CORRIDOR CAPITALISATION PLAN FOR THE GYŐR-MOSON-SOPRON AND BURGENLAND REGION

D.T3.2.6

Version 1
09 2021

Disclaimer:

The content of this report, including suggestions for infrastructure improvements, should be understood as ideas by the authors for further consideration. They do not necessarily reflect positions or opinions of the Project Partners involved or contributing to the study.

1. Content

2. Introduction

According to the CORCAP project Application Form (AF) PP7 KTI Institute for Transport Sciences develops a corridor capitalisation action plan for the Győr-Sopron-Burgenland Region, taking into account the results and findings of D.T1.2.6 (Regional analysis of challenges and needs for the Győr-Sopron-Burgenland Region) and O.T1.2. (Decision-support tool specifying and prioritising pilot actions for multimodal freight transport complementing OEM corridor development). The document is jointly prepared by PP9 GYSEV who is one of the natural key stakeholders in the area being regional rail company operating on cross-border and other corridor sections.

Relevant results of WPT2 activities (particularly D.T2.3.10 Best-practice guideline on low-cost improvements for rail freight transport in railway corridors) are also considered during the process of elaboration.

2.1. General Objectives

In line with CORCAP projects main aims, the current deliverable general objective is to support the development of a sustainable and attractive living and economic environment in Western Hungary and Burgenland province. From the logistic sector's side this can be achieved by better positioning and enhancing the functionality of the corridor through improved coordination between transport and spatial planning. As an expected result it could to contribute to strengthen the logistics locations and extends positive economic impacts at areas where it is the most needed.

2.2. Specific Objectives

The current deliverable has to support Specific Objective no. 1 eliminating bottlenecks in the Western Hungary / Burgenland region for transit traffic on the OEM-corridor by analysing the current state- in order to ensure the coherence of regional development and other sectoral plans by reviewing and purposefully explaining existing and under review materials.

2.2.1. Overview of existing plans and studies

The Orient/East-Med Corridor connects large parts of Central Europe with ports of the North, Baltic, Black and Mediterranean Seas. These ports are functioning as multimodal logistics platforms and the corridor aims to provide further economic centres in central Europe with modernised, multimodal connections. On the corridor lies the Elbe River, that has a key role as an inland waterway and improvement of multimodal connections between Northern Germany, the Czech Republic, the Pannonian region and South-Eastern Europe is targeted through the incorporation of the river. By maritime connection, the corridor is also planned to link Cyprus to continental Europe.

Besides the substantial development needs of the Elbe, CEF (Connecting Europe Facility) identified multimodal connections missing between Hungary, Bulgaria, Romania and Greece. Further improvements are needed between Hegyeshalom and Bratislava (rail), Mosonmagyaróvár and the Slovakian border (road)[1]. In this part of the study, we present the current situation in Győr-Moson-Sopron County regarding the relevant section of the TEN-T corridor. We also explore the wider area and the potential spatial and

