with connection to the D1 motorway.
- In the western part of the city, route II/573 of class II disconnects from route I/63 and connects to route II/563 in Kolárovo.
- On the outskirts of the City of Komárno, there are two routes of class III. Road III/1462 of class III and road III/1463 of class III.

Figure 58: Road Capacity (port of Komárno)

Parameter	Description	Value	Units	Remarks
NV	Maximum number of trucks per day	60	number	*This should be based on operators' experience. It depends on the appointment system for trucks, waiting time, loading/unloading time etc.*
TL	Maximum load per truck	40	t	
WD	Number of working days per year	212,5	days	
Annual road capacity	Cap. = NV x TL x WD	510 000	t/year	

The Road Inspectorate issued a heavy trucks ban in the residential area for heavy goods vehicles over 3.5 tons, in the neighborhood of which the Komárno cargo-freight port is located. On the basis of the stated ban, access to the western pool by heavy goods vehicles is diverted to a detour route around the residential area. Also, transshipment activity has been stopped in the evenings and at night and during public holidays due to noise and dustiness. A disadvantage of the port is its narrow and long territory of the port without possibilities for further development due to the close proximity to the already mentioned residential area, and the slanted, or semi-slanted riverside wall, which forces vessels to be moored at a greater distance from the bank at low water levels of the Danube.

UKRAINE

Information is based on the research conducted for D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo.

Reni, Izmail and Ust-Dunaisk ports

- Network structure: The major road of Ukrainian part of the DR is M-15: Odessa – Izmail - Reni Road (to Bucharest). It coincides with part of the European route E87 (Odessa - Constanta - Izmir - Antalya), part of the European corridor "Black Sea Economic Community". M-15 highway passes along the Reni port, about 2 km from the port of Izmail and from Ukrainian terminal of Orlovka – Isaccea international ferry crossing. (D_T2.2.1)
- Type of road: asphalt-concrete highway
- Number of lanes: 4
- Maximum speed:110 km/h
- Axle load for trucks allowed 10 t/axle
- Bottlenecks: no direct road connection with Romania and Bulgaria

Restrictions: : in order to reduce the destruction of asphalt roads, there are restrictions on the movement of heavy vehicles with a total weight of more than 24 tons and an axle load of more than 7 tons (except for vehicles carrying dangerous, perishable goods, live animals and poultry, as well as transportation related to the prevention or elimination of the consequences of emergencies), with an air temperature reaching more than + 28C, guided by the requirements of the Laws of Ukraine "On Road Traffic", and the Resolution of the Cabinet of Ministers of Ukraine dated 27.06.2007 № 879 "On measures to preserve public roads".

5.2 Identification and presentation of the existing/possible road services:

AUSTRIA

Port of Vienna - Albern

At the Container Terminal of the Port of Vienna there is a Terminal Operating Management System (TOM) which raises the efficiency of truck handling. The numbers of the loading units or license plates of the trucks are initially registered by means of an OCR photo (optical character recognition) when entering the terminal and automatically compared with the customer data already stored by means of system interfaces (operations management handling system and gate operating system).[44]

A specially developed application enables trucks and loads to be notified in advance - directly by the freight forwarder or the operator. The loading units are checked at one of four check-in lanes, the driver can log into the self-check-in kiosk and is automatically assigned to the respective truck stop. The self-check-in can be operated directly by the driver in nine different languages. The newly introduced ILU codes can also be processed. In the two exit areas in Terminal 1, Terminal 2 and Terminal 3, the exiting trucks are digitally photographed using the latest line scan cameras and compared with the stored system data using OCR. An extension is only possible if the data match exactly.

Figure 59: Foto-IN-Gate-Entry at the container terminal of the Port of Vienna[45]

Container trucking at the Port of Vienna is done by TerminalSped. Chassis types: Standard 20 'and 40', chassis for high cube containers, multifunctional chassis and pull-out units for transporting 20'- 30'- 45 ', short chassis for 20-foot containers and city traffic.[46]
TerminalSped offers Europe-wide truck transports. The services include part and full loads from and to Austria and Europe and "first and last mile" processing.
The bulk goods transports (e.g. animal meal, various metals such as aluminum and copper, fertilizer,

[44] https://blogistic.net/hafen-wien-wien-staerkt-drehscheibe-weiter/

[45] https://www.hafen-wien.com/de-at/home/aktuell/news/142/Hafen-Wien-Tochter-WienCont-staerkt-sich-in-der-LKW-Abfertigung

[46] https://www.hafen-wien.com/de/home/logistik-lager/transport

waste paper, etc.) are handled by the service provider TSped BULK. The operator uses 100 moving floor trucks and 10 tipper trucks for road transportation all over Europe, mainly in France, Italy, Germany, and the Benelux countries. The customer receives the truck at any loading point in Europe within two days. Each dispatcher speaks at least three different languages.

Port of Ennshafen

In year 2019, the road infrastructure was upgraded with the general renovation of the Ennshafenstrasse. This included the expansion of the power supply and the fundamental renewal of the road surface and two new access gates for trucks with large volumes.[47]

The resident companies also make considerable investments. In year 2019, Danubia Speichererei has implemented innovations in the access and stopping area for trucks. Thanks to optimized logistics processes, all vehicles are processed much faster and more efficiently.
Fixkraft Futtermittel built a second factory access road including weighbridge and a truck wash and modernised the production facilities. Rauch Recycling created two new handling halls.[48]

Many companies have taken measures for clean logistics and renewable energy; from the construction of photovoltaic systems to the use of LNG-powered trucks and facilities for electromobility.
Further service at the Ennshafen Container terminal is the fully digitized truck handling. Thanks to the touch free truck gate processing, the delivery of an empty container and collection of a full container is done within within less than 20 minutes per vehicle and one of the best turnaround times in Austria.´ In addition to the new gate system, the process makes possible an extension of the truck acceptance times to 6:30 p.m.[49]

Port of Krems

Road-related services offered at the Port Krems to freight forwarders are generous capacities, truck scales, customs office and a petrol station.

[47] https://www.ennshafen.at/2019-brachte-ein-plus-in-allen-bereichen/

[48] https://oevz.com/en/ennshafen-growing-turnover-in-all-segments-in-2019/

[49] https://www.ct-enns.at/de/cte-leistungen/lkw-abwicklung-gateprozesse-touch-free/

Figure 60: Petrol station for trucks at the Port Krems[50]

Port Linz

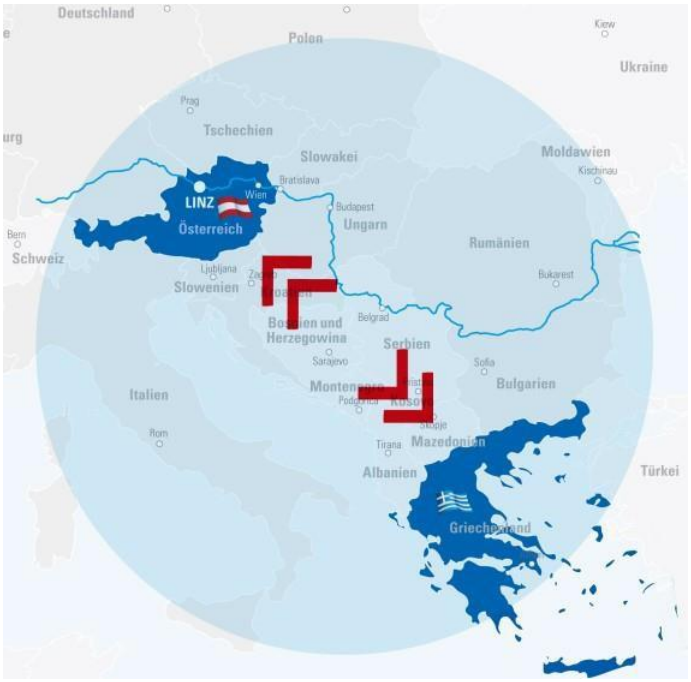
Transport logistics at the Port of Linz are done by Österreichische Donaulager GmbH. Tramsport is done in whole Europe as combined shipments, less-than-truckload, and full truckload shipments. The truck fleet feature GPS-tracking and handheld terminals as well as ADR equipment. The fleet consists of trucks with hoisting platform, swap-body trucks with hoisting platform and semi-trailer (partition wall, two evaporators and double-decker design). The reefer semi-trailers meet the standards of the pharmaceutical industry.[51]

Further value-added services include day and night shipments from Linz to Greece and back, regular and temperature-controlled transport of hazardous substances according to ADR regulations, inbound logistics, track & trace on the Internet, monitoring and alarm systems, licenses for feed transport, deviation management, emergency management, time slot management and empty packaging logistics.

[50] https://www.rhenus-hafenkrems.com/standort/trimodale-anbindung/

[51] https://www.donaulager.at/en/donaulager/transportlogistik/transportlogistik.html

Figure 61: Transport destinations by truck/road from Port of Linz[52]



BULGARIA

Port of Varna

Goods transported by trucks and other cargo vehicles in Port of Varna can vary. The main types of goods are FAME (vegetable oils and animal fats), dry bulk cargo – cereals (wheat, sunflower, corn rapeseed etc.), coal, packaged and liquid fertilizers, general cargo - metals (including metal scrap), clay, foodstuffs and many more.

Since the port is the biggest one in Bulgaria, many vehicles drive cargo in and out of it every day, although a number for the daily vehicle visits in the port cannot be provided.

In terms of bottlenecks, parts of the road infrastructure within the port terminals is quite old and is in need of maintenance. If the road surface is not renovated, that might drive away potential clients, who can boost the cargo turnover through Port of Varna.

Port of Burgas

The type of goods, transported via trucks within the port territory are agricultural production (mainly cereals), metals, inert materials, industrial materials and equipment.
Trucks come in and depart out of the port on a daily basis.
The transport time of vehicles arriving to/departing from the port is different depending on the destination. Companies from all over the country are clients of the Port of Burgas, therefore there are regular to and from the cities, where these companies are. The main clients are situated in the cities of

[52] https://www.donaulager.at/en/donaulager/transportlogistik/transportlogistik.html

Pirdop (300 km from Burgas), Sofia (380 km), Varna (130 km), as well as many companies from Burgas and the surrounding area.
The quantity of vehicles (mainly trucks), arriving at the port daily, varies.
The main types of trucks, which are used for transportation of cargo to and from the port, are trucks with opened and closed trailer (depending on the cargo).

Port of Ruse

Cargo arrives and departs from the port on a daily basis. The main types of goods, which are processed at the ports and transported by trucks are:

- dry bulk cargo – cereals, fodder, fertilizers, inert materials and coke.

For 2020, dry bulk cargo formed approximately 65% of the total cargo turnover in Port of Ruse (70% for 2019). In absolute quantity, the processed dry bulk cargo was 341 228 tons for 2020, a slight increase over the previous year (339 701 tons).
The biggest decrease in terms of volume is for chemicals and fertilizers – 43% less than 2019, as well as coke – 42% less than the previous year. At the same time, coals have increased by 12% and inert materials (clay, kaolin, quartz sand) – by 42%.

- general cargo – metals, packaged chemicals and fertilizers, machines and equipment. In total, there were 180 000 tons of general cargo processed by Port of Ruse, a 24% increase from 2019. Metals have increased by only 3%. The packaged fertilizers and chemicals, as well as machines and equipment have generally kept the same quantities from 2019.

Port of Lom

The types of goods, which are transported by road vehicles in and out of the port, are dry bulk cargo (coal, ore, concentrates, synthetic fertilizers, as well as cereals such as wheat, barley and corn) and general cargo (rolled metal sheets, cargo in big bags, palletized cargo etc.).

Heavy cargo vehicles, such as trucks, arrive at the port on a daily basis. They can be both trucks with open or closed trailer. The transport time of vehicles arriving to/departing from the port is different, depending on the destination. However, the destinations (and therefore – transport time) are unknown, since there is not publicly available information about the main clients of the port.

Port of Vidin

Port of Vidin handles general and dry bulk cargo, which is transported by trucks in and out of the port's territory on a daily basis. The main types of cargo, handled at the port, are cereals and fodder (corn, wheat, barley, oats, rapeseed etc.), fertilizers, coal, inert materials (sand, kaolin, fire clay, coke etc.), as well as general cargo (single, bundled, palletized etc.).

There is a general lack of information when it comes to the processed quantities and main destinations of the cargo, which passes through the port.

The main constraints, when it comes to the road network infrastructure, is the inadequate capacity of the port. The pavement within the port is old and there is not enough parking capacity.

There is a Plan for the general development of Port Vidin South, drafted in 2020, which could address some of these constraints and make the port more attractive for potential cargo carriers and other clients. The plan envisages a renewal of the road surface on the territory of the port. In addition, new parking will be built in order to increase the capacity for trucks.

CROATIA

There are good transport connections with the neighboring countries of Bosnia and Herzegovina, Hungary and Serbia. Vukovar is 16 km away from the town of Vinkovci which is the largest railway hub in Croatia. It is well connected by the state road D55 via Vinkovci with the 39 km distant junction Županja on the highway A3 Zagreb-Lipovac. It is connected to Osijek, 33 km away, by the state road D2, via which Vukovar is connected to the Vc corridor (A6 motorway).

The position of Vukovar will become even more favorable with the implementation of regional spatial plans that include investments in regional transport infrastructure. Construction of a four-lane Vukovar bypass as part of a multimodal junction (railway-road-river), construction of expressways that will connect Vukovar with corridors X and Vc on the one hand, and with border crossings on these corridors on the other.

The city's location is extremely favorable for access to other markets within Central and South-Eastern Europe because it is located on or near the following trans-European corridors:

- Pan-European Transport Corridor VII - Danube River (Vukovar Port)
- Osijek International Airport → 16 km away
- Pan-European Transport Corridor X - railway → 14 km from Vinkovci junction (largest regional railway junction)
- A3 motorway (Croatia) → 42 km away
- European route E73 - railway and motorway A5 → 31 km away.

HUNGARY

Road vehicles arrive from main road 6 to the parking lot of the storage base. Traffic management registers the arriving cargo data. Goods are transferred to the vessels on a conveyor belt after sampling.

Goods are transported directly from road vehicles to the railway wagon, or to the transit warehouse from where they reach the grain wagons on a conveyor belt. Covered loading is also available in case of rainy weather.

From barges to road, goods are picked up by a grabber and directly transported by road. In the absence of road transport, the goods are transported to storage in order to continuously empty the ship. The road transport capacity is 7,500 tons daily. Port site area is 76,000 m2, covered with asphalt, suitable for truck traffic, parking and stationing.

Dunaújváros

Weight limit for trucks in Dunaújváros is the same in the port as on public roads i.e., 25 tons.

Type of trucks has changed a lot in the last 20 years. 20 years ago, trailers, tipping trucks were widespread. Since then, kippers have taken their places, as these trucks can handle 10-15% more with the same axle load.

This change in the field of trucks have had a big impact on port facilities and technologies adapted. Facilities for receiving bulk cargo have been developed to kippers, that can lift up to a level of a two-story house.

Paks

There is no direct rail connection within the port area, tracks pass the port. Road vehicles, trucks ensure transhipment between rail and water.

Baja

Main road 55 has a Danube Bridge called Türr István Bridge, which provides a railway connection too. There is a speed limit of 50 km/h on the road, no weight limit and total weight limit. Exploration of the port is provided by IV. Károly quay and Gránátos street.

In the area of the port, trucks wait in parallel parking lots built along the roads or in case of heavy traffic, by occupying a lane on the road.

Due to the water-road and road-water transhipments at the loading site, daily average vehicle traffic gives 32,000 trucks per year.

ROMANIA

All types of trucks have access to the analysed ports. The services depend on the demand.

SERBIA

According to the Statistical Office of the Republic of Serbia, in 2019, 15.8 million tons of goods were transported on Serbian road network, totaling more than 8.17 billion ton-kilometers.

Table 11 shows the volume of goods transported in the period 2019-2020, broken down by type of traffic.

Table 11: Serbian road freight market, key performance indicators, 2019-2020 [53]

	2019	2020	2020/2019
Transported goods, thousand tons	**15858**	**15638**	**98.6**
Domestic transport	8838	8876	100.4
Export	3212	3037	94.6
Import	3299	3155	95.6
Road cabotage transport	510	570	111.8
Of which: transit	89	126	141.6
Ton kilometres, million	**8175**	**7741**	**94.7**
Domestic transport	1282	1239	96.6
Export	3260	3067	94.1
Import	3227	2998	92.9
Road cabotage transport	406	437	107.6
Of which: transit	30	35	116.7

The total volume of goods carried in road transport in 2020 was less than it was in 2019 by 1.4%, while the volume of performance in t-km went down by 5.3%.

Major bottlenecks along main international routes are the BCPs, where the delays there represent substantial percentage of the total travel time. There are several ongoing projects for the expanding of border crossings for road transportation which are identified as bottlenecks

SLOVAKIA

Port of Bratislava

Port is open Monday to Friday from 8:00 to 17:00. Based on the analysed information, the 9 wide segments have been identified, according to the character of commodities, which were subsequently grouped into 3 fields by transhipments technology types.

9 identified segments:

- agriculture,

[53] http://publikacije.stat.gov.rs/

- metallurgy and steel industry2,
- chemistry and plastics, oil products
- automotive industry and mechanical engineering,
- wood,
- secondary raw materials,
- mineral resources (salt separately),
- containers,
- construction and civil engineering.

These segments were subsequently grouped according to the already mentioned transhipments technology, in the following way:

- Dry-Bulk materials – agriculture, fertilizers, salt, metallurgy and steel industry (iron ore pellets), mineral resources (mainly sinter ore), secondary raw materials,
- Liquid materials – oil products,
- Break-Bulk products – machines and automobiles, containers, civil engineering, wood, metallurgy, and steel industry (steel coils).

Port of Komárno

Based on the analysed information, 9 wide segments have been identified, according to the character of commodities, which were subsequently grouped into 4 fields by transhipments technology types.

9 following identified segments:

- agriculture,
- metallurgy and steel industry,
- chemistry and plastics,
- automobile industry and mechanical engineering,
- wood,
- secondary raw materials,
- mineral resources (salt separately),
- containers,
- construction and civil engineering.

These segments were subsequently grouped according to the already mentioned transshipment technology, in the following way:

- loose material – agriculture,
- granular material – synthetic fertilisers, salt, iron pellets,
- bulk material – wood, metallurgy and steel industry, mineral resources, building constructions, secondary raw materials (recyclable waste and mixed ordinary waste),
- piece material – machines and automobiles, containers.

All transportation, services and dispatch for both ports is being handled by SPaP, port operator by request.

UKRAINE

Ukrainian ports of the DR are connected by highways adjoined to the international highway M-15 "Odessa- Izmail – Reni - Bucharest". M-15 is in good technical condition and requires only general maintenance. The E-58 highway passes through Ukraine, around the Black Sea and further to Russia.

The M-15 highway has a strategic importance for the economic development of the South of Ukraine, it connects 5 ports on the Black Sea and serves as a transport corridor for heavy duty trucks heading to the Giurgiulesti international border crossing point. M- 15 highway was restored during 2016-2018. M-15 highway Odessa - Reni located in the Odessa region (partially passes through the village of Palanca in the Republic of Moldova). Highway begins in Odessa, passes through the village Palanka in Moldova (but the road is owned by Ukraine), Monashi, Sarata, Tatarbunary, Izmail Reni (former highway P33) and ends at the Reni checkpoint, which leads to Constanta in Romania. The length of the Odessa - Reni (Bucharest) highway - 289.4 km.
In the port of Ust Dunaisk, cargo is not transported by road, but only by water transport.

5.3 Conclusions on the existing road infrastructure connections

AUSTRIA

Austria features an excellent transport infrastructure network with intermodal terminals which ensure the optimal combination of road, rail and waterway traffic. There are 2.242 km (as of 31.12.2019) of motorways and expressways available for road transport/traffic. Road infrastructure along the TEN-T corridors is mostly compliant to all KPI's. Non-compliant sections are minor and only found in the Austrian-Czech cross border area. Some capacity bottlenecks exist mostly in western parts of the Rhine-Danube Corridor, in sub-urban areas of main nodes and big cities.

The road connection to the four main ports from the hinterland and catchment areas is very good. The ports can be easily reached by motorways, expressways, and federal highways. Generally, theaim is to develop transshipment facilities for combined transport and railway connections designed to support the modal shift of freight from road to rail and water.

The road infrastructure within the ports, as well as the related road services - to the extent information was available – ensures a good transport, loading and unloading flow and efficient logistics. There is a focus set on the digitalisation of the processes, clean logistics and renewable energies. The businesses located on the premises of the ports invest regularly in the modernisation and renewal of the road infrastructure, developing new services (e.g. truck and trailer washings facilities, access gates, digitized truck handling, investments in the truck fleet and licenses for the transport of different goods).

BULGARIA

Some of the problems, which the ports face when it comes to the road infrastructure:

- lack of (or not enough) parking spots
- lack of vehicle waiting areas, which might cause congestions
- ports are usually connected to the national road network via deviations from the main roads, which often are not in good condition
- roads within the ports or the port connections to the hinterland are too narrow (one-lane roads)
- the connection of port cities (i.e. Lom) to the nearest main road is done through second or even third-class roads, which are not maintained are in need of renovation
- part of the road infrastructure within the territories of the ports is in need of rehabilitation

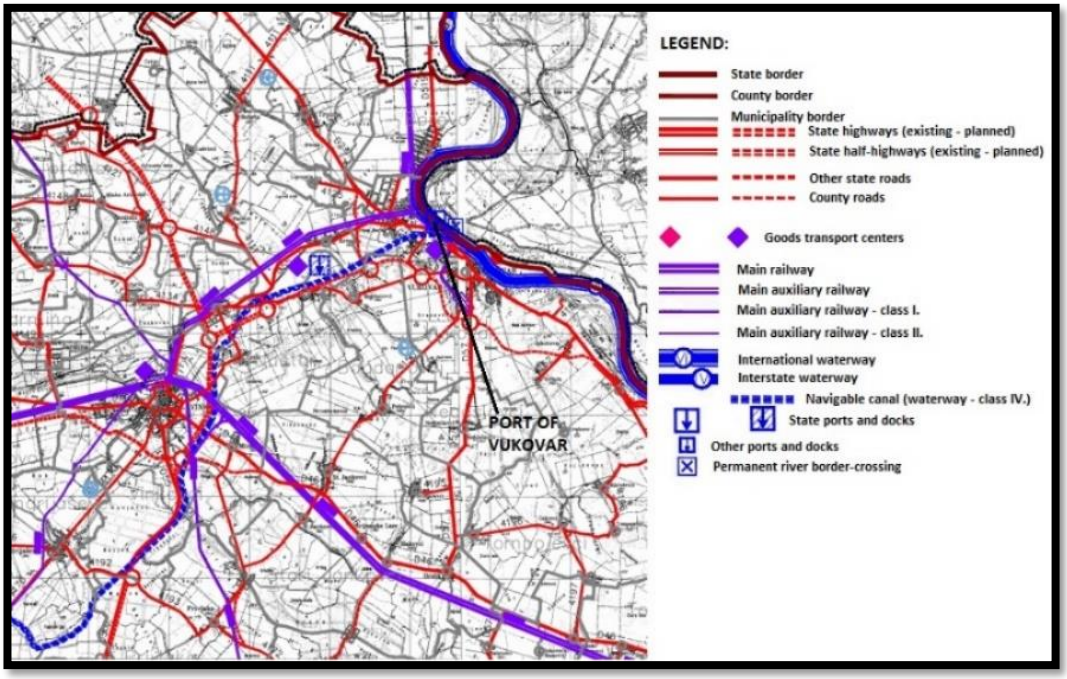
In the beginning of October 2021, there was a strike of the workers in port terminal Varna West, who insisted that the port operator Port of Varna EAD (a company with 100% state ownership) should renovate the road infrastructure of the port, since it is currently in very bad condition. They are

worried that accidents might happen and that suppliers might seize to use the port's services until that problem is solved.

There is an unquestionable need of investments in order to improve the road infrastructure connecting the ports to the hinterland, as well as the infrastructure within the ports, since most of it was build many decades ago and has not been renovated since.

CROATIA

Figure 62: Vukovar transport connections



International traffic routes, the Rhine-Danube corridor (TEN-T, former Pan-European Corridor VII) and the international road-rail route (Salzburg-Thessaloniki) Corridor X), with the Zagreb-Bajakovo section are all passing through Croatia). While the road direction is in an overall very good condition, the railway needs further improvement before its quality is at the levels required by the European standards.

In line with the initiative launched by Eastern and Southern European countries in the period 2015 - 2020, the EU will pay special attention to the development of the former Corridor X and the former Vc Corridor, which should give additional potential to the development of the sector and logistics in the County. For now, County is currently only on the Rhine - Danube corridor (according to the unique Trans - European Road network (Trans – European Network - Transport, TEN-T). The A3 motorway passes through the County, which has four exits (Babina Greda, Županja, Spačva, Lipovac). Cities (Ilok, Otok, Vinkovci, Vukovar and Županja) are interconnected by state roads, and other settlements within the County are connected by state, county and local roads. In the county area 278,258 km of state roads are managed by the company Hrvatske ceste d.o.o.

According to the Vukovar-Srijem County Road Administration, which manages the classified public roads in its area, and in accordance with the Decision on the classification of public roads from 2016, the list consists of 40 county roads with a total length of 425,720 km and 42 local roads with a total length of 198,458 km.

Until 1998, all public roads in Croatia were managed by the Croatian Road Administration, which had priority of state road maintenance while county and local roads were neglected. Therefore, this resulted in a neglected network of county and local roads without project documentation, systematic drainage, insufficient width and load-bearing capacity of the pavement structure, and 60% of the network had to be repaired through reconstructions and extraordinary maintenance.

In the past period, the most significant investments in reconstruction and extraordinary maintenance were on shares CR 4170 Vinkovci - Cerna - Gradište - Županja, CR 4218 section B. Greda - Štitar - Županja, CR 4221 Cerna - B. Greda, CR 4224 Otok - Nijemci, CR 4167 Ivankovo - Retkovci - Prkovci - Šiškovci, CR 4196 Berak - Čakovci - Mikluševci, CR 4137 Nuštar - Bogdanovci - Vukovar, and near local roads reconstruction LR 46028 Svinjarevci - Slakovci and LR 46053 Rajevo Selo - Gunja.
Pursuant to the Decision of the Government of the Republic of Croatia, i.e., the adopted Program for Reconstruction and Remediation of the Consequences of the Disaster in the area of Županjska Posavina in the past two years, a quality renovation of 19.5 km of county roads and 16.7 km of local roads occurred which will contribute to better transport connections.
space with other parts of the County.

In the projects of construction of county roads in the past period, it is worth mentioning the construction of the section CR 4172 from Otok to Spačva with access to the A3 motorway and construction of a bridge on the river Brežnica on the said section, then the construction of section CR 4150 from Petrovac to Stari Jankovci and section CR 4218 from B. Greda to Štitar.

HUNGARY

The table below summarizes the existing road infrastructure connections.

Table 12: Existing road infrastructure connections

Port	Network infrastructure	Type of road	Number of lanes	Maximum speed	Bottlenecks	Restrictions
Adony Logisztikai Központ Kft.	highway M6, exit no. 50 Szabadegyháza/Adony 6*60-ton weigh bridge	asphalt-covered, suitable for truck traffic	2 lanes	20 km / h	-	7.500 tons per day
Centroport Kft. (Dunaújváros)	highway M6, main road 6	asphalt-covered, suitable for truck traffic	2 lanes	20 km / h	-	25-ton weight limit
SYGNUS Kikötő Kft. (Paks)	highway M6, Danube bridges to the East at Dunaföldvár and at Szekszárd, route 6233 from the West	asphalt-covered, suitable for truck traffic	2 lanes	20 km / h	-	-
Bajai OKK Kft.	main road 51 and 55, highway M6 is in 20 km, M9 motorway is in 30 km	asphalt-covered, suitable for truck traffic	Gránátos street: 2*1 lanes	20 km / h	-	-

Source: self-edited based on hfip.hu

ROMANIA

All analysed ports are well connected to national roads. However, only 2 main ports are connected to 4 lanes roads, Port of Constanta to A2 motorway and Port of Giurgiu to DN5 4-lanes express road.

Road connection is secured to all destinations in Romania and other countries. Level of Service and speed depends of the overall road traffic, being at a lower level in the summer season when traffic is increasing especially to the sea side, thus to Constanta.

SERBIA

The port of Bačka Palanka has a favorable spatial micro location because it is directly connected to Corridor 10, i.e. with relevant traffic corridors in the vicinity of the E-75 highway (30-40km) and the E-70 highway (35km).

The Port of Bogojevo port is 40 km away from the E75 highway, in the direction Belgrade-Budapest. The port is connected with the regional road Bogojevo-Apatin-Sombor-Subotica, as well as with the section Bogojevo-Odžaci-Sombor of the main road No. 3, which passes through Serbia. Across the road bridge the port is connected to the section of road No. 3 Erdut-Dalj-Osijek in Croatia. The port is connected with the regional road Bogojevo – Subotica-state border Kelebia. Port of Bogojevo is connected to Kelebija with road IB.

Prahovo is connected by about 50 km of road to Vidin in Bulgaria, and Calafat in Romania, both of which are important road and rail hubs on European Corridor 4. A 150km highway also connects it to European Corridor 10, which links Serbia to other European countries. State road of class IIB No. 400 connects Port of Prahovo with the State road 35 - Dušanovac - Border with Romania near Kusjak

SLOVAKIA

As mentioned in Chapter 4.3 Conclusions port of Bratislava and port of Komárno were constructed to serve the purpose of hubs for intense transshipment what required necessary road connections. Situation is a little different for each port. Port of Komárno is literally inside the city center what brings some restrictions related to heavy traffic. Traffic flows through bridges that may be congested and , not to be forget, city of Komárno is not directly connected to any highway.

Port of Bratislava is located in direct vicinity of the city center, however there is direct connection to motorway in the city that directs either to Czech Republic (direction Brno), Hungary (direction Gyor/Budapest) or Austria (direction Wien).

Both ports, Bratislava and Komárno are part of TEN-T Core Network, but the fact that roads inside ports are owned by private company restricts access to public / EU funding opportunities

UKRAINE

With the regards to the analysis conducted D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo as well as regarding research provided for transportation of agricultural goods it can be stated that the main bottleneck is an absence of direct road connection

between Ukrainian DR and Romania or Bulgaria, since all roads pass only through Moldova, and this additional border crossing is an ongoing task that needs to be addressed.

From a geographical point of view, getting from Izmail, Reni or Ust-Dunaisk to Romania or Bulgaria is not difficult. In a straight way it is only a few hundred kilometers. However, the southern part of Bessarabia is a kind of "island". On the one hand, the Dniester estuary, on the other - the Danube, in the east - the Black Sea, and in the west - the border with Moldova.

Bessarabia is the southernmost region of Ukraine, which means it is geographically closest to Romania, the Balkan countries and Turkey. This makes it possible to create a road corridor between the ports of the Aegean, Marmara and Baltic seas. For example, agricultural cargo from Istanbul could be delivered by land to the port of Chornomorsk (Black Sea), then loaded onto the container trains going to the ports of the Baltic countries. This is one of the options, others, including multimodal transportation are possible.

Odessa-Izmail-Reni highway partially (8 km) passes through the territory of Moldova near the village of Palanka. The section of the road between Mayaki and Udobnyi is controlled by Ukrainian border customs and it takes a long time to cross. This makes multimodal transportation within the DR (Lower Danube) rarther inefficient.

In the past, several projects were proposed for the construction of new highway from the village of Mayaki to Krasnaya Kosa along the Dniester river. However, given the potential harm that the construction of the new road could cause to the ecosystem of the Dniester estuary, the project was not implemented.

Another option was the construction of a road between Ovidiopol and Belgorod-Dnestrovsky. The project feasibility study provided for the construction of a bridge over the Dniester estuary. The new road would shorten the distance for transportation between Ukrainian DR and Romania by three times, but it requires significant financial costs, which were then estimated at 1 billion EUR.

6 Existing and status of the maritime infrastructure connection and existing/possible services

6.1 Identification and presentation of the existing maritime network connections to the ports

AUSTRIA

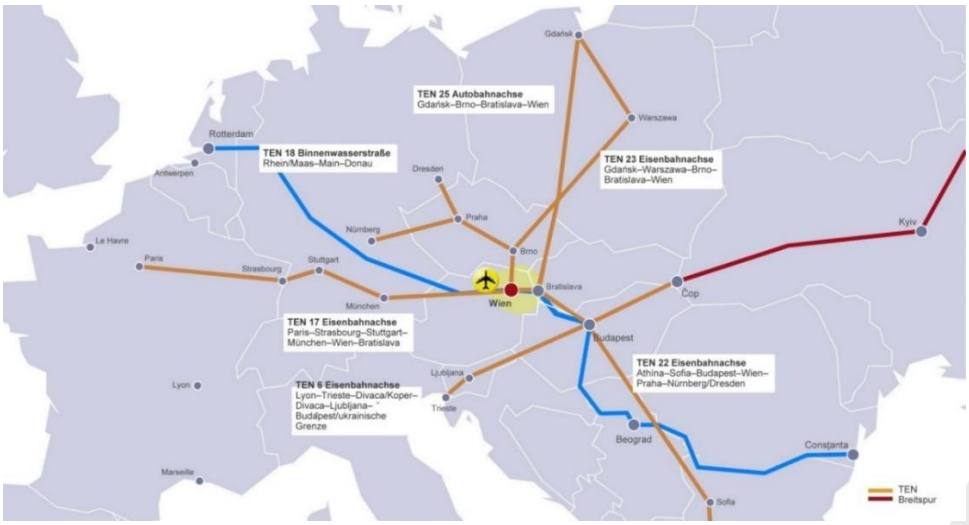
Port Vienna - Albern

The Port Vienna - Albern is situated on 3 TEN-T core network corridors: the Rhine-Danube, the Baltic Adriatic and the Orient/East-Med. The Port of Vienna is one of the most important hinterland hubs in Europe, especially for the large North Sea ports and the Adriatic ports.[54]

The main destinations on waterway at the Port Vienna are for the hub function Constanta and Rotterdam and for the gateway function Europe and Asia upstream, downstream, charter.

The port area covers roughly 350 hectares of port land, in three cargo locations. There is also an area reserved to the passenger terminal and a marina for leisure and sport vessels.

Figure 63: Accessibility of port of Vienna from the TEN-T corridors[55]



Facts and figures regarding ship infrastructure:

The Port Vienna has more than 18km of quays and riverbanks. Only 5 km of quay walls are operational. There are vertical quays are with a total length of 10.500 m and sloped quays with atotal length of 7.600 m.

[54] Here and in following: https://www.hafen-wien.com/en

[55] https://www.hafen-wien.com/en/connection/international-connections

The Albern basin:
- Length of quay: 1.400 m
- Number of basins: 1
- Length of loading tracks: 1
- Operational shore zone: 60.000 m^2
- Water depth: 8 m
- Permissible draught: 2,7 m

The anchorage capacity in all three basins of the Port Vienna is of 71 vessels. In the Albern basin the anchorage capacity is of 20 vessels.

Figure 64: Overview of anchorage capacity in the three basins of the Port Vienna[56]

HAFEN WIEN			Σ
HAFEN FREUDENAU	22	13	35
HAFEN ALBERN	10	10	20
HAFEN LOBAU	16	0	16
GESAMTSUMME HAFEN WIEN	48	23	71

The general services offered at the Port Vienna include free port/customs office, warehouse and brand article distribution centre, a police station, as well as a winter and haven harbour. At the basin Lobau (where there are also handled agricultural goods) there is a RoRo ramp with best-in-class services for heavy lift and project cargo as well as two weighbridges. At the Albern basin, heavy goods handling (loads of 450 tons in regular operation) and automatic weighbridge are available on approx. 4.000m^2 area.

Port Ennshafen

Ennshafen port is a trimodal transshipment center. The port is located in the industrial zone of the Upper Danube region, with 40% of all Austrian exports coming from this area. The port infrastructure covers a total of 3,5 million m^2.[57]

Ennshafen can be reached by water via the Enns, Danube and the Rhine-Main-Danube-Canal. There are regular sailings since July 2015 with two vessels from Passau, Enns, Vidin to Ruse or any other Ro/Ro-Ports according to requirements.

[56] https://www.hafen-wien.com/de/home/logistik-lager/umschlag

[57] Here and in following https://www.ennshafen.at/port/

Facts and figures regarding ship infrastructure[58],[59],[60]:

- Length of quay: 2.557 m
- Number of basins: 2 (basin west-upper Austria, basin east-lower Austria) and several quays
- along the river side Enns)
- Port service time 7/24 – 168h/w
- Cargo handling: over 1 mil t/a
- Number of berths: 8
- Max. number of vessels handled at the same time: 16
- Max. number of barges that can be handled in waiting areas / undeveloped quays: 34
- Mooring area: 42.000 m^2
- Bunkering station vessel/barge
- Shore side power supply and waste reception
- Quayside zone for transshipment: 64.000 m^2
- Water depth: 3 m
- Permissible draught: 2,7 m

Transshipment companies operating at the Ennshafen port are Bunkerstation Galaxy Power GmbH, Container Terminal Enns GmbH http://www.ct-enns.at, Danubia Speicherei Ges.m.b.H. http://www.danubia-speicherei.at, Donausäge Rumplmayr GmbH http://www.ruru.at, Fixkraft Futtermittel GmbH (plant) http://www.fixkraft.at, Fuchshuber Agrarhandel GmbH http://www.fuchshuber.com, LITHOS Industrial Minerals GmbH http://www.lithos-minerals.at, Johann Neumüller GmbH http://www.eisen-neumueller.at, Primagaz GmbHhttp://www.primagaz.at, and Rauch Recycling GmbH & Co KG http://www.rauch-recycling.com.

Further services like various storage (open/covered) amenities are offered by the private business companies in the Ennshafen Port.

There is a 600 CEU RoRo Terminal with high-end services for heavy lift and project cargo. For example, agricultural machines can drive straight on and off vessels, with no need for additional facilities. By using RoRo logistics, time-consuming and expensive road transportation over long distances with can be avoided. At the RoRo terminal, fast truck access routes ensure short customs clearance times. The transshipment operations are run on a flexible schedule, starting immediately upon arrival of the vessels. There are 8,500 square meters of storage space available, directly connected to the RoRo ramp. This space is designed for maximum safety, protected from flooding, fenced off, well-lit, and CCTV-monitored.

Port Krems

The Rhesus Donauhafan Krems - Port Krems is a trimodal logistics location situated in the middle of the Rhine-Danube waterway, in the catchment area of Vienna / St. Pölten. The port is the Central European handling hub for import and export for foreign ports in north-western Europe down to the

[58] Container Terminal Enns Ennshafen, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

[59] Ennshafen FACT SHEET 2019, Jan. 2020

[60] https://www.danube-logistics.info/danube-ports/profiles/action/port/country/Austria/port/76/pfc/Profile/

Black Sea.[61]

Furthermore, the Danube port Krems is a protective port with a flood protection gate and ice containment systems.[62]

Facts and figures regarding ship infrastructure[63],[64],[65]:

- Length of quay: 1.560 m
- Number of basins: 2
- Number of berths: 14
- Operational shore zone: 215.000 m^2
- Water depth: 8 m
- Permissible draught: 2,7 m

Main transport destinations/origins[66]:

Hub Function: Main transport destinations/origins along the Rhein-Main-Donau (Rhine-Main- Danube) waterway.

Gateway Function: Main transport destinations/origins along the Rhein-Main-Donau (Rhine-Main- Danube) waterway.

The services offered at the Port Krems include pre-carriage and onward carriage by road – special transports of high & heavy cargo, as well as a combination of river and sea transport via ARA- and Black Sea ports.

Port of Linz

Facts and figures regarding ship infrastructure[67]:

- Length of quay: 9.300 m
- Number of basins: 6
- Number of berths: 35
- Quayside zone for transhipment: 10.000 m^2
- Water depth: 7 m
- Permissible draught: 2,7 m4

[61] https://www.rhenus-hafenkrems.com/

[62] https://www.rhenus-hafenkrems.com/standort/trimodale-anbindung/

[63] Hubs in Austria - Port of Krems, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

[64] https://www.rhenus-hafenkrems.com

[65] https://www.danube-logistics.info/danube-ports/profiles/action/port/country/1/port/19/pfc/Profile/

[66] Hubs in Austria - Port of Krems, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

[67] Hubs in Austria: Linz Stadthafen CCT; Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

Main transport destinations/origins[68]:

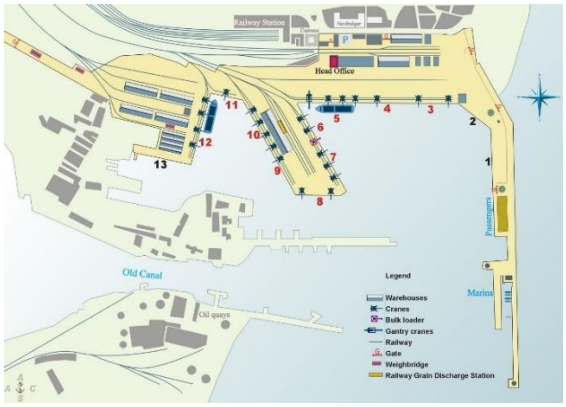
Hub function: Pre-carriage via water only 0,01 of total transshipment volume. Gateway function: Origins from ARA-ports, Germany, Hungary and destination to the ARA-ports.

BULGARIA

Port of Varna

- **Network structure** – As previously mentioned, Port of Varna consists of two separate ports – East and West.
  Port East is situated at the heart of the Varna Bay, only 1 km away from the city center, with a surface area of 429 813 m². Port Varna West is situated 30 km west of the city and has a surface area of 1 799 797 m². The map below shows the layout of the two ports:

Figure 65: Port Varna-East – map and Port Varna-West – map



(Source: https://port-varna.bg/)

(Source: https://port-varna.bg/)

- **Maximum size of the vessels** – there is no available information regarding the maximum size of the vessel, which can be serviced at the port.
- **Port capacity** – Port East has 14 ship berths: 13 for cargo ships and 1 for passenger ships. The overall quay length is 2345 meters. Maximum draught – 11.5 m. The open storage area is 73 154 m², and the covered warehouses are 35 340 m². For port terminal East, the maximum distance from the water level to the top of the hatch coaming is 15 m. for all berths.
  At the same time, Port West has 22 berths, 19 of which are currently operational and are used for cargo. The length along the quay is 3430 m. The maximum draught is 11.20 m. Port-West has open storage areas of 346 393 m² and covered warehouse spaces of 37 806 m². In addition to that, Port West has reservoirs for liquid bulk cargo with an overall volume of 10 000 m³. For port terminal West, the maximum distance from the water level to the top of the hatch coaming

[68] Hubs in Austria: Linz Stadthafen CCT; Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

can vary from 12 to 21 m. (depending on the berth). For mobile cranes, that indicator can be between 35 and 45 m

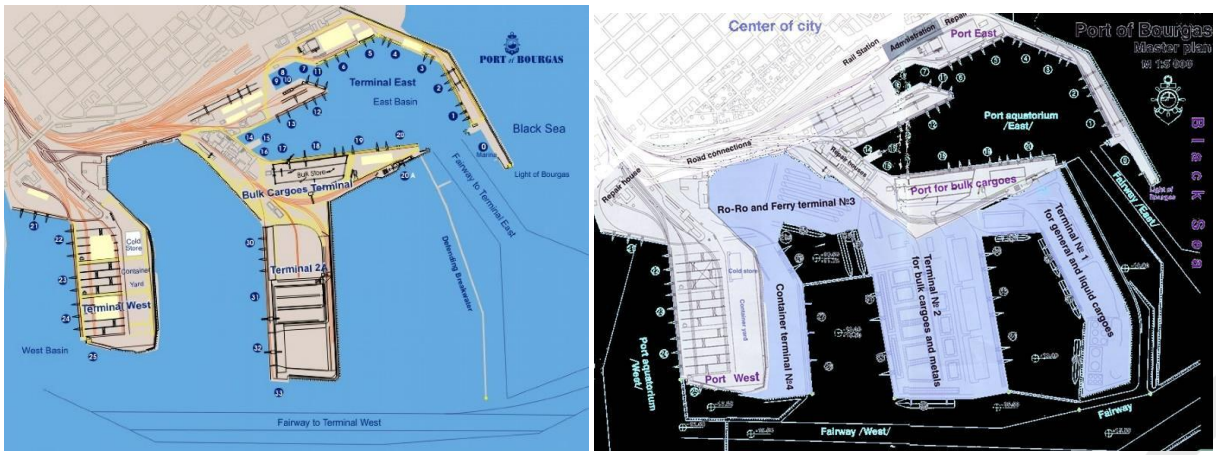
Port East has the following equipment for cargo handling: 22 portal cranes with a lifting capacity of 32 tons, one mobile crane (84 tons lifting capacity) and one gantry crane (30.5 tons). There are also 12 bucket loaders, 9 forklifts, one reach stacker and 9 container tractors. There is also a specialized grain loading and unloading facility, which is connected to a covered warehouse.

At the same time, Port West has in its disposal the following equipment: six mobile cranes with lifting capacities between 63 and 144 tons, 26 portal cranes, each with a 32-ton lifting capacity, as well as two gantry cranes with 35-ton capacity for cargo handling. As far as landside equipment, port terminal west has 10 reach stackers with a 45-ton capacity each, 24 bucket loaders, 31 forklifts with a capacity varying between 3.5 and 28 tons, as well as 17 container tractors.

Port of Burgas

- **Network structure** – Burgas has three separate ports (East 1, East 2 and West), the layout of which can be seen in the map below.

Figure 66: Port of Burgas – layout



Source: (https://port-burgas.bg/)

For port East 1 (the right one on the map in Figure 6), the ship berths are situated on its left side. Port East 2 is placed in the middle and most of the berths are placed on the inner side of the breakwater, while the others are situated on the left side. The breakwater itself is 1260 meters long and enables port operations even in the case of bad weather conditions. The berths are placed on the left side in port West as well.

- **Maximum size of the vessels** – For ports East 2 and West, the maximum overall length (LOA) of vessels using the port infrastructure can be 280 meters with a deadweight (DWT) of 125 000 and a draught of up to 14.6 meters, which means that a panamax-class vessel can be serviced there.

For port East 1, the biggest vessel, which has been anchored at the port, had a length of 267 meters. The port currently has a maximum allowed draught of 10 m.

- **Port capacity** – Port Burgas East 1 has 14 berths and has a quay length of 1950 meters. There are 50 000 m^2 of opened storage area and another 35 000 m^2 of covered warehouses. The maximum distance from the water level to the top of the hatch coaming is 16 m.
  At the same time, Port East 2 has 9 mooring berths and 5 piers, as well as a quay front of 2145.5 meters. It also has 139 866 m^2 of open storage area, as well as 16 395 m^2 of covered warehouses. There is also a 150 000 m^2 of storage for liquids and grain.
  It is important to note that port terminal East 2 has a hi-tech silo complex, on the territory of which there are auto and railway unloading areas with a total capacity of 2000 tons per hour, two elevators for the reception of grain cargo, five silo cells, each with a capacity to store 16 600 m^3, as well as three smaller silo cells with a capacity of 5100 m^3 each. Every silo cell is equipped with a modern thermal control system, as well as a dual-zone ventilation floor. The silo complex has a conveyor belt system with a loading capacity of 1200 m^3 per hour.

Figure 67: Silo complex in port terminal Burgas East 2

Source: (https://navbul-portburgas.com/)

Port West consists of 6 berths, a total quay length of 1188 meters, 142 561 m^2 of open storage area, as well as 55 866 m^2 of covered warehouses.
Port terminals East 2 and West have various cargo handling equipment, such as three electric portal cranes with a lifting capacity of 16, 20 and 40 tons, a mobile crane with a capacity to handle cargo of up to 100 tons, top loaders (for container handling), telescopic loader for cargo of up to 4 tons, as well as many forklifts and bucket loaders, whose capacity varies – 5-33 tons for the forklifts and 1.5 to 18 tons for the bucket loaders.
Port East 1 also has a rich selection of cargo handling equipment. There are four electric portal cranes (10, 12, 16 and 20 tons of capacity respectively), two mobile cranes (25 and 50 tons), three forklifts with an internal combustion engine and loading capacities between 5 and 20 tons, five bucket loaders and many others.

Port of Ruse

- **Network structure** – There is a natural breakwater in front of Port-East, which protects it from waves, currents and hazardous weather. The quay length in the main cargo terminal, Port-East, is 1618 m. The respective quay length in the other port terminal - Tutrakan, is 110 m.
  Port-East has 14 ship berths (2 of them are in the ro-ro terminal) with a total length of 1490 m. The ship berths start on the east side of the port (right side on Figure 4) from 1 and go up to 14 on the west side. There is another berth in Tutrakan.
  The maximum allowed draught is 2.5 m.
- **Maximum size of the vessels** – Port Ruse East can service ships with a maximum length (LOA) of 150 m. and a beam (maximum width) of 25 m. Draught restrictions can vary depending on the water level of the Danube.
- **Port capacity** - Port-East has has both covered warehouses (15 800 m^2) and an open storage area (190 500m^2). Port-East alone has a cargo handling capacity of 2.5 mln. t/year. The port also has the ability to handle containerized cargo, estimated to be 50 thousand TEU/year (although there is currently no specialized container terminal at the port). This capacity is conditional and depends on working hours, technology used, mode of transport, weather characteristics, etc. If the demand increases, it is a matter of organization to handle and store even bigger quantities than estimated.[69]
  Port-East has waterside handling equipment, which consists of 12 portal cranes for loading and unloading activities, with a total lifting capacity of 1440 tons. There are also two rail-mounted gantry cranes, each of them having 20 tons of lifting capacity and being able to lift 120 tons of cargo per hour. In additions to the gantry cranes, the other landside cargo handling equipment includes 5 reach stackers (with a lifting capacity from 10 to 45 tons) and 5 forklifts (each having a 5-ton lifting capacity).

Port of Lom

- **Network structure** – The port encompasses 5 quays and 13 ship berths, 3 of which are situated on the Danube, while the other 10 are in a partially enclosed body of water in the port – estuary. The total length of the berths is 1335 m., while the quay wall is 1422 m. There is also a 140 m. long breakwater.
- **Maximum size of the vessels** – the maximum length of a vessel, which can dock at the port, is 135 m.
- **Port capacity** – Terminal Lom has 13 berths, but can only service 10 ships simultaneously. The port maintains a maximum allowed draught of 2.5 m. There are additional 3 berths in terminal Oryahovo. Port of Lom has the capacity to handle approximately 3 mln. tons of cargo a year, while Oryahovo can only handle 0.5 mln t/year. According to data from the port operator, the total storage area of the port (both covered and open storage) is 132 000 m^2.

[69] Report D.5.1.1: Status of port infrastructure development along the Danube, project DAPhNE

The equipment for cargo handling consists of 19 electric portal cranes with a capacity of 5 to 20 tons each. The port also has wheel loaders, bucket loaders, forklifts and other similar equipment.

Port of Vidin

- **Network structure** – Port of Vidin consists of two cargo terminals – North and South.
  Port terminal North has a surface area of 120 000m² and 4 berths with a total length of 350 m. The overall length of the quay wall is 800 m.
  Port terminal South has a total surface area of 48 000 m². The overall length of the quay is 208 m. with a draught of 2.5 m. There are 2 berths, each having a length of 90 m. The quay wall itself is slopped instead of vertical.
- **Maximum size of the vessels** – There is no available information regarding the maximum size of a vessel, which can be serviced at port terminal Vidin North.
  Since the berths of Vidin South are each 90 m. long, that is also the maximum size of the vessel, which can be serviced at the port.
- **Port capacity** – Port terminal Vidin North offers open storages with a total surface area of 10 000 m², along with covered storage warehouses of 1620 m². The port can service two vessels simultaneously, which carry cargo of the same type – either two vessels carrying dry bulk cargo or two vessels carrying general cargo. It can process only one vessel, if it carries dry bulk cargo, which is technologically adapted for loading with a conveyor belt. If there are free ship berths, storage areas, manpower and mechanical equipment, the port can accept and service cargo ships outside the norm for simultaneous processing.
  Port terminal South has open storage areas of 18 000 m², as well as covered storage warehouses. The method for simultaneous processing of vessels is the following – the terminal can either process two vessels carrying dry bulk cargo, two vessels carrying transboard cargo, one vessel with general cargo or one vessel carrying dry bulk cargo, which is technologically adapted for loading with a conveyor belt.
  Port terminal North has two electric portal cranes and other specialized lifting equipment for loading and unloading of bulk, general and other types of cargo from and to vessels and land vehicles – forklifts and bucket loaders. Cargo with a maximum loading weight of up to 30 tons can be handled in the port. The facility is also equipped with a grain loading machine, allowing for the handling of all types of grain.

At the same time, port terminal South also has two portal cranes – one for cargo of up to 10 tons and the other – for heavier cargo. In addition to that, there is also other equipment for loading/unloading activities – mini front loaders, telescopic front loaders, forklifts, bucket loaders.

CROATIA

River transport has an advantage over other land transport modes given on the capacity and attractiveness of the transport price. However, it is equally important to fulfill shipper's expectations with regard to transport efficiency. This means ensuring reliability and service flexibility.

In this segment, river traffic lags too far behind, for example by road. To improve the reliability of river traffic it is very important for waterways to ensure navigation according to the requirements of the class, i.e., guaranteed values navigable gauge, to take into account the size of the "economic draft" when planning waterway maintenance, and to ensure quality service in ports.

The development strategy for the inland navigation sector is based on the Medium-Term Plan development of waterways and inland ports of the Republic of Croatia. In accordance with that plan the entire waterway development policy should be directed in two basic directions[70]:

- Achieving a higher level of competitiveness and quality of the existing internal network waterways (through better maintenance, removal of bottlenecks, and technological modernization of marking and navigation signaling systems),
- achieving faster and more harmonious construction of waterways according to European standards, work within the TEN-T network, and in full accordance with the principles of European transport policy.

Inland ports are key elements of the entire inland transport system waterways on which the success of the complete transport process largely depends, from the places of production to places of final consumption – end users. At the same time, ports are also links of different modes of transport by which cargo or passengers are brought and taken to their final destinations. Inland waterway ports located on European network of waterways have a special meaning given the uniqueness of the transport and the overall economic market activity on which they operate.

There are two international waterways in the Vukovar-Srijem County - Danube and Sava. The Danube is navigable along its entire length through Croatia and is towards Europe agreement on major inland waterways of international importance (AGN) classified by buoyancy class VIc. The Danube is important for international, regional and local traffic. Local passenger traffic takes place between Vukovar and Bač, where by ferry passengers are transported between two small border crossings. The Sava is conditionally navigable, that is, with great restrictions, it is associated with an unregulated waterway (insufficient draft within individual sectors, critical points, unmarked waterway, etc.).

Existing traffic depends on seasonal water level conditions and is mainly of local and regional character.

In practice, there are two separate subsystems with their own specific characteristics, so one can talk about two pools[71]:

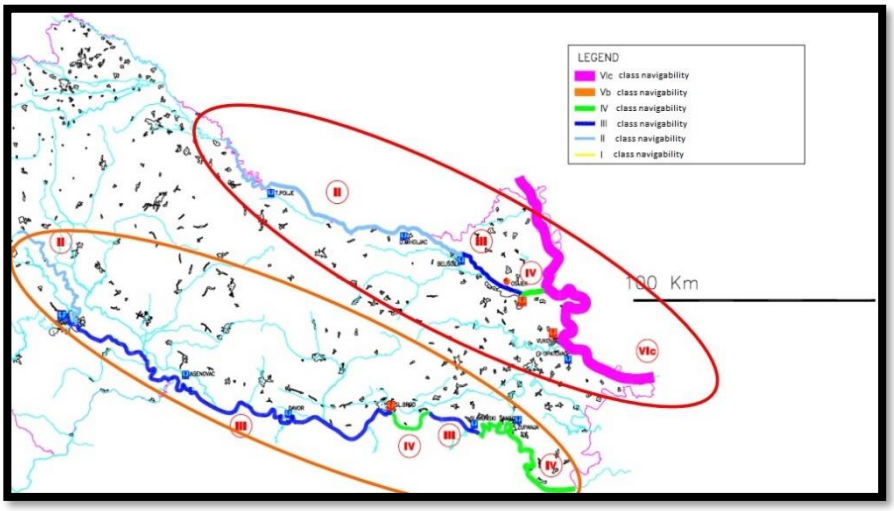
- a basin that includes the Danube waterway and the Drava waterway connected to the European waterway network,

[70] CRUP, Kavran, Z.: Srednjoročni plan razvitka vodnih putova i luka unutarnjih voda Republike Hrvatske Zagreb, 2008.

[71] Ibidem

- a basin that includes the waterway of the Sava, Kupa and Una, not connected to the European network waterways through the territory of the Republic of Croatia

Figure 68: Separation of the inland waterway transport network



The total length of current and planned waterways in Croatia is 866.7 km, of which 601.2 km is included in the network of European waterways of international importance. According to the AGN contract, the following waterways are included in the European Waterways (E-vp) system:

Table 13: Croatian waterways in European network according to AGN

Waterway marking	Waterway section	Required class according to AGN	Length in kilometers
E 80	River Danube from Batina to Ilok	VI c	137,5
E 80-08	River Drava to Osijek	IV	22,0
E 80-10	Future multipurpose channel Danube-Sava from Vukovar to Šamac	V b	61,5
E 80-12	River Sava from Račinovac to Sisak	IV	380,2
Total length according to AGN			**601,2**

From the existing Croatian international waterways Danube, Drava to Osijek and Sava downstream of Slavonski Šamac meet the classes declared in the AGN while the parameters the upstream part of the Sava River waterway do not correspond to the classes declared in the AGN. Other waterways in the Republic of Croatia are state or interstate, and not according to the AGN contract classified into an international waterway network.