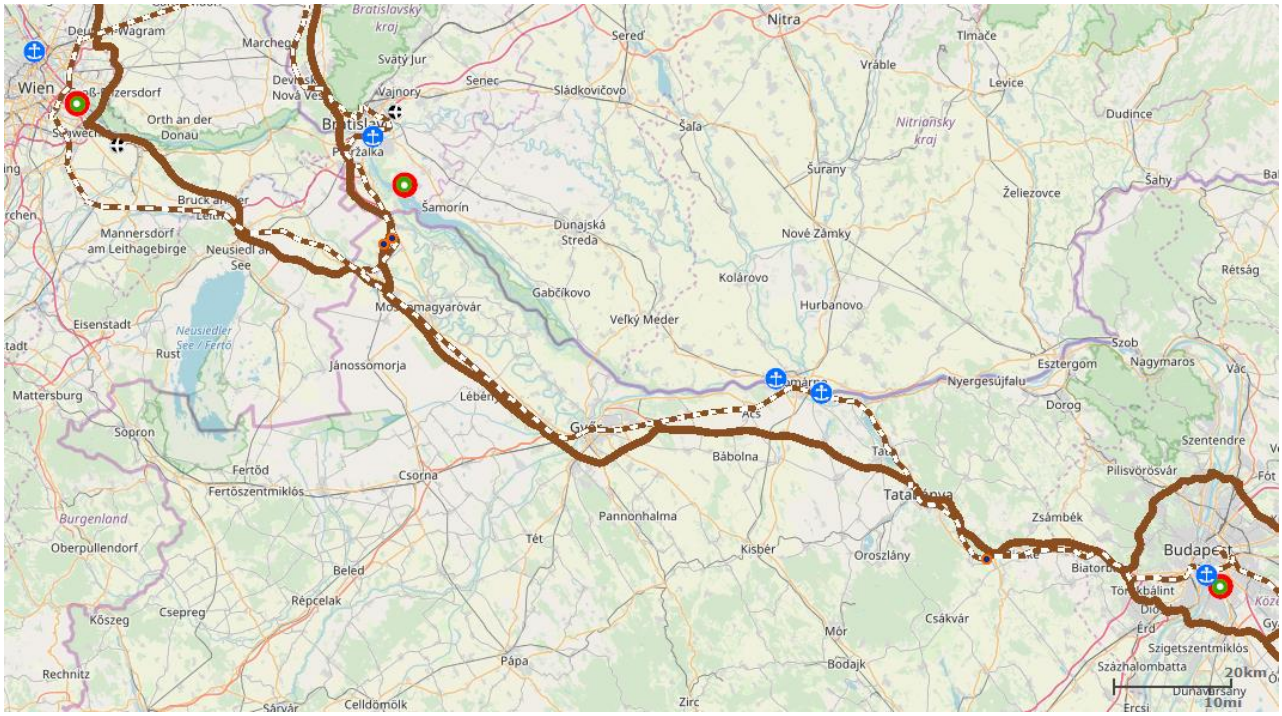

Figure 1 The The Orient/East-Med Core Network Corridor in Győr-Moson-Sopron County (dashed lines railway) Source: https://ec.europa.eu/transport/infrastructure/tentec/tentec-portal/map/maps.html?corridor=4&layer=8,9)

economic connections to it. In Figure 1 the respective section of the Core Network Corridor (road and rail) is indicated by brown lines. It should be noted, that the OEM Rail Freight Corridor (RFC OEM) comprises further rail lines in the area, such as the Győr – Sopron – Ebenfurth – Vienna line.

Győr-Moson-Sopron County lies in the western part of Hungary, its territory is 4,208 km^2, the centre of the county is Győr. In the county, there are 183 settlements and 12 cities. The population is 450,000 inhabitants, the population density is 109 inhabitants/km^2. About 60% of the population live in cities. The biggest towns are: Győr (129,000 inhabitants), Sopron (62,000 inhabitants) and Mosonmagyaróvár (32,000 inhabitants).

The freight corridor relevant to the CORCAP project is stretching between Bratislava and Budapest; and Vienna and Budapest. The above corridor sections within the county include:

M1 motorway and main road Nr. 1, which are both important road transport routes;

Budapest – Hegyeshalom (– Vienna) – Rajka – Bratislava railway line;

Győr – Sopron – Ebenfurth – Vienna railway line

Danube waterway from Budapest to Vienna and Bratislava, including the port of Győr (Gyönyű);

[1] https://ec.europa.eu/transport/themes/infrastructure/orient-east-med_en

Regional airport of Győr (Pér), however as of 2021 the airport is primarily used by Audi Hungaria Ltd. and for passenger and freight transport purposes.

The catchment area includes the neighbouring counties in Hungary, namely: Komárom-Esztergom, Veszprém and Vas counties, while, Niederösterreich and Steiermark regions in Austria may also be considered as such, as well as, Bratislava area in Slovakia (Figure 2).