Table 14: Croatian waterways which are not in European network according to AGN

Waterway - section	Class	Length in kilometers	Remark/note
River Drava from Osijek to Ždalica	II-III	176,6	Interstate waterway with Republic of Hungary
River Sava from confluence of river Kupa to Galdovo	II	3,0	Interstate waterway acc. to Sava Commission
River Sava from Galdovo to Rugvica	II	65,0	State waterway
River Kupa from confluence in river Sava to rkm 5.9	I	5,9	Interstate waterway acc. to Sava Commission
River Una from confluence in river Sava to rkm 15.0	I-II	15,0	Interstate waterway acc. to Sava Commission
TOTAL		**265,5**	

The classification of the current condition of waterways is determined by the Ordinance on classification and opening of inland waterways and is shown in the following table:

Table 15: Classification of waterways in the Republic of Croatia - current situation

River	Waterway - section	Length of waterway/km	Waterway class
DANUBE	1295+501 (Ilok) - 1433+000 (Batina)	137.5	**VIc class**
SAVA	203+300 (Račinovci) – 305+700 (Sl. Šamac)	102.9	**IV class**
	305+700 (Sl. Šamac)– 330+200 (Oprisavci)	24.5	**III class**
	330+200 (Oprisavci)– 363+200 (Sl. Brod-grad)	33.0	**IV class**
	363+200 (Sl. Brod-grad)- 583+000 (Sisak)	219.8	**III class**
	583+000 (Sisak) – 651+000 (Rugvica)	68.0	**II class**
DRAVA	0+000(Ušće Dunava) – 14+050 (Osijek luka Nemetin)	14.0	**IV class**
	14+050 (Osijek luka Nemetin) –55+450 (Belišće)	41.4	**III class**
	55+450 (Belišće) – 198+600	143,2	**II class**
KUPA	0+000 – 5+900	5.9	**I class**
UNA	0+000 – 4+000	4.0	**II class**
	4+000 – 15+000	11.0	**I class**
TOTAL LENGTH OF EXISTING WATERWAYS		**805,2**	
TOTAL LENGTH OF WATERWAYS - INTERNATIONAL CLASSES		**287.4**	

Out of a total of 539.7 km of existing waterways that are included in the European waterway network roads, only 287.4 km meet the classification requirements for international navigation. The biggest the section is the Sava River, which in Croatia largely does not meet international requirements navigation.

Danube River

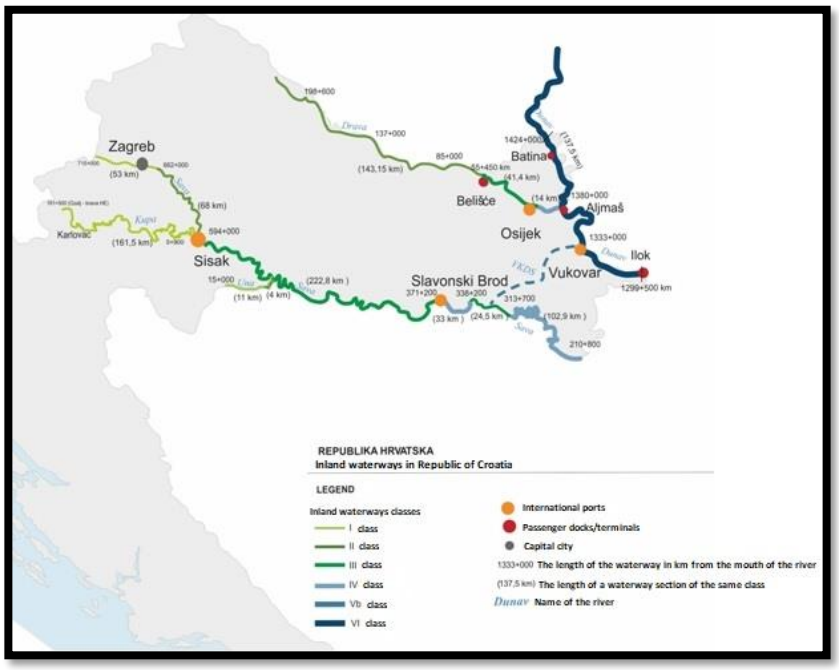
The basic hydrological characteristics of the Danube basin are: total area of 816,950 km2, from what 2,120 km2 is within the Republic of Croatia; total length of 2,857 km. The Danube is within its entire length through Croatia of 137.5 km an international waterway with free navigation for all flags.

Waterway is marked and there is an international obligation of the Republic of Croatia for its maintenance. Current situation with maintenance measures meets the requirements of class VIc.

Drava River

The basic hydrological characteristics of the Drava basin are: total area of 41,238 km2, of which 7,015 km2 is within the Republic of Croatia; total length of 749 km, of which 330 km is within the Republic of Croatia. Drava river is navigable in 198.6 km out of total of 330 km. From the confluence with the Danube to 70.0 km, Drava is an international waterway with free navigation for all flags, where trade takes place to the international port of Osijek. From 70.0 km to 198.6 km (the mouth of the Ždalica) is the Drava interstate waterway between the Republic of Croatia and the Republic of Hungary. Navigation on this section is lesser in comparison to other sections. The waterway is marked and there is an interstate obligation of the Republic of Croatia for its maintenance.

Figure 69: Croatian waterways - current condition



On the section from the mouth to rkm 22.0 which is in the European network of waterways according to AGN, the existing condition of the waterway does not meet the full-length requirements for international navigation according to the contract. From the confluence with the Danube to rkm 14.0, the existing condition of the waterway is satisfactory with conditions of class IV, although there are frequent disturbances in navigation due to the reduced depth at low water levels, which requires intensive maintenance measures. From rkm 14 to rkm 22.0 existing condition corresponds to class III. Upstream from Osijek, i.e., from rkm 22.0 to Belišće, the waterway satisfies conditions of class III, and upstream to Ždalica class II. Possible class changes in the boundary the area needs to be coordinated with the competent authorities of neighboring R. Hungary.

Sava River

The basic hydrological characteristics of the Sava River Basin are: total area 95,712 km2. Of the total length in the Republic of Croatia, the Sava River is navigable at 380.2 km, i.e., from Račinovac to Sisak, km 210.8 to km 591. It is possible to sail to Zagreb (Rugvica km 651) but in a small percentage of days of the year for the purpose of gravel exploitation, and sports and recreation. From the border with the Republic of Serbia, i.e., from Račinovac to Jasenovac, the waterway is in the border area with BiH in the length of 304 km. Upstream of Jasenovac, the Sava is completely in the territory of the Republic of Croatia.

The Sava is declared in the AGN contract as a class IV waterway from Račinovac to Sisak, km 210.8 to km 591. Analyzes from the study "Preliminary design of the Sava waterway", showed that the morphology of the existing Sava riverbed does not have a full-length IV class, but has the potential to reach it because of its curvature radius which does not meet standards in only 10 percent of the length of the river, and the navigable size of about 30% the length of the river. It follows that the morphological regulation of the existing riverbed is possible of reaching IV. waterway class.

Kupa River

The basic hydrological characteristics of the Kupa River Basin are: total area of 10,236 km2, from what is 8,412 km2 within the Republic of Croatia; the total length of 294 km along its entire length belongs to the Republic of Croatia. The 100 km long Kupa River forms the state border with neighboring Slovenia. Kupa is navigable for the European standardized fleet from the confluence with the Sava to the Sisak port in length of 5 km. According to its minimum dimensions of the fairway (width 35 m per rkm 3 + 300) and the width of the free profile on the masonry bridge rkm 3 + 350 of 37 m meets the requirements for I. buoyancy class. Sailing along the Kupa upstream from Sisak to Karlovac (km 137), given the numerous natural obstacles in the riverbed is not currently possible. However, the possibility of sailing should be explored for tourist and sports-recreational purposes.

Una River

The basic hydrological characteristics of the Una River Basin are: total area of 9,368 km2, of which 1,686 km2 is within the Republic of Croatia; total length of 212 km, of which 139 km within the Republic of Croatia and 130 km Una forms the state border. Una is a waterway 15 km long, of which 4 km is classified as class II and 11 km as class I. The voyage takes place for the purpose of excavation and transportation of gravel, and for sports and recreation in limited range.

Multipurpose Danube - Sava Channel

The future Multipurpose Canal Danube - Sava is declared in the AGN contract as a waterway V.b class. It is also included in the Strategy of Physical Planning of the Republic of Croatia, and the Strategy for River Development traffic in the Republic of Croatia (2008 - 2018). The canal is a multi-purpose water structure for water protection, irrigation and navigation, and thus belongs to the domain of water management.

HUNGARY

All the presented ports are strategically located on the Rheine-Maine-Danube international IWW corridor, therefore they have IWW connections both to the North Sea and the Black Sea. Hence, all the ports are benefiting from underutilized IWW in Central Europe.

ROMANIA

Port of Constanta

The Port of Constanta covers 3.926 ha of which 1,313 ha is land area and the rest of 2.613 ha is water area. The total land area of 1.313 ha is shared between the North Port that occupies a land area of about 495 ha and the South Port with about 818 ha. Another 561 ha are included, according to the masterplan, in development project for short, medium and long term perspective.

The Port of Constanta is not an open shore port. Its infrastructure is basin type with two basins. The main tuning basin for the North Port of Constanta is located in front of the oil terminal having enough area to enable the maneuvering of the common vessels calling the North Port. The first is located at the port entrance, after passing the South breakwater, while the second is located at the exit from the port, in front of the basin between piers 1S and 2S. The standard berthing maneuverings require tug assistance and present a significant challenge, especially for berthing container vessels at the Constanta South Port terminal in which the navigation is limited to one-way traffic.

The Constanta Port has the maximum draught, natural or dredged, of 19 m and a minimum water depth of 7 m. Port service time is 56 hours per week. Considering the average number of non-operational days due to adverse weather conditions such as: rain, fog and heavy storm the number of weather working days (WWD) varies between 330 and 350 per year.

Port of Galati

Port of Galati has a good maritime connectivity, which is limited to sea vessels up to max. 15,000 DWT. However, the capacity and draught of ships admitted to navigate on the Sulina Chanel and to reach the ports mentioned above are conditioned by the minimum depth at Sulina Bar (the entrance on Sulina Channel) The minimal depth recommended by the Danube Commission which should be insured is 7.01 m,

SERBIA

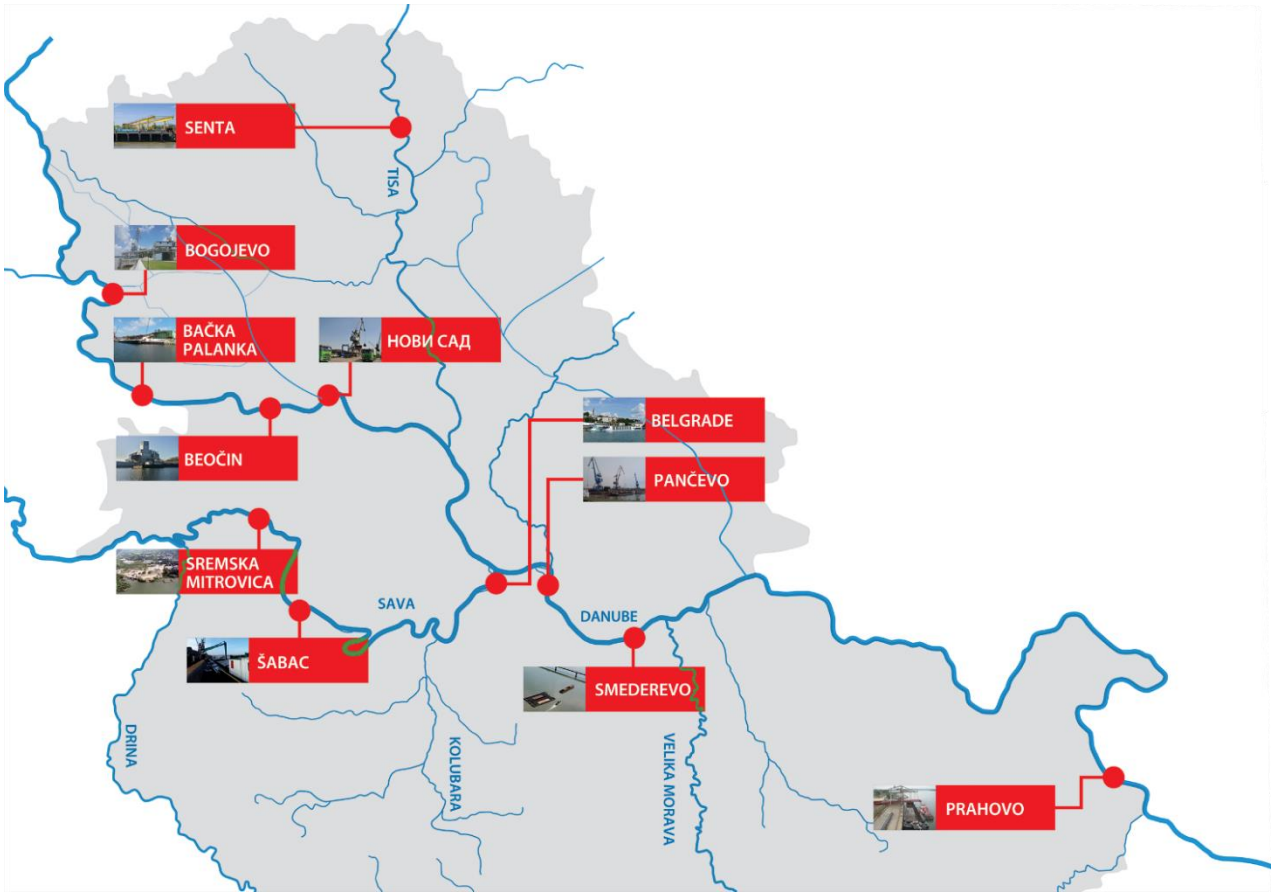
Serbia is a landlocked country situated at the crossroads of Central and Southeast Europe, in the middle of three geo-political entities: Danube macro-region, Adriatic-Ionian macro-region and Western Balkan 6 initiative. By analyzing and assessing the geostrategic and geopolitical comparative advantages of the Republic of Serbia in the wider European area, the main advantage of the Republic of Serbia is being the traffic connection of Western and Central Europe with Southeastern Europe and the Middle East, as well as the connection of Central European countries - the Middle Danube towards the South Adriatic, the Aegean and the Black Sea, or the Mediterranean.

In the following the inland waterways network is presented.

The total length of the navigable inland waterways in the Republic of Serbia is approximately 1.670 kilometers. In the Republic of Serbia there are 11 ports, 7 on Danube river: Bogojevo, Bačka Palanka,

Beočin, Novi Sad, Pančevo, Belgrade, Smederevo and Prahovo, 2 on Sava river Šabac and Sremska Mitrovica and 1 on Tisa river - Senta.

Figure 70: Inland Waterways and ports in the Republic of Serbia[72]



The Danube River

Rhine-Danube Corridor is one of the nine European corridors of the TEN-T network, which is passing through the Republic of Serbia.

The Danube River as an international waterway in Serbia is 588 km long and represents 20% of the total River length. It enters Serbia from Hungary at km 1.433,1 and leaves for Bulgaria at km 845,5 near the Timok river confluence. There are two joint stretches of the river – with Croatia in the length of 137 km and with Romania over the length of 229,5 km.

Waterway of the Danube River on the stretch from km 845+500 to km 1170 has the category VII and on the stretch from km 1170 to km 1433+100 has the category VIc. The Danube River's waterway is completely marked in accordance with the applicable international regulations.

[72] PGA

The Sava River

The Sava River as international waterway on the entire length of the flow through Republic of Serbia, from km 0 to km 210+800.

Waterway of the Sava River on the stretch from km 0 to km 81 has the category Va, on the stretch from km 81 to km 176 has the category IV, on the stretch from km 176 to km 196 has the category III and on the stretch from km 196 to km 210+800 has the category IV.

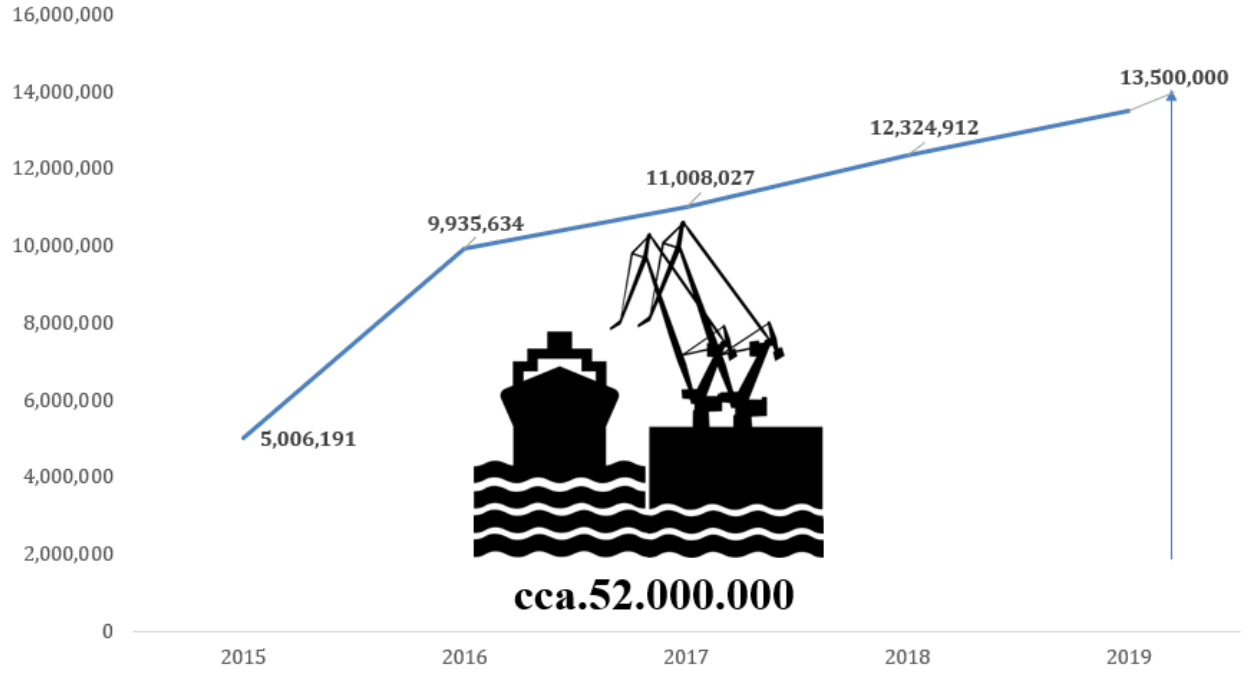
The Tisa River

The Tisa River as international waterway where international regime of navigation applies on the entire length of the flow through Republic of Serbia, from km 0 to km 164. Therefore, navigation on the Tisa River is free and open to vessels from all states regardless to the flag of vessels. Waterway of the Tisa River on the stretch from km 0 to km 164 has the category IV.

Cargo in Serbian ports

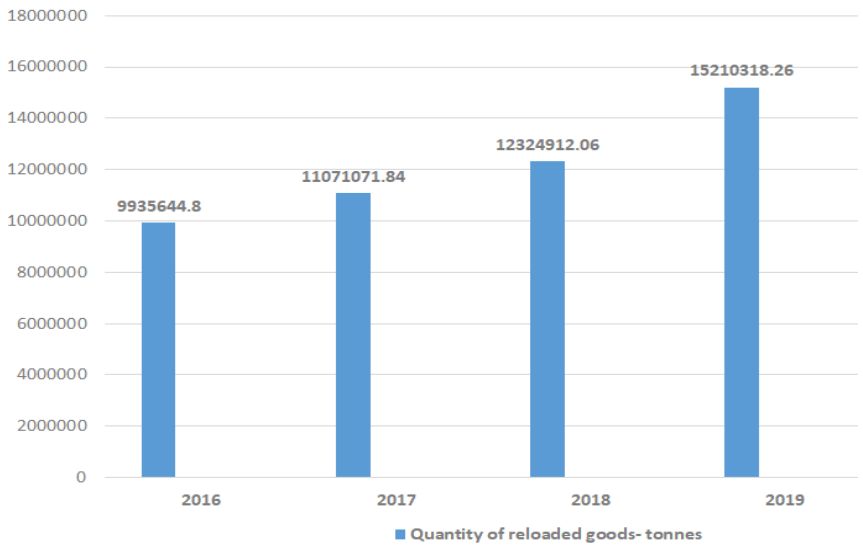
Transport of raw materials, agricultural products, oil and construction materials (sand, stone and gravel) remains major cargo in Serbian ports.

Figure 71: Quantities of cargo transhipped at all Serbian ports



According to the Port Governance Agency, in 2019, 15.2 million tonnes of cargo were transshipped on the rivers in Serbia, which represents a significant increase of 20 percent compared to the year 2018. The volume of cargo transport and transshipment that has increased by one fifth indicates a surge of economic activity in the Republic of Serbia, especially in the fields of chemical industry, energy, mining and construction.

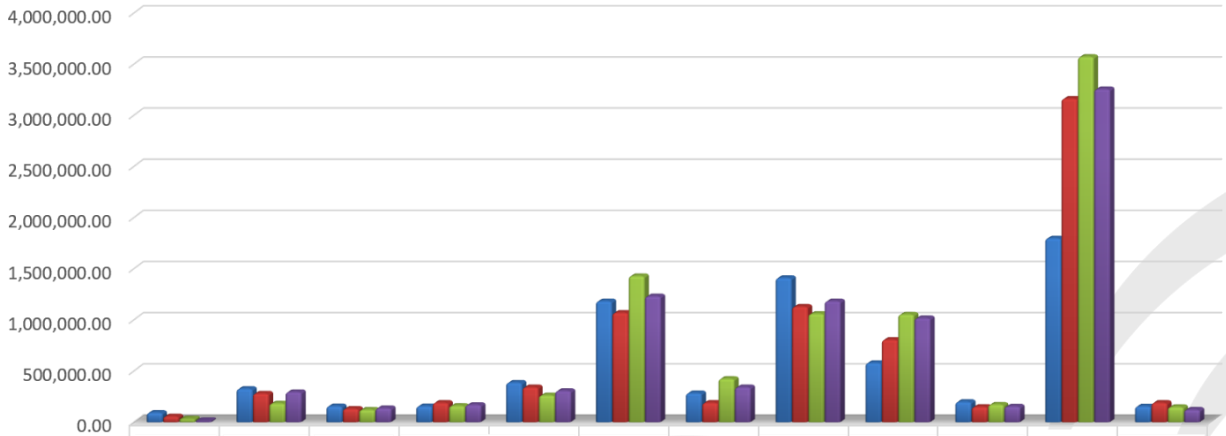
Figure 72: Quantities of transhipped cargo on rivers in Serbia, in tons



The data of the Port Governance Agency show that 10 out of the total 12 port areas in the Republic of Serbia recorded an increase in the cargo transshipment. The biggest growth was achieved by the port area in Smederevo, where a total of four million tonnes of cargo was transshipped, making the port in Smederevo one of the busiest ports on the whole Danube.

After the Port of Smederevo, the Port of Novi Sad and the Port of Pančevo have the highest cargo throughput (please see the Figure 43 below).

Figure 73: Cargo flows through Serbian inland ports[73]

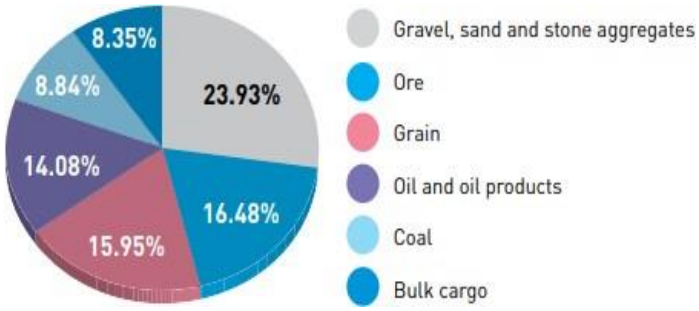


	Port Apatin	Port Bačka Palanka	Port Beočin	Port Belgrade	Port Bogojevo	Port Pančevo	Port Leget	Port Novi Sad	Port Prahovo	Port Senta	Port Smederevo	Port Šabac
2016	93,434.15	326,539.6	156,627.2	156,869.3	386,544.4	1,182,814	284,026.9	1,410,211	579,047.6	198,973.7	1,797,496	155,318.6
2017	57,194.72	280,379.2	132,061.8	190,406.8	342,301.8	1,069,658	190,042.4	1,129,673	805,913.8	150,266.5	3,162,824	190,042.4
2018	33,863.00	183,417.0	122,568.5	160,387.2	262,699.3	1,428,631	424,381.6	1,058,983	1,053,127	172,481.4	3,572,035	148,819.0
2019	13,174.76	295,003.7	137,866.0	169,696.6	306,166.5	1,231,298	342,493.6	1,182,943	1,017,965	154,073.0	3,256,339	123,032.0

[73] Port Governance Agency

As before, the most frequently transshipped cargoes are gravel, sand and stone aggregates, which together account for 23.93 percent of total transshipment. Ores are in second place with a share of 16.48 percent, while grain is in third place with 15.95 percent. Oil and oil products ranked fourth with 14.08 percent. In addition to these, increased quantities of coal and bulk cargo were also recorded. Coal and bulk cargoes accounted for 8 percent of total river transshipment in Serbia in 2019. According to the Agency, the largest difference in the amount of the cargo transshipped was recorded for grain and oilseeds. Thanks to the improvement of the conditions on the international market for mercantile goods, 969,000 tonnes of more grain were recorded compared to the previous year.

Figure 74: The most frequent transhipped goods on rivers in Serbia



In case of low water levels, navigation is limited or in some cases no possible at all with ships complying with the European standards. The hectic change of the water level of the Danube affects the navigability of the river as well as the utilized capacity of the cargo vessels.

Bottlenecks have been identified in places where navigation is difficult due to low water levels. On the section from Belgrade to Djerdap II, there are no problems in terms of the navigation due to the effects of the construction of the HEPPs Derdap I and Djerdap II. On the other hand, several sections critical for navigation has been identified on the sector upstream from Belgrade and along the joint section with Croatia.

The project Hydrotechnical and dredging works on the critical sectors on Danube River in Serbia, between Bačka Palanka and Belgrade is underway. Project aim is to eliminate six critical sectors on the stretch of the Danube River between Belgrade and Backa Palanka, from km 1287 to km 1195, whereby the safety of navigation on Serbian inland waterways will be significantly improved. The main activities of the Project include construction of hydro-technical structures and dredging of fluvial sediments in compliance with the environmental protection requirements.

This project will contribute to the improving of the conditions and safety of navigation, which is of great importance for the Republic of Serbia, bearing in mind that in the classification of the main transport corridors of the EU, Danube is part of the Rhine-Danube Corridor and that 87% of the total volume of water transport is generated on the river Danube, and most of the transshipment is done in ports on the section between Bačka Palanka and Belgrade.

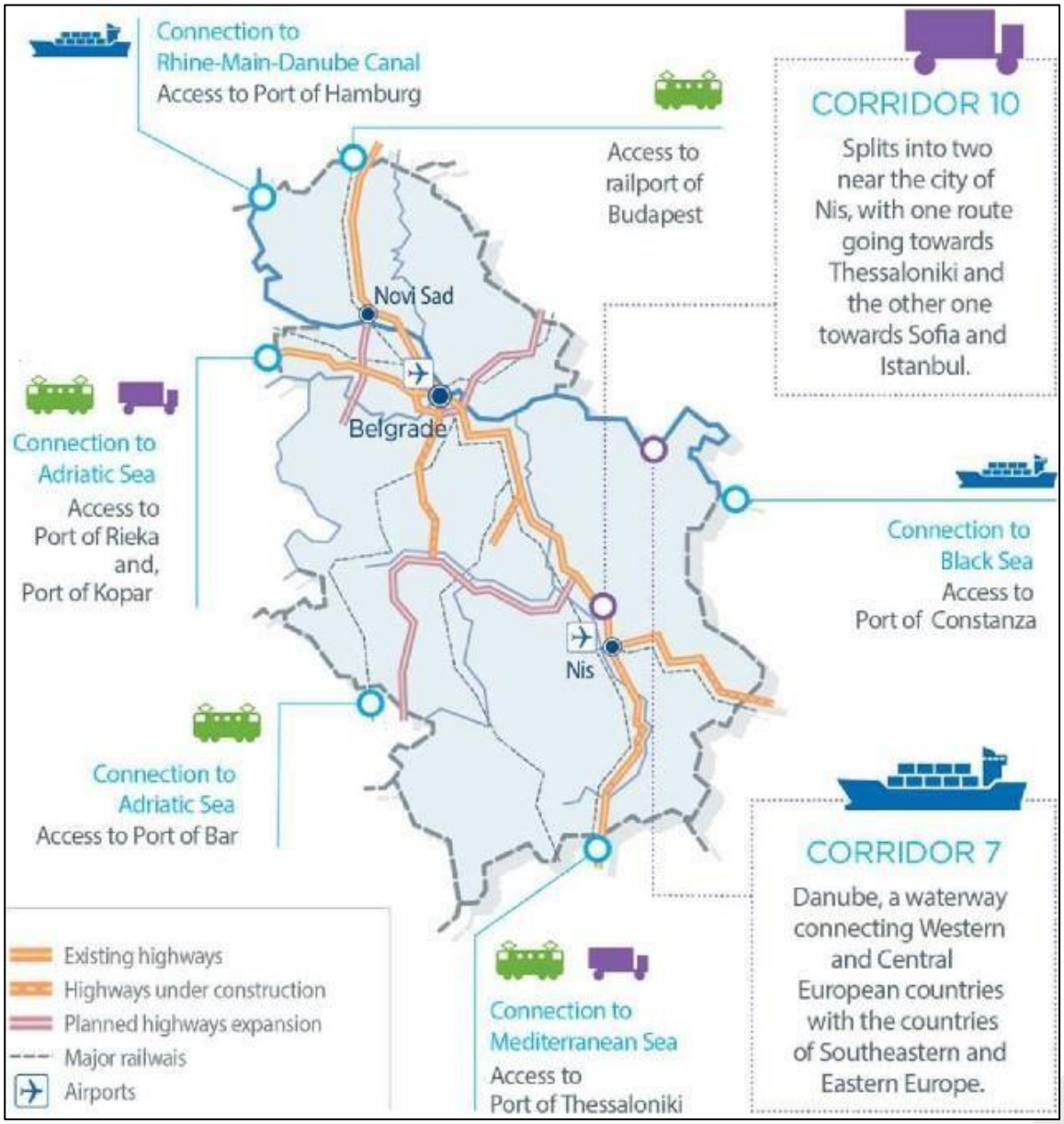
The critical sector with the Republic of Croatia is still unresolved.

Development and installation of the navigation monitoring and electronic fairway marking system the Danube river (ATONS) was finished.

In order to eliminate bottlenecks due to insufficient capacity in the ports in the export season, projects have been started to expansion capacities in the ports Bogojevo, Prahovo, Smederevo, Sremska Mitrovica and the construction of the new port of Belgrade. The total investments value in infrastructure is 200 million euros, while total investments value over 400 million euros.

Serbia is a landlocked country situated at the crossroads of Central and Southeast Europe, in the middle of three geo-political entities: Danube macro-region, Adriatic-Ionian macro-region and Western Balkan 6 initiative.
Figure 45 below presents a schematic overview of how railway network, road network and inland waterways are interconnected in Serbia and integrated into a larger European network.

Figure 75: The main rail, road, and water connections in and through Serbia



Note: The connection to Mediterranean Sea also provides access to Port of Piraeus. There is also possibility to reach Turkish ports, but this is not currently used due to congested Turkish railway infrastructure.
Source: Compass Lexicon based on http://serbia-investment.com/optimal_geographic_location , last accessed on 9 October 2019

The most common choice for the majority of Serbian freight forwarders are the Northern Adriatic ports (Rijeka, Koper, Trieste) when it comes to for East Asian and North American imports goods. The choice of Northern Adriatic ports over Thessaloniki for East Asian and Rotterdam for North American shipments may be interpreted as a choice of cost savings over speed by freight forwarders. Shipments traveling from East Asia to Belgrade via the Suez Canal would arrive more than one day sooner if routed through Thessaloniki. Moving North American goods through Rotterdam to Belgrade would save three days of transit time.

Bogojevo

Total port area is 150,000 m^2, it has a covered storage area and it is equipped with a gantry crane, with the max. lifting capacity of 20 tonnes, and a conveyor belt.

Bogojevo is an open type port with aquatory of 12 m deep. Total quay length is 210m, out of which vertical quay is approximately long 90m. Two vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 6 vessels. On the filled plateau behind the operational shore, a grain silo, a dryer, closed and open warehouses, a truck scale weighing system, an administrative building and gates were built.

The port has silo of 30,000 tonnes and 10,000m2 of covered storage space available for port users. The main types of cargo handled in port are grains, chemical fertilizers, gravel and sand.

Bačka Palanka

The port of Bačka Palanka is located on in the agrarian area of South Bačka.

Total port area is 740,000 m^2, it has an open and covered storage area, it's equipped with a gantry crane, with a max. lifting capacity of 12 tonnes, a mobile crane with a 9-tonne capacity, a floating crane with a 6 tonne capacity, a conveyor belt, pneumatic equipment and a Ro/Ro-ramp.

Total quay length is 322m, all of which is the vertical quay. Three vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 12 vessels.

The depth of water in the port basin ranges from 3.93m to 8.86m. The average size of the vessels reloaded in the harbour is 90m in length, 11m in width, with a capacity of 1,500 tonnes and freeboard of 2.5m. The port handles dry bulk and break bulk cargo. Storage facilities consists in 8,260 m2 of open spaces and 650 m2 closed spaces.

Prahovo

The port covers surface of approximately 6,7 ha. Port of Prahovo is an open type port with maximum available draft maintained at 4 meters. Total quay length is 677m, out of which vertical quay is approximately long 320m. Six vessels can be simultaneously accommodated and serviced. Anchorage has the capacity to accommodate 60 vessels.

Port of Prahovo has the following facilities and devices: conveyor belt, pneumatic equipment, Ro/Ro-ramp and 6 gantry cranes of 40 tonnes lifting capacity per each. When it comes to storage facilities, there is an open storage area, covered storage area and customs warehouse.

Northward, the Danube connects Prahovo to the countries of the Danube basin, all the way to Germany. Through the Rhine-Main- Danube Canal it is connected to Rotterdam and the North Sea, as well as Mannheim, one of the most important transport hubs and the centre of the European chemical industry.

Towards the east, Prahovo is connected by the Danube to the Black Sea and the Port of Constanta, an important international hub for maritime traffic.

SLOVAKIA

Port of Bratislava

Container terminal has a direct regular railway connection by means of container to shuttle trains: Bratislava – Mělník (CZ) and vice versa, Bratislava – Bremerhaven (DE) and vice versa, Budapest (HU) – Bratislava, Rostock (GER) – Bratislava, Koper (SLO) – Bratislava.

Port of Bratislava is connected with 3 maritime ports, port of Koper (SLO), port of Rijeka (HR) and port of Antwerp (NL). by regular rail shuttle service. Connection to port of Koper runs once per week (Saturday). Shuttle to Rijeka and Antwerp should have started in 2021. Unfortunately, exact statistics about number of containers / TEUs transhipped through the corridor are not yet available.

Port of Komárno

No regular maritime connection currently in operation

UKRAINE

This chapter is based on the research conducted for D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo.

Reni port

- Network structure: One of the most important factors influencing the development and operation of the Reni port is its location at the junction of the Ukrainian, Romanian and Moldovan borders and at the intersection of 4 international transport corridors: Cretan No. 7 and No. 9, Eurasian (TRACECA) and Black Sea. At the present time, the cargo flows of the countries of the former Soviet Union, Eastern and Central Europe, as well as the Black and Mediterranean Seas intersect here.
- Maximum size of the vessels: The maximum draft s is 7 m. The maximum length is 170 m. The deadweight is 20.000 tons.
- Port capacity: 10 million tons per year

Izmail port

- Network structure: Port of Izmail is a major transport hub, in which the work of sea, river, rail and road transport is closely intertwined. Due to its advantageous location, the port is a crossroads of important trade routes connecting the countries of the Mediterranean, the Middle East, North Africa with the Danube countries of Western Europe and the CIS countries.
- Maximum size of the vessels: Port can accept vessels whose length does not exceed 150 m, width - 30 m, draft - 7 m. The draft of ships entering the port is limited by the passage depths of the Sulina Canal and the Bystroe Canal on the Ukrainian section of the Danube River.
- Port capacity: the throughput of the port terminals reaches 9.3 million tons per year.

Port of Ust-Dunaisk

- Network structure: The port of Ust-Dunaisk is located in the Zhebryyans'kyi Bay, directly at the entrance to the Kiliya arm, and by its specialization is one of the Danube ports. The sea approach channel to the port of Ust-Dunaisk has a length of 7 km. Another connecting channel, 1.5 km long, runs from the port harbor to the Prorva arm. Port potential: passage of transit cargo; connects the countries of the Danube basin with the countries of the Black Sea-Azov basin, the Mediterranean, the Red Sea and Southeast Asia. It is an integrated part of Transport Corridor 7.
- Maximum size of the vessels: For vessels over 160 m in length and with a draft of more than 7 m, entry and exit from the port through the sea approach channel is allowed only during day hours and with good visibility.
- Port capacity: 5 million tons per year.

6.2 Identification and presentation of the existing/possible maritime services:

AUSTRIA

The relevant information has been presented in section 6.1.

BULGARIA

Port of Varna

Port of Varna is the biggest and busiest Bulgarian port. Ships arrive and depart with all types of cargo each day. The main categories of cargo, transported by sea vessels, are FAME cargo (vegetable oils and animal fats), dry bulk cargo – cereals (mainly wheat, sunflower, corn and rapeseed), coal, packaged and liquid fertilizers, sulfuric acid, general cargo - metals (including metal scrap), clay, foodstuffs and many more.

2020 was the worst year for grain harvest in the last 6-7 years, therefore the port did not process as much grains as in 2019. The main grain products saw a 20% decline from the expected exported amounts, which pass through the port.

As a whole, Port of Varna has processed 7.1 mln. tons of cargo in 2020 – 52% of it was dry bulk cargo, 12% - general cargo, 10% - liquid cargo and 26% - containerized cargo. In comparison, in 2019 the port has processed 8.45 mln. tons of cargo. This is due not only to the bad harvest of grain, but also to the coronavirus crisis, as well as the decrease of containerized cargo handling on a worldwide scale. Port of Varna has handled 12.3% less containers than in 2019, when the handled containerized cargo was 2.1 mln. tons.

Port of Burgas

Port of Burgas is the second biggest in Bulgaria (after the port in Varna), therefore the everyday traffic of vessels on the port's territory is intense as ships arrive and depart daily.

The main types of goods, transported via ships, barges and other vessels, are agricultural production (mainly cereals), metals, inert materials, industrial materials and equipment.

In 2020, port terminals East-2 and West have processed a total of 1 548 554 tons of dry bulk cargo – a 5% increase over the previous year when it was 1 471 109 tons. Port East 2 handles approximately 14 times more dry bulk cargo than Port West. In terms of general cargo, Port East-2 has processed 192 630 tons, while Port West – 732 988 tons. All of the liquid cargo handled at Port of Burgas, is processed in port terminal East-2 – 1 240 084 tons for 2020. Contrary to that, all of the containerized cargo is handled in Port West – 1 230 740 tons.

In terms of cereals/grain, the two port terminals are evenly matched. East-2 has handled 639 233 tons, while the processed cargo for West was 594 137 tons.

The overall processed cargo in the two port terminals for 2020 is 6 178 366 tons.

HUNGARY

As regards arranging of transport, predictability is a key challenge in IWT. Hungarian Danube ports are willing to adapt maritime ports' practices considering the note of readiness. However, ETA

(estimated time of arrival) is frequently not predictable due to the tons of unexpected environmental factors (weather, water level, navigability, ports' unequal price policy etc.).

ROMANIA

Port of Constanta

The port has ten terminals for bulk cargoes. The dry bulk cargoes (iron and non-ferrous ore, grain, coal, coke, cement, construction materials, phosphate etc.), are operated in specialized terminals located next to the river-maritime basin. There are specialized terminals that operate iron ore, bauxite, coal and coke have 13 berths. There is specialized terminal where fertilizers, phosphate, urea, apatite and other chemical products are operated.

The port is an important node in integrated logistics chains, offering through the five tri-modal terminal quick and safe access to port facilities from an inland transport system including inland water, railway system and road access. Currently there are a limited number of containers moving inland by water freight.

For oversized and over weighted cargoes in the Port of Constanta, private companies provide heavy lift cranes that facilitate the handling of heavy lift and out-of-gauge loads.

The port has an excellent road connection directly to highway A2 to Bucharest. Currently, the highway infrastructure is under development being focused on a continuous network to the north-west part of the country and the Romanian-Hungarian border. These road link will provide faster time of transit especially for containers and general cargo transiting Romania and Port of Constanta.

Port of Galati

The Galati port is the largest sea-river port, respectively the second largest port in Romania, with access to the Danube maritime sector and the Black Sea through the Sulina Chanell and the Danube-Black Sea Chanell. Galati Port is located on the left bank of the Danube, from km 77 to km 148+900, is managed by the National Company Maritime Danube Ports Administration SA Galati; has a total of 56 operating berths. We mention that the access to the Port of Galati can be done by river and sea vessels (max. 15,000 DWT). However, the capacity and draught of ships admitted to operation and which may reach the port are conditioned by the minimum depth of the Danube recorded at Sulina Channel.

SLOVAKIA

In Slovakia, there are no regular barge feeder lines to/from any seaports. Connection between port of Bratislava and maritime ports is covered by rail shuttle service that is 100% dedicated to container transportation. Major constraint is in low demand for container transhipment in general

UKRAINE

Reni port

The Reni Sea Port is equipped with an extensive network of railways, with a large amount of loading/unloading machinery and lifting devices (with the capacity of up to 250 tons). The main characteristics of the Port of Reni:

- port territory is 94.36 hectares;

- harbor area is 40.28 hectares;
- port fleet vessels - 5 units (fire and rescue boat, launch boat, a floating crane, waste collection vessels);
- push convoys - 6 units (the owner - state enterprise "Reni Commercial Sea Port");
- auxiliary vessels - 4 units.

On March 23, 2000, the Law of Ukraine "On Reni Special Economic Zone" came into force. The SEZ "Reni" was created for a period of 30 years in Reni port. The total area of SEZ "Reni" is 94.36 hectares.

In the port of Reni has the following cargo handling equipment. Cranes used for handling goods: “Albatross” type with lifting capacity -10t, “Sokol” type with lifting capacity - 16-20t, “Condor” type with lifting capacity - 32-40t. The port also has one KATO truck crane with a lifting capacity of 50 tons, overhead crane with a lifting capacity of 250 tons, floating cranes - with lifting capacity from 5 to 100 tons, auto and electric loaders with lifting capacity from 1.5 to 10 tons, special tractors, roll trailers, grain all-weather pneumatic loader, wagon unloader. Most of the transhipment technologies at the port are at the end of their life cycle and new cargo handling equipment is needed.

Detailed description of port facilities, technological and operational parameters is given in D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo.

The geographical location and significant agricultural production potential of the region allow port to handle more than 1.5 million tons of grain cargo annually. Transshipment of grain cargo is carried out on the 15 berths of the first and second cargo areas of port, which make it possible to accept vessels with a draft of up to 7 m using several technologies: grab unloading of ships, unloading according to the direct option from a grain carriage through an elevator, as well as by means of private terminal operators: “Reni elevator” LLC and “Reni-Line” LLC. Since the port does not have its own storage tanks, grain is reloaded according to the direct option (wagon - grain carrier - vessel), the transshipment rate is 1000 tons per day on a working day with favorable weather conditions.

In Chapter 3 of this report main terminal and port operators (both state and private), providing services of agricultural cargo handling, of the port of Reni were described.

Storage of grain cargo is carried out at the “Reni elevator” LLC, which was described in Chapter 3 of this report. Loading is managed by trucks and wagons through direct option and through warehouse. The capacity for one-time storage is 40 thousand tons.

In accordance with the Law of Ukraine "On the special economic zone "Reni", a terminal for the transhipment of grain and the production of compound feed is operating on the territory of the Reni port by "Reni-Line" LLC with a capacity of 200 thousand tons per year, on the territory of which technological lines have been put into operation, allowing to carry out loading grain onto ships, both from railroad and road transport. The possibility of the complex for one-time storage is 20 thousand tons.

The grain potential of the port of Reni is the main cargo turnover, which consists of grain cargoes transported to/from Moldova, about 250 thousand tons of sunflower and 50 thousand tons of grain, which is about 30% of the cargo turnover of the port of Reni.

- Grain handling in 2019 - 765,34 thousand tons;
- Grain handling in 2020 – 367,35 thousand tons.

In 2020, 763 thousand tons of general and bulk cargo were transported to/from the port of Reni by maritime transport.

Izmail port

This port is one of the most modern and highly equipped Ukrainian ports on the Danube. Due to its favorable geographical location, this port is a European gateway of Ukraine. It's an important transportation link, connecting countries of Central and Northern Europe with the countries in the Black and Mediterranean Seas. This port is a large transport hub, where different types of maritime, river, railway and road transport are interconnected. The navigation of Izmail is provided year-round and 24 hours per day. Port has 24 berths with a total length of 2618.6 m. The capacity of the berths of the port allows accepting and handling cargo operations for vessels with following parameters: draft of up to 7 meters, length of up to 150 meters, width of up to 30 meters, deadweight of up to 6000 tons.

The port berths are equipped with handling equipment, such as gantry cranes: "Albatross" type with lifting capacity -10t, "Sokol" type with lifting capacity 16-20t, "Condor" type with lifting capacity 32-40t, floating cranes with lifting capacity up to 100 t, auto and electric loaders of various carrying capacities, etc. For auxiliary operations - tractors, bulldozers, cranes other equipment are available.

Detailed description of port facilities, technological and operational parameters is given in D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo.

Bulk cargo is handled in the seaport of Izmail: pellets, grain; general cargo: cargo in big bags, paper and cellulose, packaged cargo of indoor and outdoor storage and others from land transport to sea and river vessels.

In Chapter 3 of this report main terminal and port operators (both state and private), providing services of agricultural cargo handling, of the port of Izmail were described.

Grain handling in 2019 - 11.38 thousand tons.

Grain handling in 2020 - 0 tons.

Due to weather conditions (rain, snow, humidity, etc.), the port of Izmail periodically restricts cargo operations with grain.

Port of Ust-Dunaisk

Ust - Dunaisk port carries out warehouse operations, transshipments and freight forwarding services for transit, foreign trade and domestic cargo. Cargo is delivered by self-propelled vessels, non-self-propelled barges and lighters. At the present time, maritime area doesn`t have any berths or other hydrotechnical structures. There are 3 anchorages for the berthing of the vessels being handled, but significant depths maintenance is required. River cargo area includes cargo berth of the port-point of Kiliya specialized in handling bulk cargo. Grain processing complex is located in the port-point of Kiliya. Berth length - 150 m. Depth at the berth is up to 4.4 m. The port has gantry (only in the port-point of Kiliya), floating and truck cranes, auto and electric forklifts. For manoeuvring of convoys with non-self-propelled vessels and rearrangement of floating cranes, the port has pusher tugs and tugboats. A berth of the port-point of Kiliya is equipped with 4 portal cranes: «Albatross» type with a carrying capacity of 10 - 20 tons, 3 cranes of "Gantz" type with a lifting capacity of 5 - 6 tons. At the same time, it has to be mentioned that only 2 portal cranes are in operation, because the other two require maintenance.

Storage of goods is managed on the territory of the port-point of Kiliya in a warehouse with an area of 960 sq. m. and open storage areas with a hard surface with a total area of 1415 sq. m.

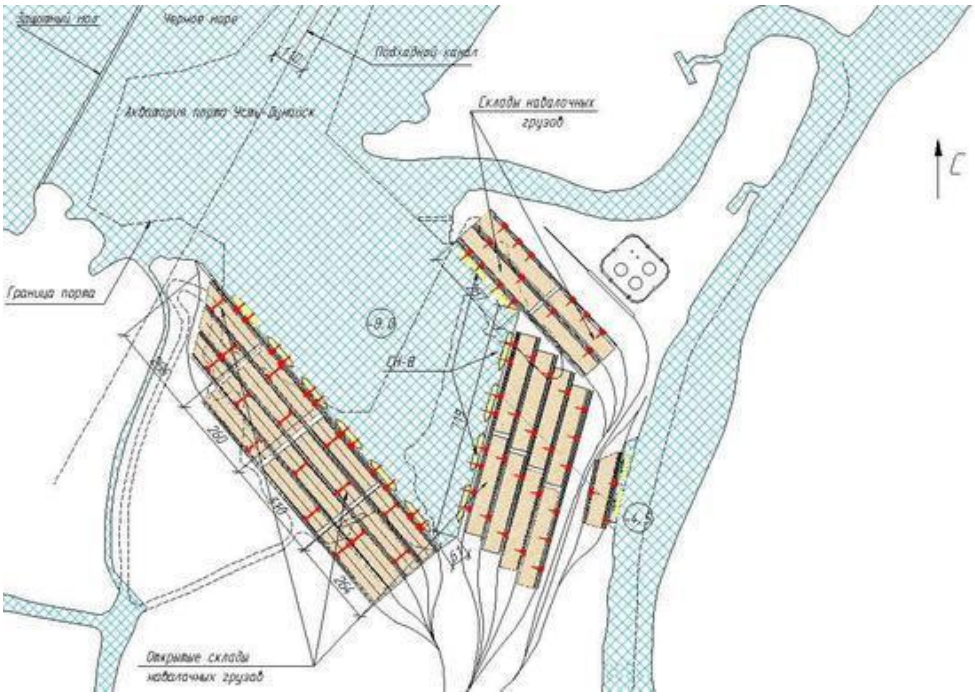
Detailed description of port facilities, technological and operational parameters is given in D_T2.2.1: Status-quo & Mid-Term Perspective Danube Ports Infrastructure; D_T2.1.1: Multimodal infra- and suprastructure facilities and services; D_T1.1.2: Transport Infrastructure Status Quo.

The port of Ust-Dunaisk has two cargo areas - maritime and river cargo areas.

The main services of the port are:

- loading-unloading of vessels;
- transshipments of cargo from river-going vessels to the sea-going vessels and vice versa;
- passenger services;
- freight forwarding and warehousing operations;
- servicing of unpowered fleet;
- navigation safety at the water area of the port, informational support;
- international activities;
- ensuring safety of mooring;
- agency and other administrative services, towing operations.

Figure 76: The layout of warehouses location at the port of Ust-Dunaisk



Grain handling in 2019 - 51.20 thousand tons.

Grain handling in 2020 - 21.30 thousand tons.

In Chapter 3 of this report main terminal and port operators (both state and private), providing services of agricultural cargo handling, of the port of Ust-Dunaisk were described.

6.3 Conclusions on the existing maritime infrastructure connections

AUSTRIA

The Austrian Danube ports are well connected to ports along the 4 TEN-T corridors.[62] The Port of Vienna is one of the most important hinterland hubs in Europe, especially for the large North Sea ports and the Adriatic ports. The main destinations on waterway at the Port Vienna are for the hub function Constanta and Rotterdam and for the gateway function Europe and Asia upstream, downstream, charter.

Ennshafen Port can be reached by water via the Enns, Danube and the Rhine-Main-Danube-Canal. There are regular sailings since July 2015 with two vessels from Passau, Enns, Vidin to Ruse or any other Ro/Ro-Ports according to requirements. Ennshafen links the North Sea to the Adriatic.

The Krems Port is the Central European handling hub for import and export for foreign ports in north-western Europe down to the Black Sea.[63] Main transport destinations/origins are along the Rhein-Main-Donau (Rhine-Main-Danube) waterway. Pre-carriage and onward carriage are done for sea transport via ARA- and Black Sea ports.

The Linz Port is connected to the ARA-ports, Germany, and Hungary

BULGARIA

The port system of the Republic of Bulgaria consists of two types of ports – seaports (situated on the Black Sea coast, which represents the country's eastern border) and river ports (situated along the Bulgarian part of the Danube river, which represents the country's northern border). The country's „main" TEN-T network includes the Burgas sea port, as well as the inland waterway ports Ruse and Vidin. Within the „large-scale" TEN-T network lie the Varna sea port and the inland waterway ports of Lom, Oryahovo, Svishtov and Silistra. The national port system of the Republic of Bulgaria currently has 14 628 m. overall length of the quay front in the seaports for public transport and 13 964 m. in the river ports for public transport.

The density of the existing port infrastructure is high and there is free port capacity available. However, most Bulgarian ports were built at the beginning of the last century, which negatively affects their technical condition.

A number of ports in Western Europe have the necessary infrastructure to achieve a quality development and can offer not only services, related to their main activities, but also additional ones, such as logistics. These ports possess the warehouses needed for this activity, covered and opened storage areas and the necessary equipment (front, back and specialized mechanization). In addition, most of them are situated near airports, while roads and railways connect them to the transport network. In that regard, Bulgaria's seaports Varna and Burgas are not an exception and are not inferior to their competitors in other countries. It is still necessary to speed up the update of port infrastructure

and technology equipment and improve the links with the technical and onshore transport infrastructure

CROATIA

Infrastructure facilities on waterways within Vukovar-Srijem County are few. In addition to the port of Vukovar and two passenger terminals (Vukovar and Ilok), there is also a loading dock in Ilok which is of a temporary nature and serves to service the needs of the local industrial facility.

Damage to security facilities was found on the Danube River in 23 out of a total of 87 facilities. The most critical places are in the part between rkm 1404.5 - 1402. Due to the formation of the embankment a double bed of the Danube was formed with a simultaneous erosion of the right bank with a tendency of water penetration of the Danube into Kopački rit and the movement of the river flow towards the right bank. On the left side, coastal erosion has damaged both existing protective structures and the coast.

The most important project related to the use of the potential of the Danube and Sava is the Multipurpose "Danube-Sava channel", which would better connect the rivers Danube and Sava, shortened the waterway from Europe to the Mediterranean Sea and enabled the development of ports, harbors and ports in the interior counties along the route of the canal which would enable the development of the economy and other activities related to waterways and urban development, provision of water for irrigation in agriculture, forestry, environmental protection, etc. In addition, the project of arranging the Sava waterway and raising the class seaworthiness to category IV would re-establish international traffic to Sisak.

HUNGARY

Hungarian inland ports have two main export destinations:

- ARA ports (Amsterdam, Rotterdam, Antwerp) and Western European inland waterways
- Constanta, Lower Danube and the Black Sea

ROMANIA

Port of Constanta

Port of Constanta is both river and maritime port with a geo-strategical position that favors the position of hub for this region.

Before 2009, the port was a container hub relying mainly on its road connections to the hinterland. After the economic crisis the hub moved to the ports in Istanbul region and later another hub appeared when Chinese investors bought the port of Piraeus.

Unfortunately, the road connection improved slowly. The highway network still does not offer a complete motorway connection with Budapest or the North West part of Romania creating the premises to regain the share of the markets lost after 2008. Construction works are underway and in the couple of years this connection will ensure better road connections to the hinterland.

Currently, the rail network is the main downside for the development of container traffic because of its low commercial speed. This situation favors ports like Koper and Hamburg that have developed regular railway services in this part of Romania.

Now, the port is a hub for agri-bulk cargoes, River Danube being the most efficient way for the transit of bulk cargoes towards Constanta port and its hinterland. It still needs predictability in order to attract other types of cargoes – containers, but also to improve its navigation conditions for the existing transiting cargo flows.

As conclusion, the maritime infrastructure of Constanta Port offers very good conditions for the transit of different type of cargoes. Its connections, especially railway connections, needs a strong development and improvement in order to use the entire maritime and river potential.

SLOVAKIA

Public ports in Slovakia are mainly focused on:

- transport / transshipment of iron pellets, fertilizers, and mineral oils (Bratislava)
- transport / transshipment of agricultural production (Komárno)

Mentioned sectors are not generally related to transcontinental / maritime transportation. Only sector that might be currently related to maritime transport is container transshipment. However current needs of container transportation are provided by road and railway.

UKRAINE

The existing potential for the transportation of grain cargo by Danube until today in Ukraine remains untapped. Large majority of cargo is delivered to seaports by wheeled transport (trucks and railway wagons). In fact, both methods of transporting goods are the highest in the supply chain: temperature conditions on the roads, lack of grain carriers, both trucks and wagons, etc. The development of river transportation of goods should not only reduce the cost and optimize the transportation of agricultural goods, but also exclude unnecessary links from the logistics chain due to river anchorage transshipment services.

To conclude aforementioned, it can be resumed that Ukrainian ports on Danube, which have a status of maritime ports have necessary infrastructure to handle the volume of agricultural goods of the region, but there is a need for capacity modernization.

Thus, reconstruction of certain berth in the port of Reni and capital maintenance works are required to be carried out in the harbor of the port of Ust-Dunaisk. Also, cargo handling equipment needs significant modernization. All the aforementioned activities require comprehensive investment. The investment proposals developed by state enterprise “Ukrainian sea ports authority” are presented on the website - http://investinports.com.

Following below are the main strategic development projects, which are envisaged for maritime infrastructure in ports of Reni, Izmail and Ust-Dunaisk with regards to future investment needs for agricultural Danube ports. According to the Law of Ukraine "On the Sea Ports of Ukraine" and the plan

for the development of Reni, Izmail and Ust-Dunaisk for short (up to 2018), medium (till 2023) and long-term (until 2038) perspective certain major projects for ports needs with regards to agricultural cargo handling were identified.

Major investment projects for agricultural cargo handling in **Reni port** are following:

1. Project of the development of the cargo-handling terminal at the berths №№ 34, 35, 36, 37 of the port of Reni foresees creation in the zone of berths №№ 34, 35, 36, 37 a berthing line having total length of 443.6 m, and a universal terminal for handling cargo in export / import / transit mode. It will provide a reconstruction of the transhipment terminal existing capacities, which currently is 1 million tons per year.
   Main technical characteristics:

- Specialized multipurpose transshipment terminal;
- Open sites' total area: 6.1 ha;
- Available simultaneous storage of 200 thousand tons of cargo;
- Number of portal cranes – 6 units (load capacity – 10 tons);
- 5 railway lines;
- Railway cargo loading front 1886,19 m.

2. Reconstruction project of berth № 7 in Reni port with a total length of 83 m., to create new handling capacities for grain and food cargoes.
3. Construction project of a transshipment terminal for grain and packaged cargo of "Agro-Reni" LLC to increase the capacity for handling of cargo - up to 500 thousand tons per year and the total capacity of the terminal for one-time storage - up to 30 thousand tons;
4. Construction project of a terminal of temporary storage facilities for the private enterprise "Trans-Expo", which will allow increasing the capacity for handling of cargo to up to 650 thousand tons per year, the total capacity of the terminal for one-time storage to up to 25 thousand tons;
5. Construction project of a grain terminal of "Reni-Line" LLC to increase the capacity for handling of grain cargo to up to 200 thousand tons per year, which will also include installation of 4 silos and expanding of the total capacity of the terminal for one-time storage to up to 25 thousand tons.

Investment projects for agricultural cargo handling in **port of Izmail**:

1. "The construction of 2 berths of a bulk cargo handling terminal with the capacity of up to 2.2 million tons per year in the southern part of the harbor 90 km of Izmail seaport". Terminal will include two berths №№ 27, 28.

2. "The construction of new and reconstruction of existing objects of road transport and railway infrastructure".

Figure 77: Scheme of the drawing of main strategic projects of Izmail sea port development plan

Investment projects for agricultural cargo handling in **port of Ust-Dunaisk**:

1. Construction of new terminals at the Kiliya harbor for bulk cargo handling;
2. Construction of cargo handling complexes and reconstruction of existing berths and other structures;
3. Construction of new and reconstruction of existing road transport infrastructure;
4. Reconstruction of the project depths at the port water area, which will allow to call vessels for handling up to 50 thousand tons and above with a draft of 13.5 m.

7 Existing and status of the port infrastructure for agricultural ports

AUSTRIA

Overview of the agricultural freight loaded and unloaded in Austrian ports

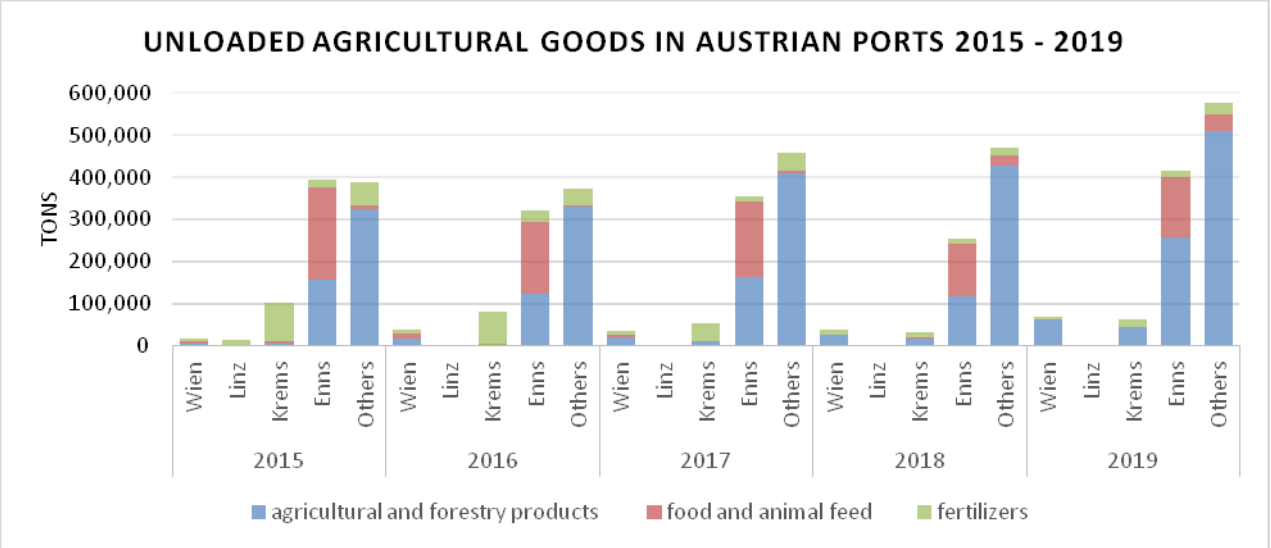
In 2019, most of the agricultural, forestry and fishery products in Austria were transported via road (34.809 million t). 7.210 million t were transported via railway and just 2.029 million t by IWW (Danube). However, transport via Danube gained massively in importance as compared to 2018 (+63%). In percent, the modal split of agricultural goods in Austria 2019 was: ca. 79,03% on road, 16,37% on railway and approx. 4,06% on the Danube waterway.

The most notable increase 2019 was observed in the transport of goods of the category "Agriculture and Forestry; Fisheries" with 63,1%, (0,8 million t) to 2,0 million t. Mainly responsible for thegrowing numbers were the two sub-categories "Grain" with + 57, 0% (0,3 million t) to 0,8 million t and "Other products of plant origin" with + 96,8% (0,5 million t) to 1,0 million t.

The largest customers for agricultural goods transport on the four public ports in Austria are Raiffeisen Ware Austria, Agrana Beteiligungs-AG, Garant - Tiernahrung GmbH and Cargill Austria Handelsgesellschaft m.b.H. These companies can make up to ½ - ¾ of whole freight volume. Company Borealis LAT handles large quantities ex-Linz, directly shipped from their production location. Münzer Bioindustrie is the largest biodiesel producer in Austria and has a production unit in harbour Lobau in Vienna. Further smaller freight volumes are handled e.g. for breweries.
Apart from the 4 main Danube ports relevant for agricultural transport, there are some private transhipment points such as Pischelsdorf, operated by Donau Chemie with Agrana as main customer; Aschach an der Donau with main customers RWA Raiffeisen Ware Austria and Agrana; Pöchlarn with serving main customer Garant Tiernahrung; Korneuburg serving the Korneuburg agricultural warehouse.

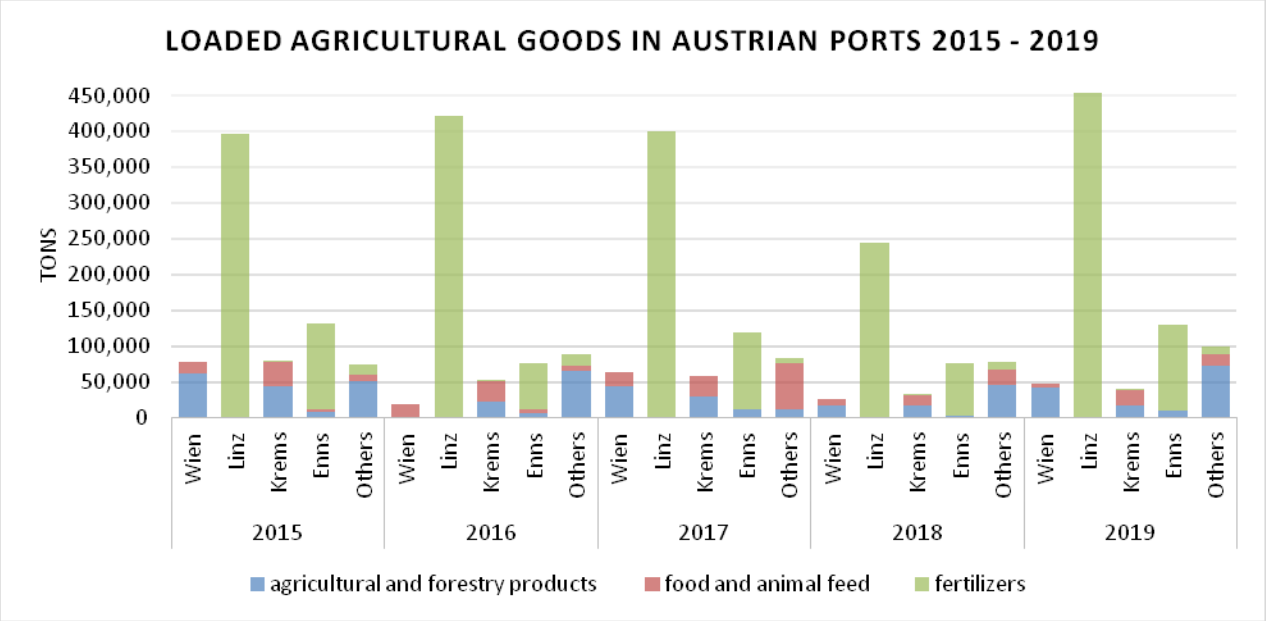
On the Austrian Danube section are handled mainly import commodities from Hungary, Croatia, Serbia, Romania. Austrian ports are well equipped with equipment for handling agricultural products (loading hoppers, silos - mostly all certified, big bag filling systems, etc.).
Austria generally has few bottlenecks. The only one worth mentioning, the Hainburger Au is being closely monitored by viadonau.

Figure 78: Unloaded agricultural goods in Austrian Ports 2015 – 2019



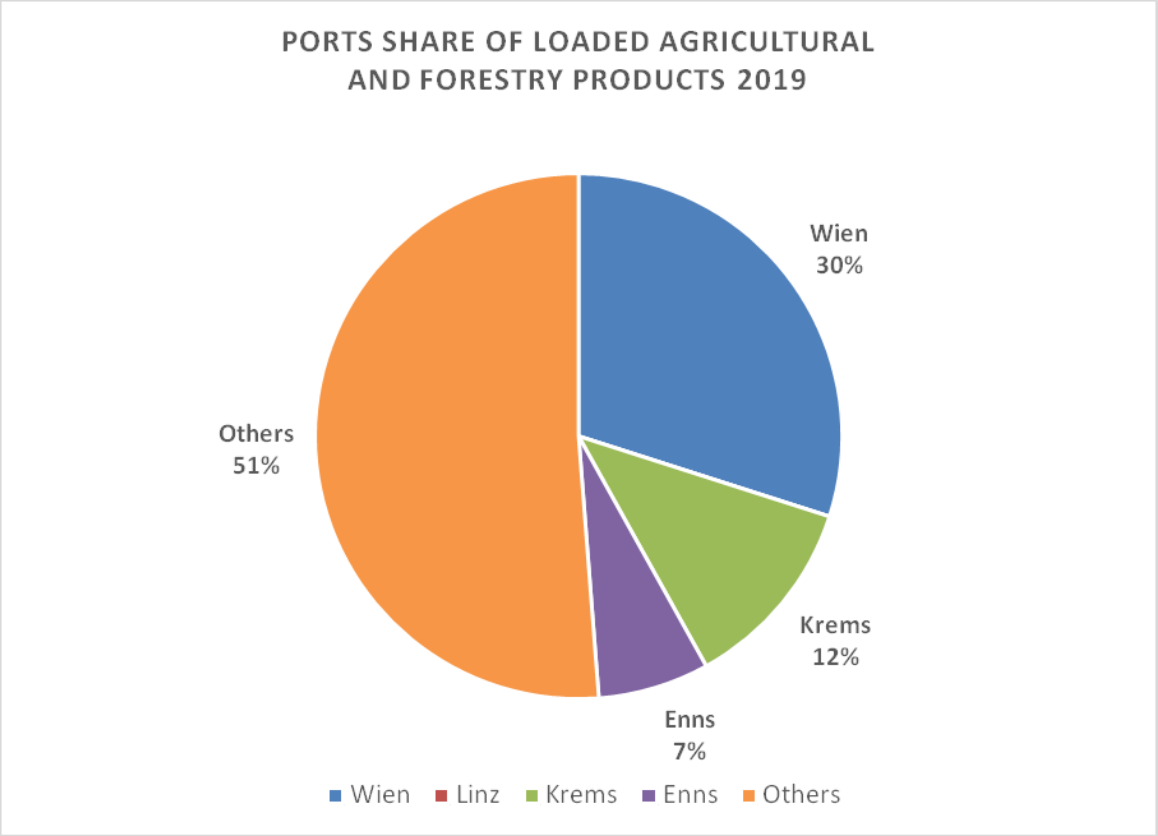
(Data from viadonau / Statistik Austria)

Figure 79: Loaded agricultural goods in Austrian Ports 2015 – 2019

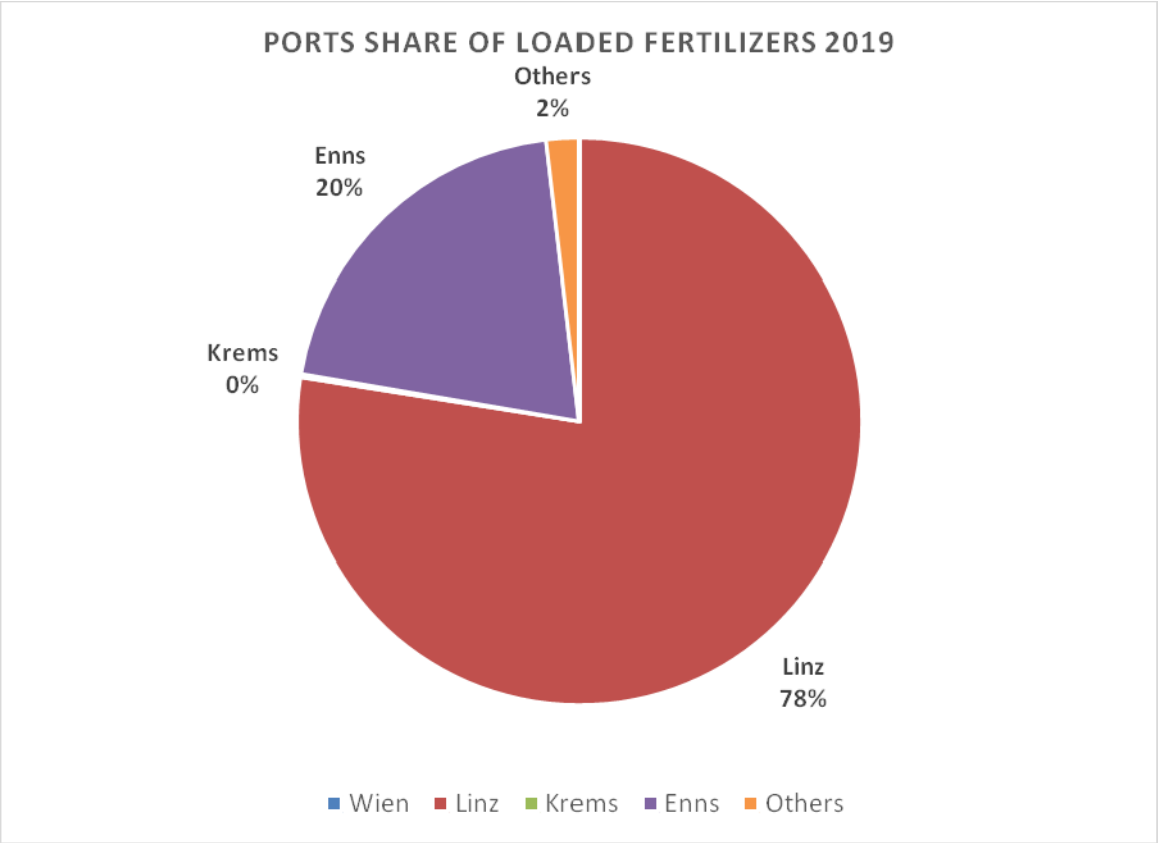


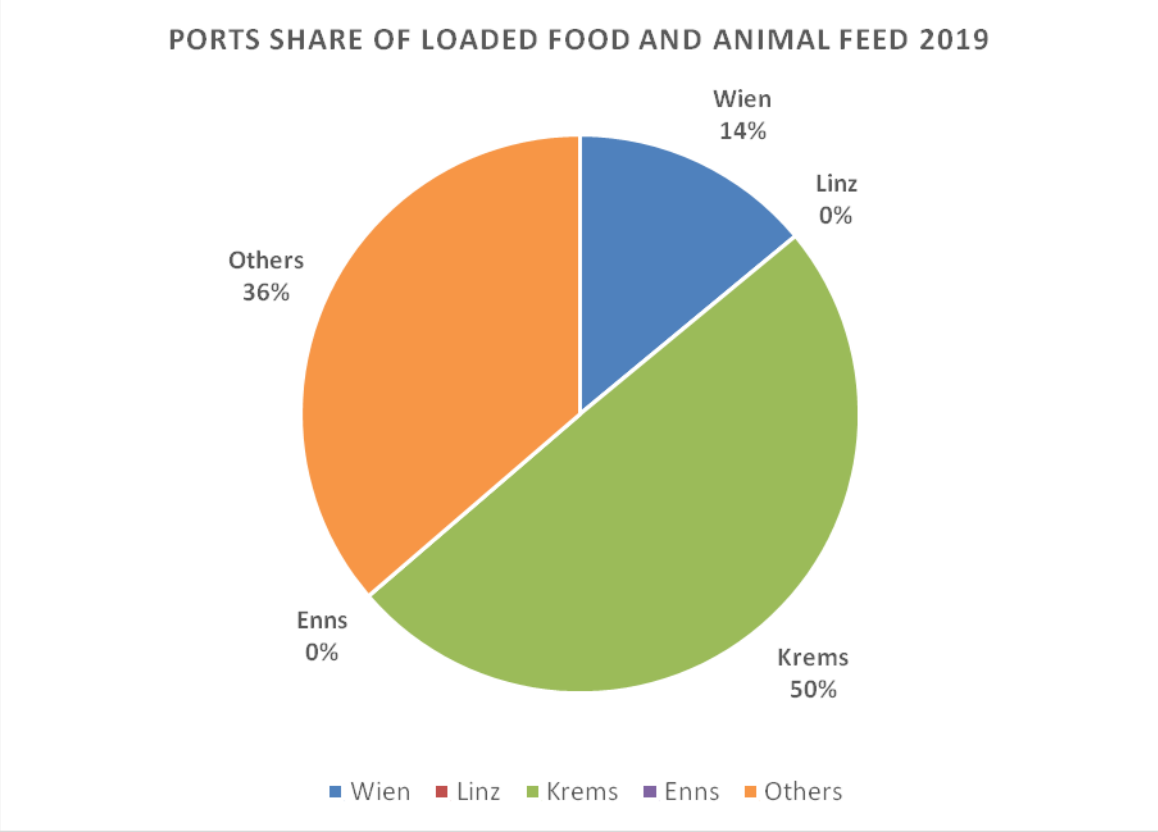
(Data from viadonau / Statistik Austria)

Figure 80: Transshipment point on the Austrian DanubE[74]



74 https://www.viadonau.org/fileadmin/user_upload/Manual_on_Danube_Navigation.pdf


PORTS SHARE OF LOADED FERTILIZERS 2019
Others
2%
Enns
20%
Krems
0%
Linz
78%
Wien
Linz
Krems
Enns
Others


PORTS SHARE OF LOADED FOOD AND ANIMAL FEED 2019
Wien
14%
Linz
0%
Others
36%
Enns
0%
Krems
50%
Wien
Linz
Krems
Enns
Others

Transhipment points on the Austrian Danube

The following important transhipment points are located along the Austrian Danube:

Transhipment point	River-km	Type	Website & email
Aschach an der Donau	2,160	Transhipment site	www.garant.co.at office@garant.co.at
Linz commercial port	2,131	Port	www.hafenlinz.at hafen.linz@linzag.at
Linz oil port	2,128	Port	www.hafenlinz.at hafenlinz@linzag.at
Linz – voestalpine	2,127	Port	www.voestalpine.com info@voestalpine.com
Linz – ILL	2,127	Port	www.ill.co.at office@ill.co.at
Linz Feldermayr*	2,125	Port	www.feldermayr.cc hafen@feldermayr.cc
Ennshafen	2,112	Port	www.ennshafen.at office@ennshafen.at
Ybbs	2,068	Port	www.schaufler-metalle.at office@schaufler-metalle.com
Pöchlarn	2,045	Transhipment site	www.garant.co.at office@garant.co.at
Rhenus Donauhafen Krems	1,998	Port	www.rhenus-hafenkrems.com donauhafen@at.rhenus.com
Pischelsdorf	1,972	Transhipment site	www.donau-chemie.at office@donau-chemie.at
Korneuburg – MOL	1,943	Transhipment site	www.motaustria.at office_wien@motaustria.com office@motaustria.at
Korneuburg – Agrarspeicher	1,941	Transhipment site	www.agrarspeicher.at office@agrarspeicher.at
Vienna-Freudenau	1,920	Port	www.hafen-wien.com office@hafenwien.com
Vienna-Albern	1,918	Port	www.hafen-wien.com office@hafenwien.com
Vienna-Lobau	1,917	Port	www.hafen-wien.com office@hafenwien.com

Source: viadonau

* located on the river Traun

Transhipment points on the Austrian Danube

Port of Vienna - Albern

In the port of Albern there are five large grain silos on the site with a capacity of 90.000 tons. Albern is the most important grain handling location in Eastern Austria.

There are some major customers such as company Bioprodukte Pinczker GmbH specialised on handling of organic grains for REWE Austria and Raiffeisen Lagerhaus/Ware. Both companies invested in their own grain silo. Raiffeisen Lagerhaus operates its own grain silo in Albern. Loading and storage facilities in Albern are mostly regulated by customers (70-80 million euros invested in the port infrastructure by customers directly).

Figure 81: Loaded agricultural goods in the port of Vienna – Albern 2015 – 2019(data from viadonau / Statistik Austria)

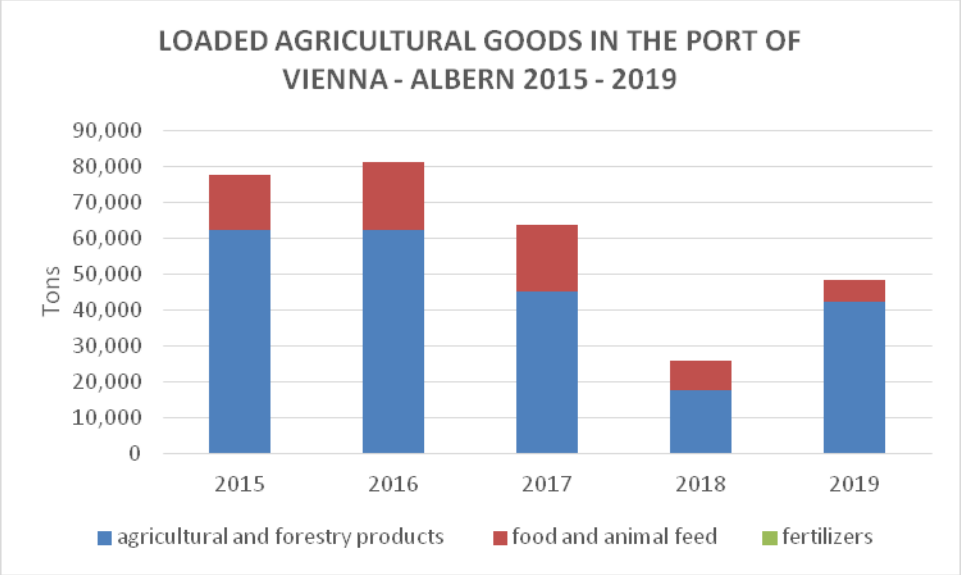
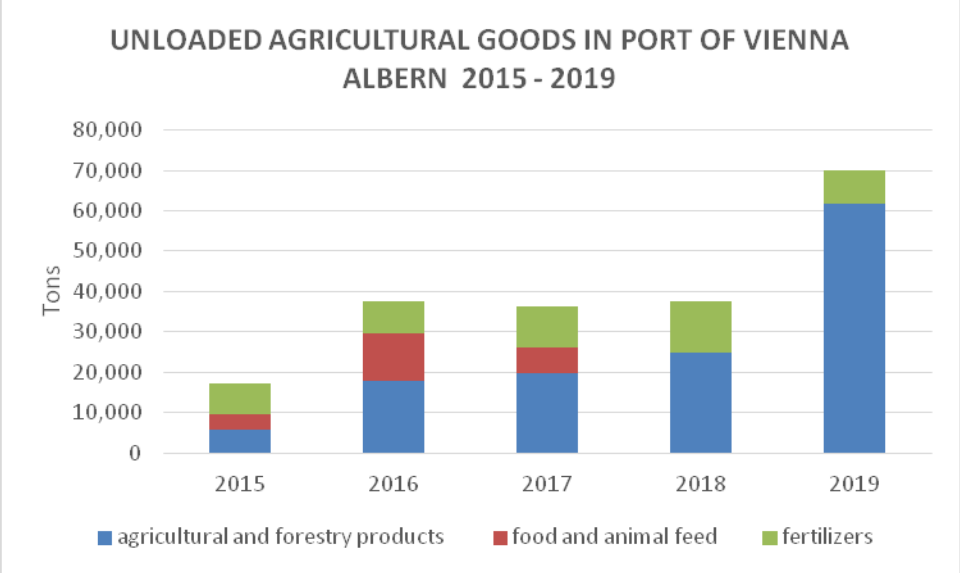


Figure 82: Unloaded agricultural goods in the port of Vienna – Albern 2015 – 2019



In following relevant facts & figures regarding the infrastructure of the Port of Vienna – with all threebasins Albern/Freudenau/Lobau[75]:

[75] Port of Vienna-Freudenau, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

Storage facilities

- Outdoor storage area: 200.000 m^2
- Covered storage area: 70.000 m^2
- Special storage: 2.900 m^2
- Storage for hazardous materials
- Animal fodder
- Cement silos
- Cold storage
- Crude oil: 200 000 m^3
- Customs warehouse: 55.000 m^2
- Fertilizers
- Free port zone/area 245.000 m^2
- Grain silos (4 silos): 90.000 m^2
- Natural gas
- Rack storage: 12.500 m^2
- Reefer services
- Other storage area

Container

- Container storage yard: 120.000 m^2 / 10.000 TEU
- Empty container/depot: 100.000 m^2 / 7.000 TEU 135 trailer slots (with option +80)
- 90 block trains / week

Transhipment

- Max. total transhipment volume: 2.000 TEU/d
- Conveyor belt
- Bridge cranes 84 t
- Forklifts <3t: 5
- Forklifts >5t: 6
- Gantry cranes (with spreaders): 3 x 45 t
- Lumber stackers
- Mobile cranes
- Paper clamps: 2
- Reach stackers (with spreaders): 15 x 45 t
- Ro-Ro ramp for cars
- Ro-Ro ramp for trucks
- Semi-trailer transportation vehicle: 1
- Wheel loader
- Further transhipment devices (with spreaders): 8 stackers for empty containers
- 4 transhipment platforms for block trains

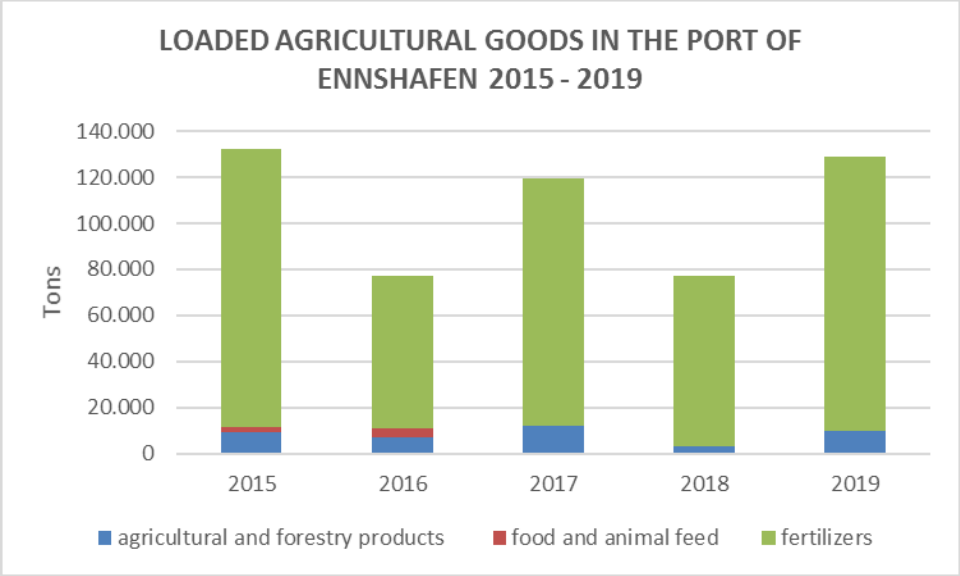
High & Heavy loads

- 4.000 m^2 area for handling heavy cargo at the Port of Albern
- Handling of loads of up to 450 t in regular operation

Port of Ennshafen

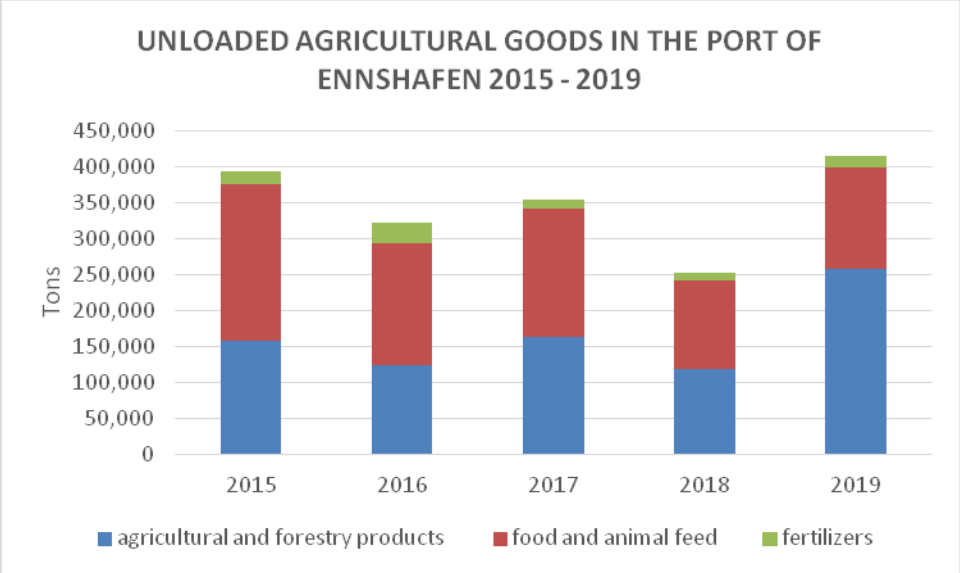
Most agricultural goods loaded at the Port of Ennshafen are fertilizers. The unloaded freight is made up of agricultural products as well as of food and animal feed.

Figure 83: Loaded agricultural goods in the port of Ennshafen 2015 – 2019



(data from viadonau / Statistik Austria)

Figure 84: Unloaded agricultural goods in the port of Ennshafen 2015 – 2019(data from viadonau / Statistik Austria)



Facts & figures regarding the infrastructure of the Port of Ennshafen:[76],[77],[78]

Infrastructure

- High and Heavy transport via mobile cranes
- Ro/Ro-transhipment at the Ro/Ro terminal in Ennsdorf
- 8.500 m^2 of storage space available, directly connected to the ro-ro ramp

Handling facilities and devices

- Covered water transhipment
- Conveyor belt
- Pneumatic equipment
- Ro/Ro-ramp
- 6 Gantry cranes, max. lifting capacity 45 (4x45,40,16 t) (single use)
- 11 Mobile cranes, max. lifting capacity 41 t (single use)

Transhipment

- Container
- General cargo
- Bulk cargo
- Conveyor belt
- Forklifts <3 t, 3-5 t and >5 t
- Gantry cranes
- Lumber stackers
- Mobile cranes
- Paper clamps
- Pneumatic equipment
- Pump
- Reach stackers
- Ro-Ro ramp for cars and trucks
- Spreader
- Wheel loader
- Further transhipment devices

Container terminal

- Capacity: 500.000 TEU
- Covered area: 275.000 m^2
- Quay length: 630 m
- Number of tracks in the terminal: 10, each 720 m long (for block trains)
- Inexpensive rail access directly to the terminal
- Transfer station: currently six tracks, each 690 m long, three more tracks

[76] Container Terminal Enns Ennshafen, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

[77] Ennshafen FACT SHEET 2019, Jan. 2020

[78] https://www.danube-logistics.info/danube-ports/profiles/action/port/country/Austria/port/76/pfc/Profile/

Companies in the agricultural & bioenergy industry based at the Ennshafen and using the port infrastructure are:

- Beiselen Ges.m.b.H, http://www.beiselen.at (seeds, fertilizers, agricultural products, crop protection products)
- Biomontan Produktions-u. Handels GmbH, https://www.biomontan.com/de/Umwelttechnik (environmental engineering and biogas)
- EHA Ennshafen Agrar Handel GmbH and Fixkraft-Futtermittel GmbH, https://www.fixkraft.at/unternehmen/ (animal feed, including a production plant on the grounds ofthe Ennshafen port)
- Fuchshuber Agrarhandel GmbH, https://fuchshuber.online, (Purchase, storage, processing and marketing of grain & oilseeds; trade with animal feed, fertilizers, pesticides, seeds and fuels. Operates silo facilities of around 100,000 tons, with a total storage volume for loose bulk goods of 300,000 tons)
- Lithos Crop Protect GmbH, https://lithosprotect.at/about-us/?lang=en (crop protection)
- VFI GmbH, https://vfi.co.at/de/, (organic oils for the food industry, conventional oils and fats, packed oils for catering and retail. Seed crushing facility at the Ennshafen port)

The operators in the port offer services such as as transshipment, heavy cargo transshipment, warehousing, packaging, and bunkering.[79]

Figure 85: Transshipment companies map

Transshipment companies operating at the Ennshafen port are Bunkerstation Galaxy Power GmbH,

[79] https://www.ennshafen.at/wp-content/uploads/2019/07/Ansiedlerplan_U-Betriebe_EN.jpg

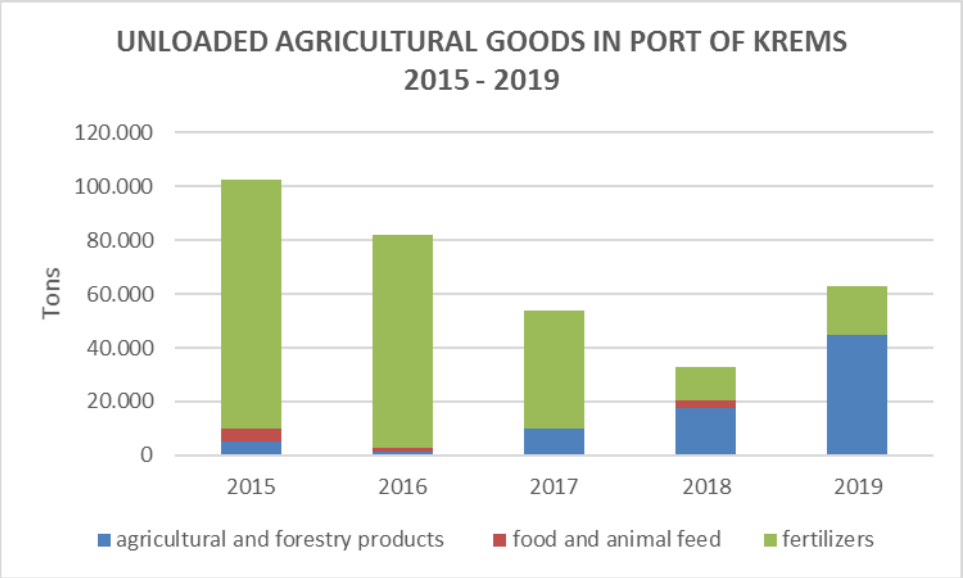
Container Terminal Enns GmbH http://www.ct-enns.at, Danubia Speicherei Ges.m.b.H. http://www.danubia-speicherei.at, Donausäge Rumplmayr GmbH http://www.ruru.at, Fixkraft

Futtermittel GmbH (plant) http://www.fixkraft.at, Fuchshuber Agrarhandel GmbH http://www.fuchshuber.com, LITHOS Industrial Minerals GmbH http://www.lithos-minerals.at, Johann Neumüller GmbH http://www.eisen-neumueller.at, rimagaz GmbHhttp://www.primagaz.at, and Rauch Recycling GmbH & Co KG http://www.rauch-recycling.com.

Relevant agri-customers are BOREALIS and LIKRA Tierernährung, BOREALIS has production facilities in Europe (e.g. Quevilly plant in France) for nitrogen fertilisers and technical nitrogen products. The fertilisers are transported by vessels with a loading capacity of up to 15 000 tons which dock and tranship at the company's quay. Some of the ammonium nitrate is transported to Constanţa by maritime vessel and moved directly to inland vessels by floating crane. The inland vessels supply warehouses in Romania, Bulgaria, Serbia and Hungary.[80]

Port of Krems

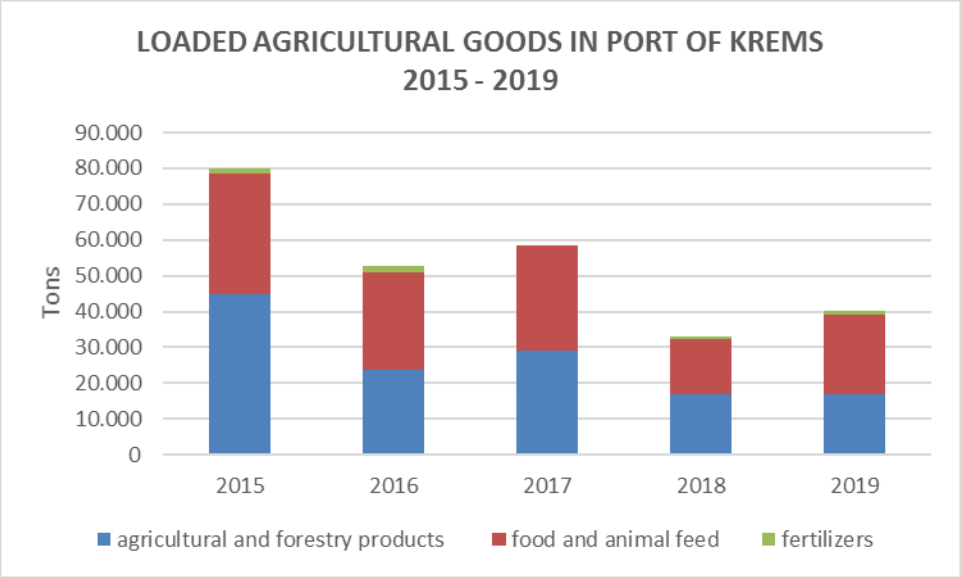
Figure 86: Total unloaded agricultural goods in the Port of Krems 2015 – 2019



(data from viadonau / Statistik Austria)

[80] https://www.viadonau.org/fileadmin/user_upload/Manual_on_Danube_Navigation.pdf

Figure 87: Total loaded agricultural goods in the Port of Krems 2015 – 2019



(data from viadonau / Statistik Austria)

Facts & figures regarding the infrastructure at the Agro Terminal of the Port of Krems:[81],[82],[83]

Fertilizer Terminal

- fully automated bagging 10-50kg
- packaging solutions for fertilizers, wood pellets and deicing products

Grain Terminal

- Silo 20.000 tonnes - 66 cells
- Handling Ship/Rail/Truck
- Drying
- Health preservation
- Laboratory
- Certified for organic grains (SGS Bio Certificate 2017)

Handling facilities and devices

- Conveyor belt
  Forklift and loader up to 40 tonnes
- 1 Luffing/Slewing crane, max. lifting capacity 6,5 to. (single use)
- 2 Gantry cranes, max. lifting capacity 50 to. (single use)

[81] Hubs in Austria - Port of Krems, Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

[82] https://www.rhenus-hafenkrems.com

[83] https://www.danube-logistics.info/danube-ports/profiles/action/port/country/1/port/19/pfc/Profile/

- 2 Mobile cranes, max. lifting capacity 19 to. (single use)
- Handling up to 150 tons with mobile cranes

Container

- Container storage area: 10 000 TEU
- Empty container/depot: 6 000 TEU

Transshipment

- Max. total transshipment volume: 440 TEU/d
- Container: 40 TEU/h
- Bridge cranes: 2 x 40 t + 50 t
- Reach stackers: 4

Port of Linz

Figure 88: Loaded agricultural goods in the port of Linz 2015 – 2019(data from viadonau / Statistik Austria)

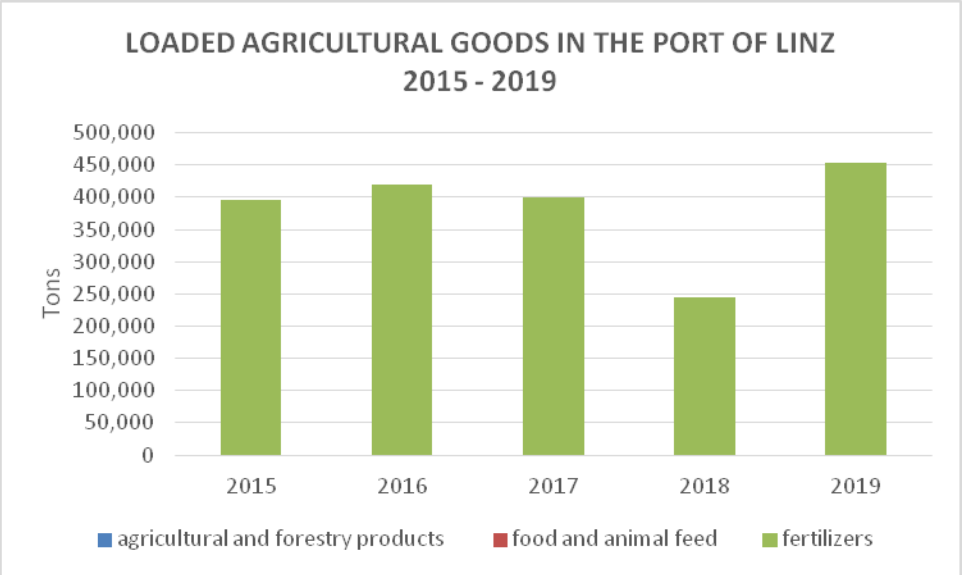
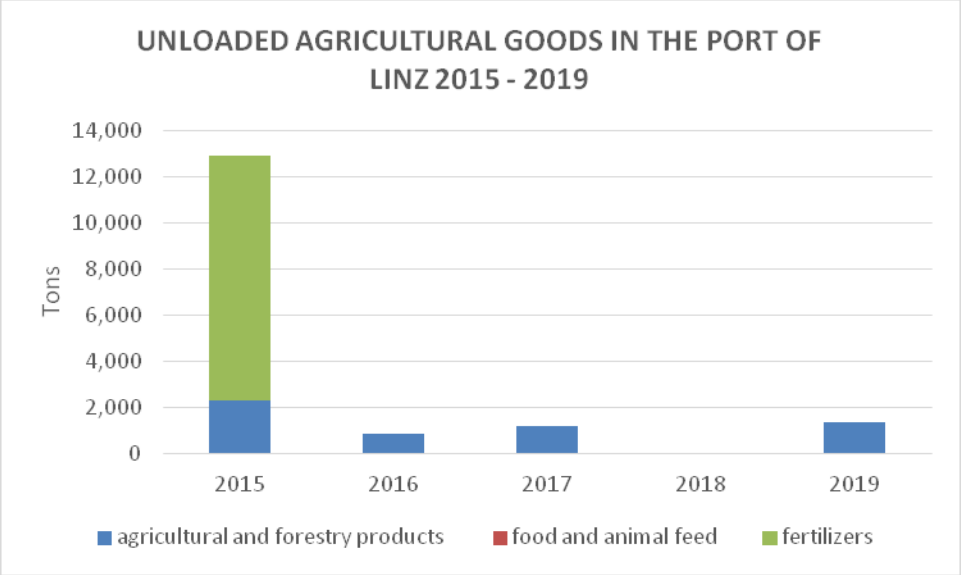


Figure 89: Unloaded agricultural goods in the port of Linz 2015 – 2019(data from viadonau / Statistik Austria)



Facts & figures regarding the infrastructure at the Port of Linz[84]:

Container

- Container storage area: 5.000 TEU
- Empty container/depot

Transshipment

- Max. total transshipment volume: 1.200 TEU/d
- Container: 40 TEU/h
- General cargo: 50
- Bulk cargo: 150
- 9 forklifts <3 t. 3 forklifts 3-5 t, 4 forklifts >5 t
- Gantry cranes: 2 x 41 t
- Lumber stackers
- Mobile cranes up to 200 t
- Paper clamps, pneumatic equipment
- Reach stackers: 6 x 10-45 t
- Spreader, wheel loader

[84] Hubs in Austria: Linz Stadthafen CCT; Federal Ministry for Transport, Innovation and Technology, Republic of Austria, 2019 https://www.bmvit.gv.at/en/verkehr/hubs/index.html

BULGARIA

Port of Ruse

Port of Ruse offers various services to the vessels on its territory, including: the handling of bulk cargo (dry, liquid, general and containerized), mooring services; supply of electricity, water and communications to the vessels; ship chandling, warehousing services, as well as repairs.

Transshipment services are the main ones offered by the port. The terminals are equipped with portal cranes and other machinery, which can load and unload goods to and from any water or land transport unit. Port Ruse has a capacity of transhipping cargo units with maximum weight of up to 60 tons. Heavier cargo units, such as out-of-gauge cargo, can be handled with the help of an SWL-floating crane with a 100-ton lifting capacity.

The main categories of goods transported through the Port of Ruse are dry bulk cargo – coal, cereals and fodder, clay and coke - as well as general and ro-ro cargo. The port also has the capacity to handle containerized cargo, although currently there is no container terminal per se.

Goods are processed daily from 08:00 until 19:30 with the exception of major national holidays, when the port does not work.

Port-East has the capacity to process 2 500 000 t/year.

Imports have decreased their share in the overall cargo turnover. In 2020, they took 48% of the share in the total cargo turnover, while in 2019 they were 64%. Significant part of the exports, which is 26% of the overall cargo passing through the port, is taken by metals and cereals. 21% of the cargo is taken by coastal/transboard transportation (from one port to another in the same country). That kind of transportation has marked a significant increase in the last 3 years – from 75 000 tons in 2018 to 133 000 in 2020.

Main imported goods: coal (5%), metals (17%), cereals/grain and fodder (33%), packaged chemicals and fertilizers (12%), clay (15%) and coke (5%).

Main exported goods: metals (70%) and cereals/grain (10%). The situation with the exports is dynamic, because in 2019 the two types of goods had almost identical shares in the export "portfolio" of Port East – cereals/grain (38%) and metals (41%).[85]

Port of Lom

The types of goods, which arrive and depart from Port of Lom are generally the same as the goods transported by road vehicles - dry bulk cargo (coal, ore, various kinds of concentrates and synthetic fertilizers, as well as cereals such as wheat, barley and corn) and general cargo (rolled metal sheets, cargo in big bags, palletized cargo etc.).

The arrival, handling, storage and forwarding of the cargo passing through the port to its destination, are carried out according to a concluded contract with the client for port services or a written and approved request.

The client (or the freight forwarding company) must provide the port with all the necessary information of the cargo – license, transport conditions, cargo properties (quantity, type), methods for

[85] Annual report on the port's activities for 2020 and 2019, published by the port operator

storage and transshipment, weighing etc. There is a special requirement that the client must warn the port if the cargo has a large volume (over 2 m^3/ton) or is out-of-gauge (for cargo over 9 m.).

Ships and other vessels arrive in the port daily, however there is a lack of information regarding the transported cargo quantities.

Port of Vidin

Both port terminals in Port of Vidin (North and South) are specialized in the transshipment of cargo. They are equipped and certified to process mainly dry bulk (cereals, inert materials, wood, coal, etc.) and general cargo (containers, metals, machines, equipment, out-of-gauge and heavy cargo, etc.).

Besides cargo transshipment and other cargo-related services (trimming, separation, fastening and unfastening of cargo, cleaning of vehicles before and/or after reloading activities, disinfection, fumigation, labeling, marking, sorting, repackaging etc.), both terminals offer general port services such as ship bunkering, mooring, energy supply, maintenance, repair etc.

Ships and vessels arrive at the port daily for loading/unloading activities.

Currently there are some constraints, which prevent the port from reaching its potential. Part of the equipment used for the transshipment services is obsolete and needs to be replaced. The port capacity in terms of the number of ships it can service, is also lacking.

There are currently plans for the removal of some of these constraints and for development of the port. In port terminal South, there is a project for establishing new functional zoning of its territory, renovation of the port mechanization, elongation of the quay wall and the addition of a new berth, which would increase the port capacity. There are also plans to increase the storage areas by constructing new warehouses (both covered and specialized).

All ports mentioned so far in this report have the necessary infrastructure and equipment to handle agricultural goods and cargo. However, none of them are fully specialized for that. They are largely multipurpose port terminals, which can also handle many other types of cargo. Even if they have the means to process agricultural goods, they cannot be considered as typical agricultural ports, since they also handle other types of bulk or general cargo.

The only purely agricultural port on the Bulgarian side of the Danube is a small private port, built near the village of Aydemir, which is 6 km west of the city of Silistra.

Port YGY-Silistra

Figure 90: Port YGY-Silistra

Source: (https://portmarlinsilistra.com)

The port is situated between km. 381.900 - 381.700 and is approximately 100 m. outside of Danube's fairway.

YGY-Silistra is a private port of the Archer-Daniels-Midland Company, commonly known as ADM. The company operates in Bulgaria through ADM Bulgaria Trading EOOD. ADM is a multinational food processing corporation, which manages many plants across the world, where cereals and oilseeds are processed in order to be used in industries such as food and beverage, as well as animal feed.

YGY Logistics EOOD (formerly known as ADM Bulgaria Logistics) is the port operator.

The port was officially opened on June 21st, 2017 as the first private port for cereals and grain products. The official investment was for 11 mln. BGN, which earned the investor a Class A certificate, giving the company a few advantages, among which are benefits such as individual administrative services, as well as the provision of shorter terms for the execution of these services.

The concept was that the port would be used as an export checkpoint for ADM's products to the Romanian port of Constanta, where the international company has the largest grain terminal in the region. However, the port is also opened to all other merchants and cargo carriers, who want to export their agricultural goods to the port of Constanta and from there – to the rest of the world.

- Port infrastructure

Port YGY-Silistra is a port for public transport of regional importance. It has the technical and organizational capabilities to provide safe and secure conditions for port services related to the processing of various types of cereals and oilseeds, while observing the high safety criteria.

The port has the following parameters:

Figure 91: Parameters for Port YGY-Silistra

Territory	20 754 m²
Quay length	228.18 m.
Ship berths	2
Length of ship berths	114.09 m.
Length of a floating facility (pontoon)	20 m.
Minimum depth in front of ship berths	4 m.
Maximum depth in front of ship berths	14.92 m.
Open storage areas (including parking zone and internal port roads)	8000 m²
Covered storages (warehouses)	1900 m²
Overall volume of the silos for grain cargo	33 480 m³

Specialized areas have been built on the port territory - buildings and facilities, grouped and territorially separated in the following functional zones:

- **quay transshipment area** – each berth is equipped with 1 specialized machine for continuous loading. It is a stationary cantilever metal construction with mounted rubber belt conveyor. The external support is mounted on a foundation in the area of the support block of the quay wall and the length of the cantilever is 24 m. over the river. In order for barges and self-propelled vessels to have the opportunity to berth there during low levels of the Danube, a floating pontoon has been installed. In these cases, an additional conveyor, mounted on the pontoon, is used for the loading of grain.

Figure 92: Cantilever metal construction for grain loading

Source: (https://portmarlinsilistra.com)

- **silos** – there are 10 silos used for grain storage. Each silo cell is metal, vertical, cylindrical, with a diameter of 14.30 m and a capacity of 2580 m^3. They are equipped with vents, inspection hatches on the roof, stairs, roof fans and a central fan.

Figure 93: Silo complex of Port YGY-Silistra

Source: (https://portmarlinsilistra.com)

- **elevator tower** – a metal construction, which has technological equipment for vertical transport – 7 elevators. The tower has the necessary components – stairs, railings and technological platforms, which are used for servicing the entire construction.
- **facility for grain unloading** – the cereal and grain cargo arriving on the port's territory by road is unloaded in that facility, which is equipped with two shafts for cargo. Each shaft has a mounted metal basket, which takes the cargo to the elevator tower via a built-in chain conveyor (redler) and a gate valve.
- **grain cleaning machine** – used for separation of the impurities in the grain
- **grain dryer** – if the delivered grain has high humidity, it is transported to a specialized bunker and from there – to a grain dryer. Once the grain is dry, it can be transported via an elevator to the silos for storage or it can be loaded onto a ship.

➢ Connectivity

Port YGY-Silistra is connected to the national road network via a 550 m. paved road, built by the Silistra municipality.

The port itself has a gate and a guardhouse, which serves as an access control point for people and vehicles going in and out of the port. There is a parking area for light vehicles with 10 parking spots.

There is an old internal railway network going through the port's territory. The rails are placed on the northern side of the port, running approximately 6 m away from the quay wall. After 2 km. they connect with the national railway network. However, the railway is currently not used and there are no plans to use it in the near future, therefore no cargo arrives to the port through it.

CROATIA

The total area of the port is 221,000 m2 of land area, without space for further development within the existing port area. The port has a total of 7 terminals, of which one is a terminal for bulk cargo, one for cereals, one for piece bulk (general) cargo, two terminals for liquid cargo, one multi-purpose terminal and one for pallet cargo. All terminals have access to all traffic modes (rail, road, river). The port has the capacity to handle high, heavy and large loads, while it cannot handle block trains, but it can handle intermodal freight units. The total length of the coast is 1,700 m, of which 55 m is a vertical shore with a concrete wall, while 205 m is a vertical shore on the so-called. dolphins, and 860 m is a sloping shoreline of which approximately 600 m is still undeveloped or devastated.

The port has 3 entrances to the road with a total of 4 lanes. It has one one-way rail access. The total length of railways on the coast is 800 m while the total length in the port area is 4405 m. The port has 13,000 m2 of storage capacity for dry bulk and general cargo, and 10,000 m3 of storage space for liquid cargo.

Figure 94: Comprehensive list of cargo handling equipment in the port of Vukovar

- DH DHC 400 and DHC 600 hp locomotives,
- C hook for coils sheet metal with a load capacity of 25 t,
- Grapples for bulk cargo from V = 5m3 to V = 13m3,
- Spreader (spreader) 20 " and 40 " containers,
- Vehicle handling device:
  - on load capacity 3.6 t, L = 4m H = 3.4m;
  - on load capacity 2.5 t, L = 3m, H = 2.7m,
- Tugboat PRILJEVO power 480 HP,
- 10000 m2 of arranged open storage space,
- 3000 m2 of closed storage space,
- 1 x 20 t forklift,
- 7 x forklifts with a capacity of 2 to 5 tons (Linde),
- 2 x ULT loaders,
- 1 x port mobile crane 63 t (Gottwald HMK 170),
- 2 x port gantry cranes 5/6 t load capacity (Ganz) i
- 1 x port gantry crane 16/25 t load capacity (Ganz).

Terminal for transshipment and storage of bulk cargo (cereals and oilseeds) in the port of Vukovar

The total area of the part of the port area that is the subject of concessions for public services is 46,423.18 m2, of which the port area is 10,202.28 m2.

In nature, the area that is the subject of the concession is a terminal for cereals and oilseeds, which allows the reception of vessels, transshipment and storage of agricultural goods and raw materials in bulk. Within the terminal there are specialized facilities and plants that ensure the reception of vessels for the transport of grain up to 1,000 tons and a draft of 2.5 meters. Access to road and rail vehicles is provided to the terminal and is connected to state roads D2 and D55. The terminal is connected to the communal infrastructure which is an integral part of the common facilities in the port area.

The terminal for cereals and oilseeds is located on the banks of the Danube River from 1,335 + 941.7 rkm to 1,336 + 147 rkm. The terminal has a built port infrastructure with one berth for vessels/barges.

At the terminal there is specialized equipment, a device for loading and unloading grain - Bargolink 300/15 in nature is a static device with a mechanical elevator and conveyors, capacity 200 t/h, as well as an automatic system for moving the vessel to berth.

At the location of the terminal there are 2 industrial tracks with a total length of 750 m. The Vukovar-Vinkovci railway passes through the location, as well as the Vukovar-Osijek Road. The terminal is equipped for boarding road vehicles and weighing of goods is provided. The terminal is equipped with all the necessary infrastructure to preserve the quality of cereals and oilseeds (dryer, grain cooling system, etc.)

There are three silos on site:

- Three-row new silo (TNS) with a capacity of 25,000 tons, with 45 cells and 24 inter-cells
- Three-row old silo (TSS) with a capacity of 13,000 tons, with 30 cells and 10 inter-cells
- Two-row silo (DS) with a capacity of 10,000 tons, with 24 cells and 8 between cells

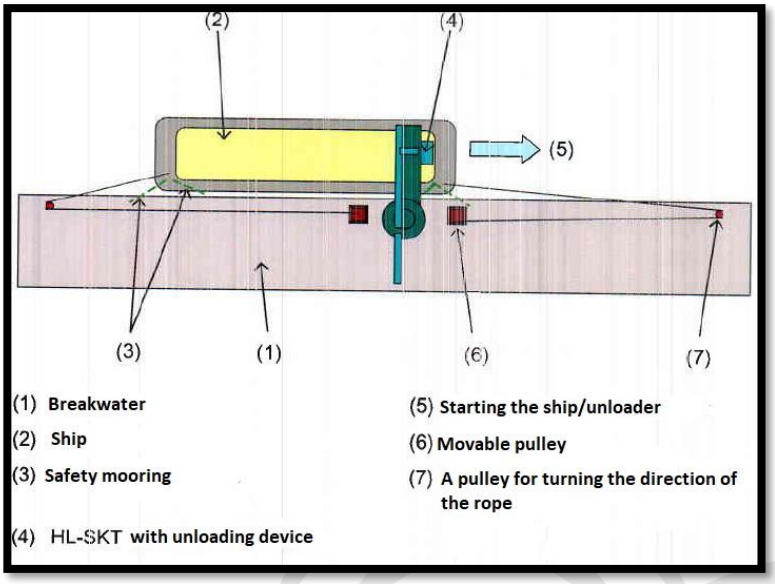
In 2011, a complete reconstruction and modernization of the three-row new silo was performed at the terminal, and new automatic lines for the transport of cereals and oilseeds with a capacity of 200 t/h were installed, which are managed via the central system. Unloading of cargo from ships is done using a special HL-SKT elevator and two horizontal augers that help fill the elevator.

The loading of river vessels is done in such a way that the cereals are delivered by chain conveyors from the silo to the transshipment terminal by means of which the goods are discharged into the ship or barge by a telescopic tube. The telescopic tube ends with a special outlet equipped with a dedusting system and aspirated to eliminate dust during operation. Goods can be transported in all directions and stored in a silo. Goods can be redirected to wagons or trucks through silos. It is also possible to fill vessels from wagons and trucks via hoppers via silos. The new flow balance allows precise control measurement of transshipped quantities. All systems are equipped with the most modern devices for environmental protection and safe operation.

Figure 95: Bargolink 300

From the truck, the grain can be unloaded on two hydraulic platforms, one next to the old three-row silo with a capacity of 60 t/h and one next to the three-row new silo with a capacity of 200 t/h.

Figure 96: A system for moving the vessel to berth



Hydraulic platforms are located next to two hoppers for receiving grain and oilseeds from trucks with a capacity of 120 t/h and one unloading point for railway wagons with a capacity of 200 t/h. Railway wagons can be placed in the desired places since the silo enters two industrial tracks with a total length of 750m. The wagons can be weighed on a specialized railway scale.

The Vukovar-Vinkovci railway passes in the immediate vicinity, to which industrial tracks are connected. The total receiving capacities are 580 t/h. All three silos are interconnected by internal transport devices (chain conveyors and elevators) with a capacity of 120 t/h. With these devices, it is possible to deliver goods from the most distant cells to the transshipment terminal for vessels. In the three-row new silo there is a flow balance which controls the transshipped quantities of goods. From the silo it is possible to load goods on road vehicles at twelve loading points with a capacity of 100t/h. Wagons can be loaded at seven loading points with a capacity of 100 t/h. Due to the covered loading and unloading places, handling of goods is possible in all weather conditions.

HUNGARY

Adony

Two adjacent sites with 170,000 m², a total of 84 European level, heat-insulated bases have been established with 12 m height and suitable for storing nearly 500,000 tons of grain (and/or other bulk cargo). Although, the two batteries are located next to each other, they can even be operated completely independently from each other. In both areas, the halls can be approached on a concrete road network suitable for freight traffic. Grain is loaded and uploaded with high-performance mobile devices under the control of four 60-ton bridge scales. To meet the typical drying needs during the harvest periods, there is a modern and high-performance Stella-type drying / cleaning plant. It has a drying capacity of 40 tons per hour and a cleaning capacity of 120 tons per hour.

Port of Adony with its 960-meter-long river frontage and port facilities give direct access to IWT on the Danube. The port enables 6 barges or vessels to dock simultaneously and 4 barges to load or unload parallelly.

Facilities:

- built-in hoppers, rubber conveyor belt, pouring belt
- floating conveyor belt with rubber belt for loading
- mobile rubber conveyor belt or FUCHS loader with a 4 m3 loader bucket

The communal wastewater generated on vessels is taken over by the port on demand and led to its own wastewater treatment plant.

Figure 97: Port of Adony

Source: portofadony.hu

Dunaújváros

At the 6th quay of the port of Dunaújváros, there is a 1,600 m2 flat storage room that can be divided into four cargo spaces, where 6,300 tons of bulk goods can be stored at the same time. Loading and unloading and transshipment to/from road/rail/IWW are all possible. The blades made of a special material for the slings of the technological system (traction conveyor) protect the grain.

In case a warehouse is full, four cross racks can unload about 800 tons of goods with computer control without opening the gates. The additional quantity is pushed into the cross hoppers by a New-Holland front loader.

Barges can be loaded with a capacity of 3,000 tons per day thanks to the technology of 200 tons per hour. Furthermore, there is no need to move the ship, the loading device moves in parallel with the ship, continuously fills the cargo spaces, an infrared connection with the loading belt ensures the process.

The covered 18-meter-long hopper can receive road vehicle in all weather conditions.

In case of cereals, a self-made container and a hopper are available, as well as special grain wagons.

Paks

The port is equipped for the parallel loading of 3 ships, 2 trains can be unloaded and loaded in parallel on the industrial tracks next to the site. Warehouse capacity is 30-40,000 tons. The port can also handle the movement of goods within the site with its own fleet, but it can also reorganize its fleet of 18 trucks on demand.

Figure 98: Figure Port of Paks

Source: hfip.hu

Transshipment services

- Road-Ship (2 terminals, 3 loading berths – 350mt/h loading capacity/berth)
- Ship-Road
- Road-Rail
- Rail-Road
- Rail-Ship
- 2 weighbridges (60mt registered and certified)

Warehousing and contract storage

- Warehouses with/without upper conveyor belt system (250 tons/h loading capacity)
- multiple segregated storage capacity (23 segregated bays at the terminals)
- Short (indirect loading) and long-term storage

Handling facilities and devices

- Forklifts
- Front loaders
- Conveyor belts
- 150 mt/h unloading capacity
- Road transport
- Fleet of 13 trucks

Baja

Baja has a 623-meter-long sliding embankment and 757 m vertical (within which 313 m has pontoon berthing possibility). Covered public customs warehouse area in the port is 9,800 m², open-air public customs warehouse is 1,500 m². Covered-open storage area is 4,100 m², open-air storage area is 11,930 m². Further covered warehouse is 7,000 m² and the factory floor is 2,309 m². There are four cranes in the port: a 10-ton portal crane and a 10-ton cantilever gantry crane and two 40-ton container cranes with 2x24 m span).

Figure 99: Port of Baja

Source: hfip.hu

There are four crop loading equipment with a total capacity of 800-ton per hour. There is a 45,000-ton capacity grain silo and four 60-ton scales. The port has a 60-ton Ro-Ro ramp as well, portable on 70 meters.

The table below summarizes the existing port infrastructure.

Table 16: Port infrastructure of agricultural ports

Port	Location	Length of quay	Number of terminals	Loading capacity	Annual traffic	Storing capacity
Adony Logisztikai Központ Kft.	1,598-1,597 rkm	1,000 m	3	600,000 tons per year	350,000 tons per year	170,000 m², 84 unit for 500,000 tons of bulk cargo
Centroport Kft. (Dunaújváros)	1,580-1,579 rkm	120 m vertical	1	300,000 ton/year	136,000 ton/year	1,600 m² flat storage for 6,300 tons bulk cargo
SYGNUS Kikötő Kft. (Paks)	1,527+939 – 1,528+121 rkm, 1,528+500 – 1,529+100 rkm	floating equipment and 100 m vertical	2 terminals, 3 mooring places (2 for loading in, 1 for loading in- and out)	1 M ton/year	425,000 ton/year	55,000 tons
Bajai OKK Kft.	1,479+140 – 1,480+600 rkm	1,380 m (444 m vertical)	9	2 M ton/year	800,000 ton/year	9,800 m² covered and 1,500 m² open public customs warehouse 4,100 m² covered-open and 11,930 m² open storage area 7,000 m² covered warehouse and 2,309 m² factory floor

Source: self-edited based on hfip.hu

ROMANIA

For the selected agricultural ports – existing ports and potential ones for agricultural products, an assessment of the port infrastructure will be carried out.

Agricultural products operated in the Romanian ports is presented in table below.

Table 17: Agricultural products operated in the Romanian Ports situated on the TEN-T network

Name of TEN-T core and comprehensive network ports	Agricultural products	TRAFIC 2018 2019	Other Goods	Container
Constanta	wheat, maize rapeseed, sun flower, barley, soybean	17963535 to 21329156 to	oil, iron ore, coal, chemicals, fertilizer, ores, wood, steel	yes
Galati	wheat, maize rapeseed, sun flower, barley, soybean		oil, iron ore , coal, chemicals, fertilizer, ores, steel	yes
Giurgiu	wheat, maize rapeseed, sun flower,	191.166 to 292.252 to	oil, chemicals, fertilizer, wood	no
Calafat		227.854 to 209.273 to		no
Cernavoda			sand, gravel	no
Drobeta TR.Severin			fertilizer, ores, steel products, oil	no
Braila				
Calarasi	wheat, maize rapeseed, sun flower	310.558 to 298.006 to	minerals	no
Oltenita	wheat, maize rapeseed, sun flower	349.389 to 310.668 to		
Corabia	wheat, maize rapeseed, sun flower	166.239 to 266073 to		no
Bechet	wheat, maize	110.000 to 140.000 to	fertilizer	no
Danube - Black Sea Canal	wheat, maize rapeseed, sun flower, barley, soybean	Transit traffic 5764221 to 6785549 to	oil, iron ore , coal, chemicals, fertilizer, ores, wood, steel	yes

NOTE: For the purpose of the Report the port of Corabia and the port of Bechet, which are not part of the TET-Network, and the transit traffic through the Danube - Black Sea Canal were mentioned.

Port of Constanta

The port has facilities for the operation and storage of cereals, which are served by specialized berths with depths between 7 and 13 m. Both river vessels and Panamax type sea vessels are operated. The storage facilities include silos and warehouses, which ensure a total storage capacity of over 1,200,000 tons. High capacity seagoing vessels are operated on specialized buoys at a depth of 17 m, transshipping directly from river vessels.

The most important grain operating companies in the Port of Constanta are: Canopus Star, North Star Shipping, United Shipping Agency, CHS Silotrans and Chimpex.

Port of Galati

Port of Galati has facilities for the operation and storage of cereals. The storage capacity is of 30.000 tonnes.

Port of Giurgiu

Following TTS information the following can be considered:

Silos Port Giurgiu

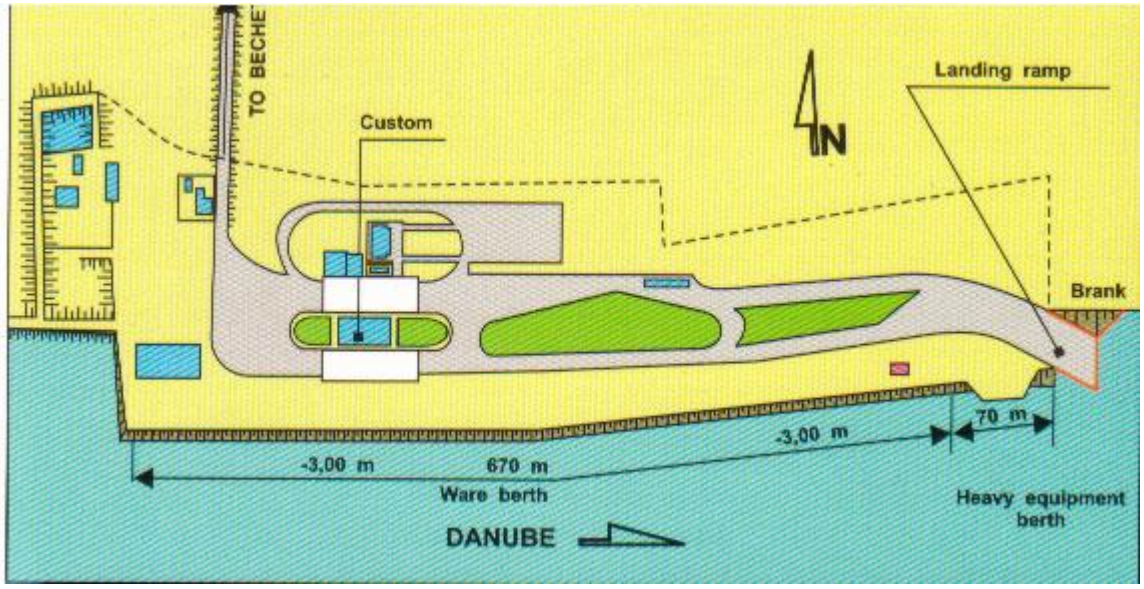
Silo Port Giurgiu - River port located on the left bank of the Danube, at km 489 - 497, "Giurgiu Port Complex" Working sector "Ramadan", access to the quay being made directly from the navigable signal.

The port area is equipped with:

- Grain silo with 4 metal cells with a total storage capacity of 6000 tons;
- Goods storage platform with an area of 1000 m2;
- Laboratory equipped for taking samples and for establishing the quality indices of the received / delivered goods;
- 60 ton car electronic scale;
- 2 operating berths with a total length of 150 m, with the possibility of operating goods in domestic and international traffic;
- Cheu pereat;
- 16 tf gantry crane;
- Mooring pontoon;
- Mobile shiploader system;
- Video security and surveillance system.

Port of Bechet

Figure 100: Location and organization Port of Bechet



The port has 600ml long docked docks and a RO-RO type river mooring ramp as well as a platform for loading oversized parts.

Ways of communication:
- road access to DN 54A, DN 55 and DN 55A

Following TTS information, in Bechet TTS offers transhipment and storage services for:

- cereals and feed products
- bagged fertilizers (Big Bags)

Storage

- Capacity 1300 tons of bagged fertilizers - warehouse 51.0 m x 15.0 m
- Floating storage 600 tons

Equipment

- Grain transhipment facility
- Sing car
- Crane
- Bobcat
- Maneuvering equipment

Calafat

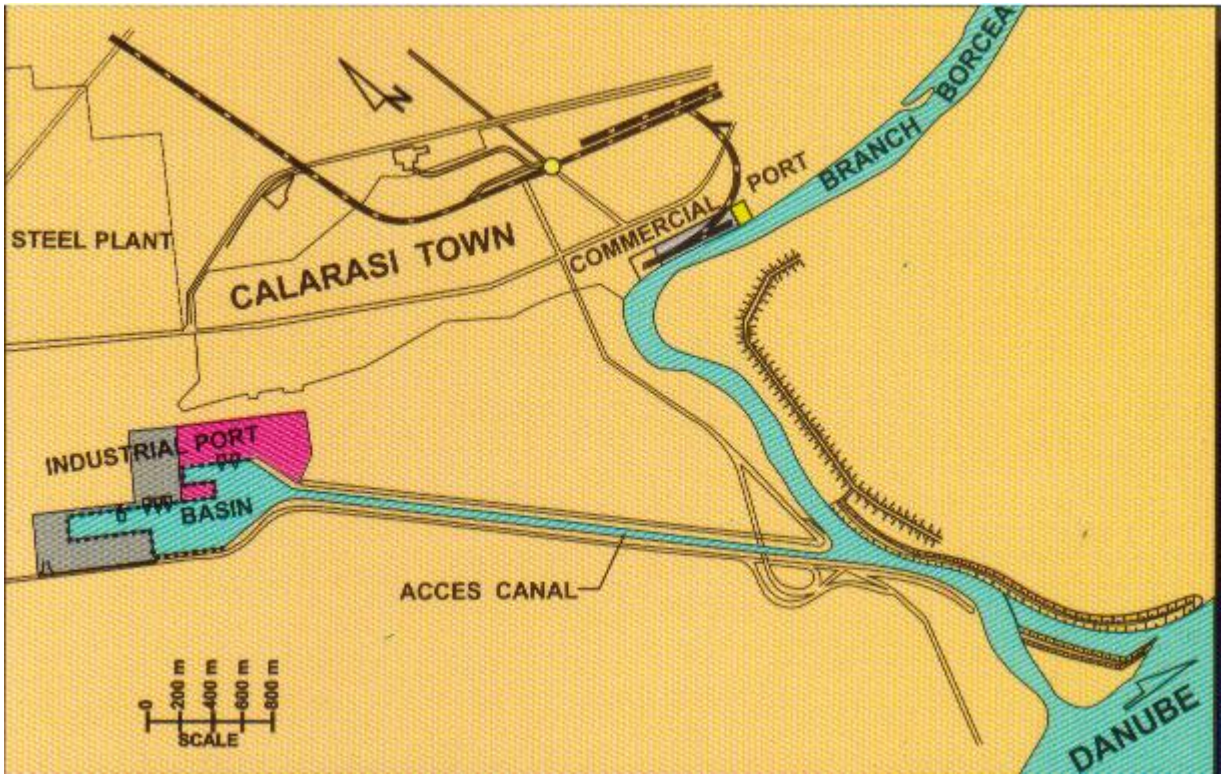
Cerealcom Dolj has storage capacities of 5.000 tonnes in the Port of Calafat, and a capacity of loading barges of 250t/hour.

Recently, Cofco International, the largest grain trader in Romania, part of the Chinese concern Cofco, has built a grain silo with a storage capacity of 25,000 tons in Calafat.

Calarasi

The organization of the port is presented in the figure below.

Figure 101: Location and organization Port of Calarasi



1.Commercial Port

Boundaries of the port / place of operation - Km 91- Km 99, Borcea Arm, left bank.

The limits of the operating berths km 91- km 99, Borcea arm, left bank.

The surface of the port territory administered by CN-APDF-SA GIURGIU is 81505 sqm.
The length of the walled / vertical / natural shore quays is 828 m.

Operating berths: - 100 ml berth for passengers;
- 250 ml 2 cargo operation berths;
- 100 ml 1 grain operating berth;
Waiting berths: - 200 ml 2 berths.

2. The Industrial Port
Limits of the port / place of operation - Km 99- Km 100, Borcea Arm, left bank.
The limits of the operating berths km 99- km 100, Borcea arm, left bank.

The surface of the port territory administered by CN-APDF-SA GIURGIU is 62,500 sqm.

Access roads: -road: DN 3 Bucharest -Calarasi - Constanta

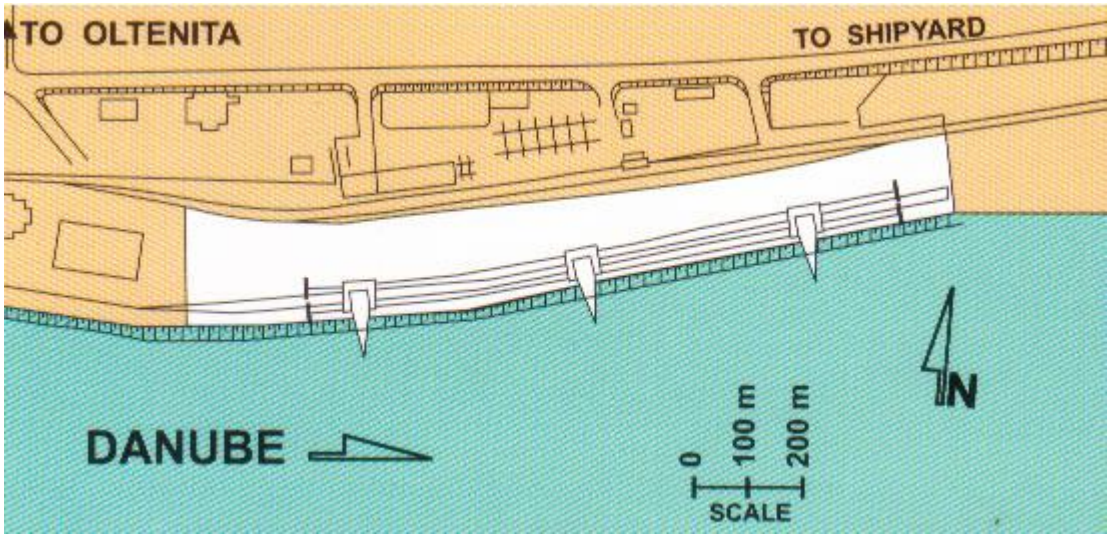
- DN 3B Calarasi - Fetesti
- DN 31 Oltenita – Calarasi

Railway Access: - CF Industrial port - Calarasi Sud CF station – Ciulnita

Oltenita

The organization of the port is shown in the figure below.

Figure 102: Location and organization Port of Oltenita



Main characteristics
The port is located in Oltenita city on the Km 428- Km 430 + 800 on the left bank of the Danube
The surface of the port territory is 88,577.25 sqm.
The length of the walled / vertical / natural shores is 900 m.
-3 gantry cranes of 5tf

Operating berths:

- 300 ml 3 berths for passengers;
- 200 ml 2 cargo operation berths;
- 80 ml 1 berth for oversized parts;

Waiting berths - 300 ml 6 berths.

Silo - 6000 to

Operating capacity 450,000 to / year.

Accessibility/ways of communication:

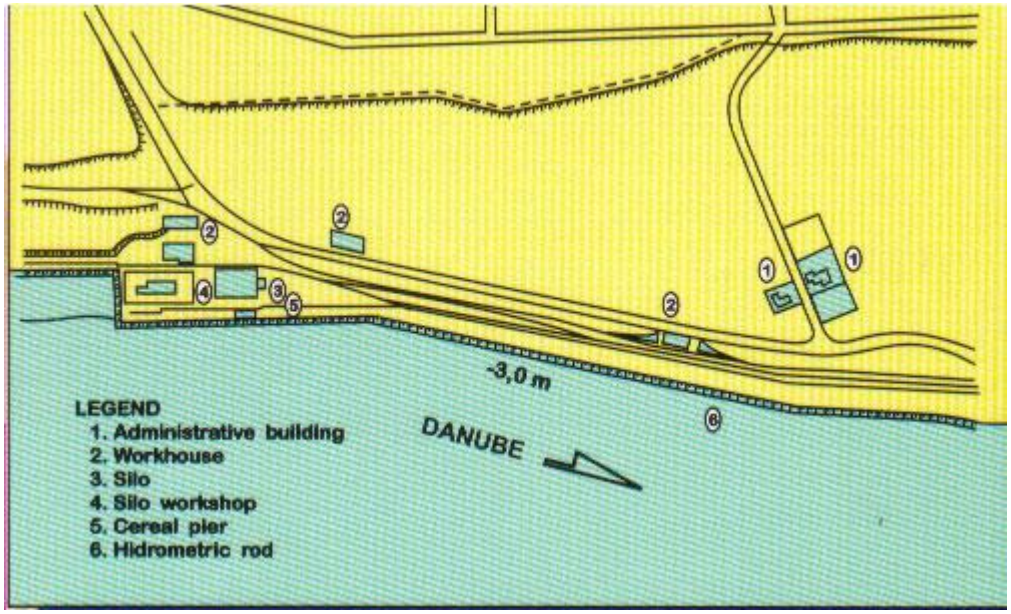
- road access connected to the street network of the city and further connections to DN 4, DN 31 and DN 41;

- railway connections provided by connecting to the city station.

Corabia

The organization of the port is shown in the figure below.

Figure 103: Location and organization Port of Corabia



The surface of the port territory managed by CN-APDF-SA GIURGIU is 227357 sqm
The length of the walled / vertical / natural shore quays under the administration of CN APDF SA Giurgiu is 1490 m.

-Operating front: 1150 ml perished key
-150 ml 1 bucket of cereal;
- 300 ml 3 cargo berths;
- 700 ml 7 berths waiting.

Operating capacity 200,000 to / year.

Accessibility/ways of communication:
Road - through the street network the port has ensured connections to the national network:

- DN 54- DN 64 Corabia - Caracal (41 Km) / DN 6-Bucharest -Timisoara
- DN 54 Corabia - Tr.Magurele (31 Km)
- DN 54A Corabia - Bechet (44 Km)

Railway: the railway system of the port is connected to the national railway system, but is not in operation.

SLOVAKIA

For the selected agricultural ports – existing ports and potential ones for agricultural products, an assessment of the port infrastructure will be carried out.

In recent years, the role of providing logistical transportation of goods has passed from the manufacturer to an intermediate link in the whole chain – wholesalers. A large part of the companies actively uses water transport especially for export (especially relevant for the Port Komárno). The level of possible transshipment in ports is highly volatile and difficult to estimate as it depends on a good harvest. However, there is a trend of market fragmentation when smaller agricultural and productive cooperatives are expanding, but this trend is likely to be fully visible only in the next few years. Still, this area is not very attractive for the Port Bratislava, as industrial enterprises are more concentrated in its surroundings than entities engaged in agricultural production, which are concentrated mainly closer to the Port Komárno.

Port of Bratislava

From the point of view of commodity transhipment, transhipment quays in the Winter port are generally used for bulk cargo. Quay 1 - 3 is oriented for export, Quay 4 is oriented for import. The transhipment activity in Winter port is focused exclusively on transhipment of dry bulk cargo. The supporting commodity is processed iron ore (iron ore pellets). Minor folded commodities are fertilizers. The overall capacity for dry bulk cargo is around 35 % (year 2017). The total open storage capacity in Winter port for transhipments of bulk cargo is 33 720 sqm and the closed storage areas are 21 790 sqm. Winter port does not have any silos.

Figure 104: Transhipment Capacity for Dry Bulk Cargo (port of Bratislava)

Quay	Name of Technology	Comodity Cargo	Cargo Specification	Total capacity of the quay [t]	Open Storage Size [sqm]	Sheltered Storage Size [sqm]
1	Cranes type GANZ	Dry bulk cargo	processed ore -iron pelets	1 073 971	10 760	
2	Cranes type GANZ	Dry bulk cargo	processed ore - agloruda	939 725	4 800	4 000
3	Cranes type GANZ	Dry bulk cargo	processed ore -iron pelets	525 197	5 200	
3	Conveyor belt type TELESTACK	Dry bulk cargo	artificial fertilizers	456 000		7 250
4	Cranes type GANZ - import	Dry bulk cargo	Processed fertilizers and iron	847 930	12 960	10 540
Total capacity Dry Bulk Cargo				**3 842 823**	**33 720**	**21 790**
Recent year (2017) performance Dry Bulk Cargo [t]				**1 375 397**		
Utilisation [%]				**35,8%**		

Port of Komárno

The Port of Komárno is a public port used to transship goods between railway, road, and waterway transport means, or as an intermediate warehouse. Conceptually, technologically, and structurally, the Port of Komárno is built to transship bulk substrates, i.e., dry bulk cargo or agricultural products. In terms of activities, the Port of Komárno is divided into six sections. Activities focusing on handling liquid goods, metal materials, and bulk goods. The operator sets the protective zone under the bridges that intersect the Danube at the port aquatorium. For security reasons, this zone is 20 meters long downstream and upstream.

UKRAINE

Taking into account that all the Ukrainian ports on the Danube River are maritime ports, this part was described and concluded in a previous chapter.

8 Conclusions

8.1 Rail infrastructure and services

AUSTRIA

Generally, the rail infrastructure connections within Austria, to the main trade markets and along the TEN-T corridors is very well developed. The standard gauge railway infrastructure is given and the minimum line speed of 100 km/h is everywhere achieved. Austria complies fully with the required 22.5 t axle load. 70,35% of the total available lines are electrified, whereas 98,32% of all double-track rails are currently electrified. The majority of the country's network is non-compliant regarding the train length of ≥740m.[86] Also, the ERTMS/ETCS compliance is still relatively low. Austria has a well-developed network of transport hubs connecting road and rail. Bottlenecks also emerge from different operating parameters at border section areas and insufficient axle load.

The immediate rail connections of the four ports with their hinterland and catchment areas are well developed with no special bottlenecks.

The rail infrastructure within the four ports ensures a good shift from rail to ship. There are rail freight stations connecting to the railway network, rail tracks in block train length, optimal railway sidings and tracks for loading/unloading. Usually, more trains can be attended to in parallel, which raises the logistics efficiency. The connections to the destinations in the European north and south ports for both pre-carriage and onward are very satisfactory and subject to continuous development.

Generally, the Austrian transport policy is driven by a model shift strategy, from road to rail. By 2025, 40% of freight transport should be done by rail. One important focus is set on the harmonised deployment of ERTMS/ECTS, which is still very undeveloped. 17.5 billion euros will be allocated in the expansion and modernization of the rail infrastructure over the next six years 2021 – 2026

BULGARIA

Some of the main Bulgarian railroads, which include cities with ports and are part of the core Trans-European transport network (TEN-T) are the following:

- Vidin (port city) – Sofia – Kulata
- Dragoman – Sofia – Plovdiv – Burgas (port city)
- Ruse (port city) – Stara Zagora - Dimitrovgrad

In addition, there are also some railroads, which are part of the comprehensive TEN-T area:

- Ruse – Varna (port city)
- Gorna Oryahovitsa – Varna

The main goal for the core railway network in Bulgaria is to meet the requirements of Regulation (EU) 1315/2013. Currently, the requirements for full electrification, a standard track gauge of 1435 mm and an allowed load of 22.5 tons/axle are met. Some of the other requirements, such as reaching speeds of 100 km/h, the possibility of running trains with a length of 740 m. and full deployment of ERTMS

[86] Review of the 2020 Work Plans of the four TEN-T corridors passing Austria

(European Rail Traffic Management System) are still not fully implemented in the core railway network.

According to Art. 25, para. 1 of the Bulgarian law on railway transport, the state participates in the financing of activities such as the construction, maintenance, development and exploitation of the railway infrastructure. The financing for these activities comes annually through the state budget in the form of a capital transfer, directed with priority towards fields of national interest, for which financing through international projects and funds could not be received.

The state financing is determined by the Minister of Transport, Information Technology and Communications on one side and the state-owned National Railway Infrastructure Company on the other. The company is the sole owner of the railway infrastructure in the country. The funds from the state subsidy go towards the operational maintenance and exploitation of the rail infrastructure. The mid-term plans until 2022 are those funds to remain on the same level as in previous years – 145 mln. BGN per year.

Investments from the European infrastructure funds need to be directed towars the development of the core TEN-T railway network, namely the direction Vidin-Sofia-Plovdiv-Svilengrad, as well as Plovdiv-Burgas.

A memorandum was signed on 06.09.2017 between Bulgaria and Greece for the development of the railway connection Thessaloniki-Kavala- Alexandroupoli-Burgas-Varna-Ruse. This connection would encompass the three biggest and most important port cities in Bulgaria. The financing is provided by the EU and the goal is to create a multimodal transport corridor between two of the biggest Greek ports on the Aegean Sea, the two biggest Bulgarian ports on the Black Sea and the biggest Bulgarian port on the Danube River.

CROATIA

The favorable geographical position of the County enabled the rapid development of railway traffic and the development of the City Vinkovci as a passenger and cargo-shunting hub. However, Vinkovci has not yet reached pre-war levels importance despite progress and investment in infrastructure reconstruction. An international pass through the County railway corridor, and it is estimated that in 2015, around 311,000 passengers were dispatched from the station to Counties. Considering that significant investments are being made and planned in the reconstruction of the railway on the route of the corridor, for further increase in traffic and strengthening of the County as a railway and logistics center is to be expected. Tome bi should also contribute to the stronger integration of railways and the use of the Danube for the transport of goods, i.e., intermodal forms of transport. It should also be noted the existence of a RO-LA terminal (truck transport terminal tractors on railway wagons) in Spačva, which were opened by the Croatian Railways in 2007.

The following railways were built through the County, which are buildings of importance for the Republic of Croatia and are classified, in accordance with the Decision on the Classification of Railways (Official Gazette, No. 3/14):

- Railway Corridor RH1 (former X. Pan-European Corridor) DG-Savski Marof-Zagreb-Dugo Selo-Novska Vinkovci-Tovarnik-DG (state border with Serbia), line mark M104 (Novska - Vinkovci - Tovarnik - State border - (Sid));

- Railway Vinkovci - Vukovar-Borovo naselje - Vukovar, line code M601, belongs to other railways for international traffic
- Railway Vukovar-Borovo Naselje - Dalj - Erdut - State border - (Bogojevo), mark line R104, belongs to railway lines of importance for regional traffic;
- Railway line Vinkovci - Drenovci - State border - (Brčko), line code R105, belongs to railways of importance for regional traffic;
- Railway line Vinkovci - (Gaboš) - Osijek, line code L208, belongs to the railway lines from importance for local traffic;
- Railway line Vinkovci - Županja, line code L209, belongs to the railways of importance for local traffic.

The opening of the renovated Vinkovci - Osijek railway in 2008 further improved the quality of the railway transportation. Currently, railway traffic in the County takes place in seven directions (Vinkovci Zagreb, Osijek, Vukovar, Tovarnik, Drenovci, Županja, Slavonski Šamac). Since there is no data on the share of railways in public transport at the county level, it is difficult to assess the actual role of railways in total transport in the area. The reconstruction of the main railway line Zagreb - Tovarnik on the section Vinkovci-Tovarnik-state border with Serbia in the length of 33.4 kilometers has been completed, in the reconstruction of which HRK 442 million invested. In the period from 2012 to 2015, investments were made in the reconstruction of railway infrastructure is HRK 80.5 million, which is HRK 362 million less than in the period from 2009 to 2012. In the plans of HŽ infrastructure by 2020 it is planned to invest 558 million kuna for modernization, reconstruction and electrification of the Vinkovci-Vukovar railway, as well as modernization and reconstruction of the Okučani-Vinkovci railway section.

The priorities in the County in terms of railway traffic are the reconstruction and electrification of the railway Vinkovci - Vukovar, reconstruction of Vinkovci station (revitalization of the former freight station), improving the level of rail passenger transport service both in the urban-suburban segment and regional traffic, modernization and renewal of local and regional railways with a special program with the aim of creating preconditions primarily for the development of integrated public transport, modernization of railway road and pedestrian crossings over the railway, construction of LDC (logistics-distribution center) Vinkovci Vukovar, construction of Cargo center Vinkovci-Vukovar, research of possibilities and spatial conditions for refurbishment and expansion of the existing Vukovar station in the function of freight transport, introduction of new ones combined transport technology on the built and reconstructed railway network in the existing corridors in accordance with the National Railway Infrastructure Program for the period from 2016 to 2020. year (OG 103/15) and its operational objectives.

Estimated travel time Vinkovci - Vukovar is 23 minutes, Vinkovci - Županja 26 minutes, Vinkovci - Ilok 59 minutes, Vinkovci - Otok 22 minutes, Vukovar - Županja 47 minutes, Vukovar - Ilok 38 minutes, Vukovar - Island 35 minutes, Županja - Ilok 1 hour and 22 minutes, Županja - Island 29 minutes and Ilok - Island about 1 hour.

HUNGARY

Transhipment to rail in Hungarian inland ports has the lowest share, 10% compared to other modes. The most typical trains loaded in ports are Tadgs and Eas. The destinations of cargo trains from Hungarian Danube ports are Germany, The Netherlands to the west, Koper and Rijeka to the south and in case of low water level on the Lower Danube, Constanta to the east.

Ports presented above have direct or indirect connections to the national and international railway network. In the port area, rail is unelectrified due to the crane towers. The most typical bottleneck is the length of tracks within the port area which causes challenges when loading the wagons. It is time-consuming to shunt back and forth to fulfil the full capacity of trains. Port of Paks has no direct connection to the rail line, tracks do not enter the port area, but pass it from the west: trucks support the transhipment.

ROMANIA

Constanta Port

Rail connections ensure the access by rail to all destinations in Romania and abroad. However, rail accessibility shall be improved as currently delays for trains accessing the port are quite high. The feasibility study on improving the railway connections and access time to the Port of Constanta is ongoing.

Once rail accessibility is improved, it is expected that traffic from road will be attracted on the hinterland connections of the port.

Galati Port

Galati port has good rail connections that make possible rail transport on standard European gauge and also on large gauge for Republic of Moldova and Ukraine. This is an advantage for rail – inland waterway transport in both directions.

The on-going project Project Galaţi Multimodal Platform aims the development of a multimodal platform with a capacity of 150,000 TEU/year in the port of Bazinul Nou (from the Galati port), is being implemented with a completion deadline of 2023, the first year of operation 2024.

Currently, the port infrastructure and its facilities are in an inadequate technical state. The substantial upgrading of existing infrastructure will eliminate bottlenecks in two ways.

Firstly, the port infrastructure will be upgraded, contributing to: (1) the increase of the efficiency of handling modern ships with higher capacities and the increase of the safety and security conditions; and (2) facilitating rail interconnection between Russia and the European Union via Ukraine by integrating two types of gauges (1435 and 1520 mm) into the terminal's operations. This is of strategic importance and can initiate new multimodal services between Europe and Russia, Ukraine and the Republic of Moldova.

The access in the port platform is performed directly from the European road E87 (on the road) and from CFR triage through a railway line. The upgrade of the existing public road infrastructure (by building a highway passage and a roundabout) is performed in order to streamline road traffic on the

E87.

The implementation of the intermodal and IT & C facilities will enhance the capacity, efficiency, safety and security of the port operations. The upgrade of the terminal will provide a sustainable alternative to the road transport between the Central Europe and the Black Sea region, especially Turkey and Greece.
Currently, most freight transport on these routes is made by road. The efficient combination of the modes of shipping, river, rail and road will open up new possibilities for the multimodal services

Considering the draught limitations, it was taken into account the optimum scenario with a ship of 300 TEU, respectively of 8,000-9,000 dwt, considering all the containers loaded at capacity (an average of 28-30 tons/TEU).

In practice, the port-container ships transport both loaded and empty containers, generating an average of approximately 15 tons/TEU that would conduct to the possibility of the transportation of a higher number of TEUU/ship. Depending on the proportion of empty and loaded TEU, the ships that will enter within the terminal can have a transportation capacity between 300 and 500 TEU, the proportion empty/loaded being determined by the container line considering the weight and the maximum accepted draught mentioned above.

From the Traffic Study, the estimated potential is as follows:

Table 18: Estimated potential Project Galați Multimodal Platform

Potential	**2022**	**2032**	**2037**	**2042**
TEU's international OD relations	47871	144513	178429	216133
TEU's Moldavia RO, Republic of Moldavia, Ukraine (containers already from 2017)	18276	55172	68120	82515
TEU's Moldavia RO, Republic of Moldavia, Ukraine (non containers in 2017, 30% of the total in containers in the future)	11133	33608	41495	50263
Total TEU's	**77280**	**233293**	**288044**	**348911**

Giurgiu

Rail connection needs to be reestablished, and rail network shall be rehabilitated in this respect, in order to make the connection to the national rail network, and to the main rail connection from Romania to Bulgaria. Enhancing the rail accessibility would have the effect of taking over freight traffic from road, in relation especially with Constanta Port.

Drobeta Turnu Severin

Drobeta Turnu Severin Eastern part of the port is connected to the national rail network. A new connection is desired for the Western part of the port in order to enhance the use of inland waterway – rail transport.

Calafat

The port has a good connection to the national rail network, however it has been understood that the connecting rail lines need to be rehabilitated.

SERBIA

Railway network in the Republic of Serbia has approximate length of 5.000 km, out of which is only approximately 20% electrified and 10% double tracked. The railway network is mostly in poor condition with over 300 bottleneck spots, whose reconstruction is estimated to approximately 4 billion euros. However, at the moment, there is a great number of rehabilitations, re-construction and construction works on the network on-going.

The port of Bogojevo and port Bačka Palanka are not connected to the national railway network. Plans for the expansion of these two ports should include railway infrastructure, as well as their connection to the national railway network. Links could be made at the relatively close distance, in Bogojevo only 2,5km and in Backa Palanka 5km.

The port of Prahovo is connected to the national railways. There is a well-developed rail infrastructure with several industrial tracks within the port, and the whole existing complex is connected to the Serbian Railways system and the international rail network. The port is arranged with three parallel tracks, which gives the possibility of simultaneous processing of 160 wagons. Port of Prahovo has a connection with two railway sections: Crveni Krst-Zaječar-Prahovo pristanište section and Bor teretna-Prahovo pristanište section. Crveni Krst-Zaječar-Prahovo pristanište section connects port with Bulgaria, while Bor teretna-Prahovo pristanište section connects port with Belgrade and further with Hungary. Though, reconstruction of port railway tracks should be considered, alongside with the ongoing projects of revitalisation of national railway magistral sections which are accessing port.

UKRAINE

The most effective method to significantly increase export earnings is to integrate the Ukrainian transport system into international corridors. For integration within the country, it is important to build highways and routes that use high-speed trains.

To deepen integration into the EU transport services market in the field of rail transport, it is advisable to expand cooperation with the European Railways Agency (ERA) within the framework of the Organization for Cooperation between Railways.

The main problem that was acute until recently was the catastrophic shortage of grain carriers. Now it has been partially solved by increasing the number of private wagons, but another problem has

arisen - their turnover and the lack of traction rolling stock at PJSC "Ukrzaliznytsia". Plus, the grain carriers and units of the rolling stock that PJSC "Ukrzaliznytsia" have possess have significant physical and technical wear and tear.

The solution to the problem of the shortage of grain carriers is possible in the creation of a program for the construction of new wagons at the expense of PJSC "Ukrzaliznytsia" funds, received after the deregulation of the carriage component of the railway tariff. It is also necessary to stimulate the construction of new grain carriers by market participants. This can be done by providing a discount on the railway tariff to companies transporting grain in their own wagons. It will also shorten the return on investment. Another way to solve the problem of shortage of grain carriers is increasing the speed of their turnover.

The problem with the shortage of traction rolling stock can be solved by building new units at Ukrainian enterprises and / or buying them abroad. At the same time, it is necessary to amend the regulatory framework and allow private companies with their own traction rolling stock to use the common railway network. At a minimum, the required permission must be in effect in areas critical to the grain market.

The electrification of the railway is a dramatic solution to the railway problems in the south of Odessa. This will result in not only a "gain" in transportation costs owing to the switch to electric traction. This will also allow the trains to run at a little faster speed. It will also be possible to launch, up to Izmail, electric trains - both ordinary suburban and more comfortable and high-speed "Hyundai".

8.2 Road infrastructure and services

AUSTRIA

Austria features an excellent transport infrastructure network with intermodal terminals which ensure the optimal combination of road, rail, and waterway traffic. There are 2.242 km (as of 31.12.2019) of motorways and expressways available for road transport/traffic. Non-compliant sections are minor and only found in the Austrian-Czech cross border area. Some capacity bottlenecks exist mostly in western parts of the Rhine-Danube Corridor, in sub-urban areas of main nodes and big cities. Generally, there are enough free capacities for modal shift to inland waterway and good intermodal connections.

The road connection to the four main ports from the hinterland and catchment areas is very good. The ports can be easily reached by motorways, expressways, and federal highways. Generally, theaim is to develop transhipment facilities for combined transport and railway connections designed to support the modal shift of freight from road to rail and water.

The road infrastructure within the ports, as well as the related road services - to the extent information was available – ensures a good transport, loading and unloading flow and efficient logistics. There is a focus set on the digitalisation of the processes, clean logistics and renewable energies. The businesses located on the premises of the ports invest regularly in the modernisation and renewal of the road infrastructure, developing new services (e.g. truck and trailer washings facilities, access gates, digitized truck handling, investments in the truck fleet and licenses for the transport of different goods).

BULGARIA

The road infrastructure problems, mentioned earlier in this report, need to be sorted out. This is essential for improving the road connectivity of both seaports and those on the Danube. A renovated and well-maintained road network, connecting the ports to the hinterland is of great importance to improving not only the port connectivity to the national road network, but also the cross-border connections.

There are currently several projects underway, which will help in partly solving the aforementioned problems. One of them is the finishing of the Hemus motorway in Northern Bulgaria, which connects the port city Varna with the capital Sofia. This project has faced many problems through the years and it is still not certain of when the motorway will be completed.

Another project, which is expected to start, is the Ruse-Veliko Tarnovo motorway. Its length will be 133 km and it will connect the port city Ruse with the Hemus motorway and the rest of the hinterland, which is important, since the current traffic, which passes through the port of Ruse and uses road transportation to carry the goods to the rest of the country, goes through mainly second-class roads and only one first-class roads (between Ruse and Varna).

Another important connection is the one between the two seaports in Varna and Burgas. The Cherno More motorway is planned to connect the two cities, but the project is still in the early planning stages and the government is seeking funds to finance it.

Those are only part of the hinterland road connections, which need to either be built or renovated within the next years, in order to improve port connectivity with the rest of the country.

CROATIA

Despite investments in the network of county and local roads in the past period, the quality of roads is still worse than in other more developed parts of Croatia, and it is necessary to build the remaining sections county and local roads to increase the share, i.e., the percentage of paved roads in the total length road networks in the County, and at the same time provide funds for investment in sections of paved roads that require reconstruction and modernization.

State roads also require the reconstruction and extraordinary maintenance of certain sections. The problem of the passage of state road corridors through city centers was previously emphasized, which led to increase in the traffic of trucks, so due to the faster flow of vehicles in transit and increased safety traffic it is necessary to relocate the route of state roads through the construction of bypasses of the cities of Vinkovci and Vukovar. Some sections of the bypass have already been built (mostly the Southern bypass of the city of Vinkovci), some are ready for construction, and certain sections are in the phase of designing or obtaining the necessary documentation, that is, a building permit.

The problem is also the poor traffic connection of the peripheral parts of the County (especially the city of Ilok) with county centers and the highway, so the construction of expressways is needed (Srijem

border transversals), which would reduce travel time, and at the same time represent bypasses of settlements in municipalities through which they pass.

In accordance with the condition of the road infrastructure in the area of VSC and the expressed need, it can be defined that there are priority projects in road transport construction of the following state roads:

- Srijem border transversal Ilok - Šarengrad - Bapska - Tovarnik - Germans - Lipovac - Strošinci,
- Podravska expressway Virovitica - Osijek - Ilok with determined connection route Osijek - Vukovar - Vinkovci - Županja and the section Nuštar - Vukovar,
- Vukovar bypass,
- relocation of the route of the state road D55 - Eastern bypass of the city of Vinkovci
- relocation of the route of the state road D46 - Southern bypass of the city of Vinkovci (continuation of construction),
- construction and reconstruction of the state road D537, section Slakovci - Otok.

Road connection in Vukovar suffices the port's needs for now, but if the development trend continues, and by all announcements it will, the roads will also have to follow. The potential is immense, but the port's capacity doesn't mean much if the adjacent infrastructure doesn't support the growth trends. A lot of work has been done recently, a two-way, two-lane road along the whole Priljevo area, the access road to Vukovar port with parking places… As long as the trend continues, Vukovar port will continue to have a bright future.

HUNGARY

The largest agricultural ports are easily accessible on road via highways or motorways and main roads. M6 is the closest highway to the Danube to the south from Budapest where the presented ports are located.

ROMANIA

All analysed ports are well connected to national roads. However, only 2 main ports are connected to 4 lanes roads, Port of Constanta to A2 motorway and Port of Giurgiu to DN5 4-lanes express road.

Road connection is secured to all destinations in Romania and other countries. Level of Service and speed depends of the overall road traffic, being at a lower level in the summer season when traffic is increasing especially to the sea side, thus to Constanta.

SERBIA

Road network in Serbia has an approximate total length of 45.000 km, including approximately 800 km of highways, 5.000 km of first-level state roads, 11.000 km of second-level state roads and over 25.000 km of local roads.

The port of Bačka Palanka has a favorable spatial micro location because it is directly connected to Corridor 10, i.e. with relevant traffic corridors in the vicinity of the E-75 highway (30-40km) and the E-70 highway (35km).

The Port of Bogojevo port is 40 km away from the E75 highway, in the direction Belgrade-Budapest. The port is connected with the regional road Bogojevo-Apatin-Sombor-Subotica, as well as with the section Bogojevo-Odžaci-Sombor of the main road No. 3, which passes through Serbia. Across the road bridge the port is connected to the section of road No. 3 Erdut-Dalj-Osijek in Croatia. The port is connected with the regional road Bogojevo – Subotica-state border Kelebia. Port of Bogojevo is connected to Kelebija with road IB.

Prahovo is connected by about 50 km of road to Vidin in Bulgaria, and Calafat in Romania, both of which are important road and rail hubs on European Corridor 4. A 150km highway also connects it to European Corridor 10, which links Serbia to other European countries. State road of class IIB No. 400 connects Port of Prahovo with the State road 35 - Dušanovac - Border with Romania near Kusjak.

UKRAINE

One of the most pressing problems of highways in the operation of dimensional and weight control (Weigh-in-Motion (WiM)) over vehicles transporting grain cargo. The fact is that the main WiM posts are located on the roads leading to seaports. On the rest of the roads, cargo is transported without monitoring compliance with established norms. As a result, companies located in the port areas of Ukraine find themselves in a discriminatory position. WiM control should operate throughout Ukraine. At the same time, the control procedure itself should be revised, and all vehicles with axle overload without restrictions on the total weight should be subjected to penalty.

Separately, has to be mentioned the option of building special concrete roads in the direction of seaports with increased DWC standards, but a fee will be charged for transporting along them.

8.3 Maritime infrastructure and services

AUSTRIA

The maritime connection from/to the main 4 Austrian ports is given along the TEN-T corridors, between the maritime ports in the North, Baltic, Black and Mediterranean/Adriatic Seas.
The Port of Vienna is one of the most important hinterland hubs in Europe, especially for the large North Sea ports and the Adriatic ports. The main destinations on waterway at the Port Vienna are for the hub function Constanta and Rotterdam and for the gateway function Europe and Asia upstream, downstream, charter.

Ennshafen Port can be reached by water via the Enns, Danube and the Rhine-Main-Danube-Canal. There are regular sailings since July 2015 with two vessels from Passau, Enns, Vidin to Ruse or any other Ro/Ro-Ports according to requirements. Ennshafen links the North Sea to the Adriatic.
The Krems Port is the Central European handling hub for import and export for foreign ports in north-western Europe down to the Black Sea.[76] Main transport destinations/origins are along the Rhein-Main-Donau (Rhine-Main-Danube) waterway. Pre-carriage and onward carriage are done for sea transport via ARA- and Black Sea ports.

The Linz Port is connected to the ARA-ports, Germany, and Hungary.

BULGARIA

A large share of Bulgaria's international trading goes through the seaports. After the country joined the European Union, the Bulgarian ports became an external border for the European Union. This makes them especially attractive as connections between the EU, the Black Sea countries, the countries in the Far East and the Asian countries in general.

Significant investments are needed for the improvement and maintenance of the current infrastructure, as well as for the technological renovation of the Bulgarian ports. There is currently a public discussion of the Maritime Spatial Plan of the Republic of Bulgaria 2021 - 2035, which is a strategic document for the country. The information it contains shows, that a big investment is planned for the port of Varna, mainly for deepening Channel 1 and Channel 2, connecting Terminal Varna West. The draught depth for vessels will be increased by 2 m and will reach 13.5 m.

At the end of 2019, a public tender was announced for BMF Port Burgas, which aims to expand the port. The value is over BGN 300 million of European funds under the Connected Europe mechanism. The planned investment is for the extension of the quay walls, as well as the completion of the railway infrastructure. The tender is divided in two parts. The bigger part is for BGN 261 mln., it is directed to the container terminal "Burgas West" and aims to build the quay walls for berths 25A, 26, 27 and 28. This means 4 new berths will be built with a total length of 810 m for ships with up to 15.5 m draught.

The other tender is for the construction of a quay wall for berth 33 at cargo terminal "Burgas-East 2" and is worth BGN 61 mln. The completion of the existing quay wall will extend the berth. Dredging of the operational water and maneuvering areas is also planned, as well as construction of pavement and facilities, including a railway track. This will allow for the establishment of a handling and storage site for general cargo and containers. The aim is to service ships with a draught of up to 14.6 m and 120 thousand tons.

CROATIA

Inland ports located on European waterways have a special meaning given the uniqueness of the transport and the overall economic market in which they operate. There are two international waterways in the County - the Danube and the Sava. The Danube is navigable all over the length through Croatia and according to the European Agreement on Main Inland Waterways of International Importance (AGN) is classified as airworthiness class VIc. The Danube is of an importance for international, regional and local traffic. The Sava is conditionally navigable, i.e., with great restrictions it is connected with unregulated waterway (insufficient draft in certain sections, critical points, etc.). Existing traffic depends on seasonal water level conditions and is mainly suitable for local and regional sailing.

The most important project related to the use of the potential of the Danube and Sava is the strategic project of the Republic of Croatia, Multipurpose Danube-Sava canal. The realization of this project could be of great importance for development of agriculture, drainage, irrigation, water management,

flood defense, river and combined traffic. Furthermore, it would shorten the waterway from Europe to the Mediterranean Sea and made it possible for development of ports, harbors and piers in the interior of the County along the route of the canal, which would have an impact on an overall development of the economy.

HUNGARY

Due to the strategic locations on the Rheine-Maine-Danube international IWW corridor, all the presented ports have connections to the ARA ports (Amsterdam, Rotterdam, Antwerp) on the North Sea and to Constanta on the Black Sea.

ROMANIA

Port of Constanta

Port of Constanța is both river and maritime port with a geo-strategical position that favors the position of hub for this region.
Before 2009, the port was a container hub relying mainly on its road connections to the hinterland. After the economic crisis the hub moved to the ports in Istanbul region and later another hub appeared when Chinese investors bought the port of Piraeus.
Unfortunately, the road connection improved slowly. The highway network still does not offer a complete motorway connection with Budapest or the North West part of Romania creating the premises to regain the share of the markets lost after 2008. Construction works are underway and in the couple of years this connection will ensure better road connections to the hinterland.
Currently, the rail network is the main downside for the development of container traffic because of its low commercial speed. This situation favors ports like Koper and Hamburg that have developed regular railway services in this part of Romania.
Now, the port is a hub for agri-bulk cargoes, River Danube being the most efficient way for the transit of bulk cargoes towards Constanta port and its hinterland. It still needs predictability in order to attract other types of cargoes – containers, but also to improve its navigation conditions for the existing transiting cargo flows.
As conclusion, the maritime infrastructure of Constanta Port offers very good conditions for the transit of different type of cargoes. Its connections, especially railway connections, needs a strong development and improvement in order to use the entire maritime and river potential.

SERBIA

Republic of Serbia is a landlocked country.

UKRAINE

The Ukrainian section of the Danube River is a part of the international transport corridor, which has its own cargo traffic and its own European rules of the game. It is difficult to talk about the Danube as a part of Ukraine's GDP. It is an international river with its own convention and with its own nuances both in international legislation and in the legislation of Ukraine. If we talk about agricultural cargo, then mainly along the Danube they are exported to the port of Constanta for shipment there to sea vessels and mainly Moldovan transit

In Ukraine, the main competitor of maritime transport is a rail transport. It can be witnessed a trend of a gradual increase in rates for the transportation of grain by rail. It is also predicted that the launch of the Weigh-in-Motion (WiM) automatic weight control system on the roads of Ukraine will inevitably affect the cost of transportation by road and change the price balance in the road transportation market. These trends create an opportunity for maritime logistics to fully demonstrate its competitive advantages in the transportation of goods over long distances.

To summarize the foregoing, it can be concluded that Ukrainian Danube ports with maritime status have the requisite infrastructure to manage the volume of agricultural goods in the region, but capacity upgrade is required. As a result, certain berths at the port of Reni must be rebuilt, and capital maintenance work in the harbor of the port of Ust-Dunaisk is required. Furthermore, cargo handling equipment is in desperate need of updating.

8.4 Port infrastructure

AUSTRIA

Agricultural products are mainly imported to Austria (43%) or are in transit (50%). The import commodities come from Hungary, Croatia, Serbia and Romania. Generally, the Austrian inland waterway and the port infrastructure are well equipped to handle transportation of agricultural goods and have relevant equipment such as products loading hoppers, silos - mostly all certified, big bag filling systems, etc. There is still great potential for modal shift to the Danube especially at the interface to the bioenergy sector. Generally, there are enough free capacities for modal shift to inland waterway and good intermodal connections.

There are also many investments made in the digitalisation of ports.

Services such as transshipment, heavy cargo transshipment, warehousing, packaging of agricultural bulk goods and fertilizers as well as bunkering are available.
Austria generally has few bottlenecks. The only one worth mentioning, the Hainburger Au is being closely monitored.

BULGARIA

The ports of the Republic of Bulgaria are important logistics points for the overall transport process. Over 60% of the imports and exports of Bulgaria's international trade passes through them and this has an extremely strong impact on the overall development of the country's economy. In recent years, the EU has paid close attention to the port industry. It has become a major factor for the organization from a strategic, economic, commercial, environmental and social point of view. This is quite logical, as ports are important not only for sea, river and intermodal transport in Europe, but also as economic axes, a source of employment and integration of the population.

Inland waterway transport is the most cost-effective option for transporting agricultural and other types of goods, and it is often the only option. In Bulgaria as a whole, the infrastructure of river ports is morally obsolete, but it nevertheless allows for the processing of not only the current amounts of cargo, but also for the acceptance of new ones. Danube ports have capacity that is not fully utilized and their modernization will lead to the possibility of full deployment of the services those ports can provide to their customers.

CROATIA

Infrastructure facilities on waterways within the County are few. Except for the Port of Vukovar and two passenger ports (Vukovar and Ilok) there is also a terminal in Ilok which was of a temporary nature and served servicing the needs of a local industrial plant, but is no longer operational. Available capacities within the port of Vukovar are distributed among the existing concessionaires: Vupik d.d., Luka Vukovar, Nautica Vukovar, LUKOIL Croatia. Transshipment port Vupik d.d. for loading and unloading of cereals and oilseeds in Vukovar, investment of 530 million was realized in 2012, and consisted of a 205 m long river mooring for receiving river boats and barges up to 3,000 t carrying capacity and length of 120 m. Loading and unloading of ships and barges is possible 24 hours a day. The terminal is completely connected to the silo and loading and unloading capacities on the railway, as well as with truck loading and unloading capacities.

The traffic of the port of Vukovar fluctuated significantly after the war. After a period of falling freight traffic on water roads, caused by the global economic crisis, is expected in the next medium term traffic growth and return to the level reached in 2006. Given the unpredictability of the movement commodity flows as well as the state of the whole economy, it is not known when growth of transshipment in river ports will occur. Passenger traffic maintained a high level of demand during the crisis so its further growth is expected in the following period. Most of the goods in the Port make up fertilizers and raw materials for fertilizers, iron goods, coal, cereals and oilseeds.

Of the major projects related to the further development of port infrastructure, it should be noted that for several years funds were invested from domestic and international sources in the preparation of technical documentation and obtaining the necessary permits for the expansion of the Port of Vukovar.

The construction of the county port of Ilok is planned, for which a conceptual design has been prepared. Making the idea and the main project of the construction of the Port itself will depend on the available financial resources. In Croatia there are no winter ship accommodation capacities in which ships would take shelter during the periods of ice, so certain activities are undertaken that the permits for the construction of such a winter house in Opatovac are obtained. The construction of river ports in Županja and two ports in Vukovar (Sports Island and the so-called Marina) are also planned. Also thus, from next year, the Port Authority will start preparing project documentation for capacity expansion of the passenger port in Vukovar at an existing location in the city center. The future development of inland ports will be in line with the Medium-Term Waterway Development Plan and the Inland Ports of the Republic of Croatia 2009-2016, prepared by the Ministry of Maritime Affairs, Transport and Infrastructure.

HUNGARY

Trimodal connections are available in all presented ports – except Paks. However, rail line does not enter the port area, tracks pass it from the west, therefore it is possible to load/unload cargo to/from trains with the port's capacity in Paks as well.

Annual turn-over is between 136,000 tons and 800,000 tons per year meaning all the ports traffic remain way under their total loading capacities (i.e. 300,000 tons to 2 million tons annually).

Sources:

hfip.hu – Hungarian Federation of Danube Ports

portofadony.hu

The Intermodal Development of the Port of Baja – public tender

ROMANIA

Rail port infrastructure need rehabilitation and increase of capacity in the following ports:

- Port of Constanta;
- Port of Galati – see new intermodal terminal;
- Port of Calafat;
- Port of Drobeta Turnu Severin.

New rail infrastructure is needed in the port of Giurgiu.

Road infrastructure: parking capacity is needed in all ports, especially in the Port of Constanta where at the peak season for cereals long queues are noticed outside the port and also on the internal road network of the port.