The traffic that flows through the northwest region has two main directions that happen to be perpendicular to each other. One is the east-west corridor that goes from Budapest to Vienna thus connecting Southeast and Western Europe. The main routes of this corridor are the M1 Highway in Hungary, the Budapest-Vienna Railway and the Danube River. Part of the east-west rail freight traffic (ca. 40%) is even using the Győr – Sopron – Ebenfurth line. The other main corridor of the region has only evolved in the last decades when the north-south road freight traffic was seeking an alternative route to circumvent the Austrian highways and the Semmering rail line with its steep gradients and certain loading gauge restrictions. Currently a significant part of the Polish-Italian truck traffic goes along the Western border of Hungary between Slovakia and Slovenia, mainly using the 86 and M86 highways. Even rail traffic in North-South direction through Western Hungary is evolving since the electrification of the GYSEV North-South route, especially container traffic between the seaport of Koper and destinations in Slovakia as well as destinations in Central Hungary (Budapest). The development of this traffic was one of the reasons for establishment of the Amber Rail Freight Corridor connecting Slovenia, Hungary, Slovakia and Poland, now offering a fully electrified North-South route east of the Alps.

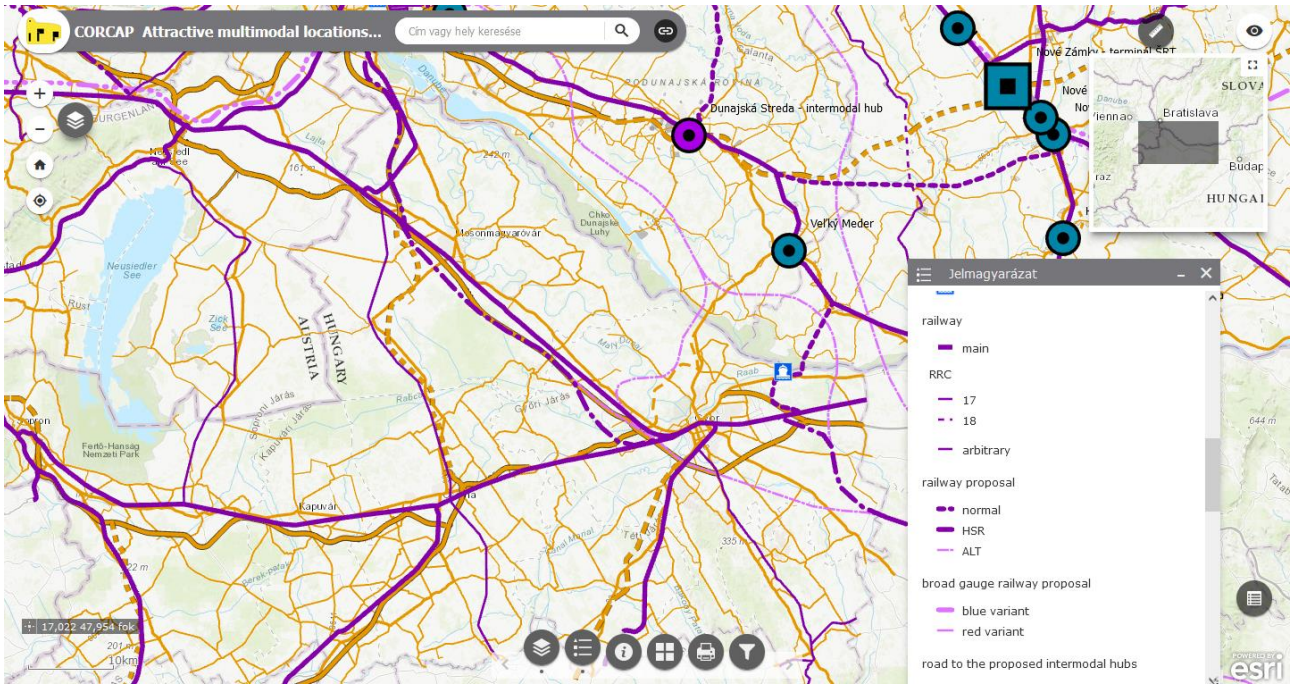

Figure 2. Existing and planned rail and road network in Győr-Moson-Sopron county and Northern Burgenland
https://ippoz.maps.arcgis.com/apps/webappviewer/index.html?id=4daafdb58a8b4c5699bd54b6b35abfe9

The most important freight corridor directions are shown on Figure 3 where the split of the of largest freight flow from Budapest (and from Curtici) towards Western Europe are split at Győr via Hegyeshalom and Sopron (Figure 3).

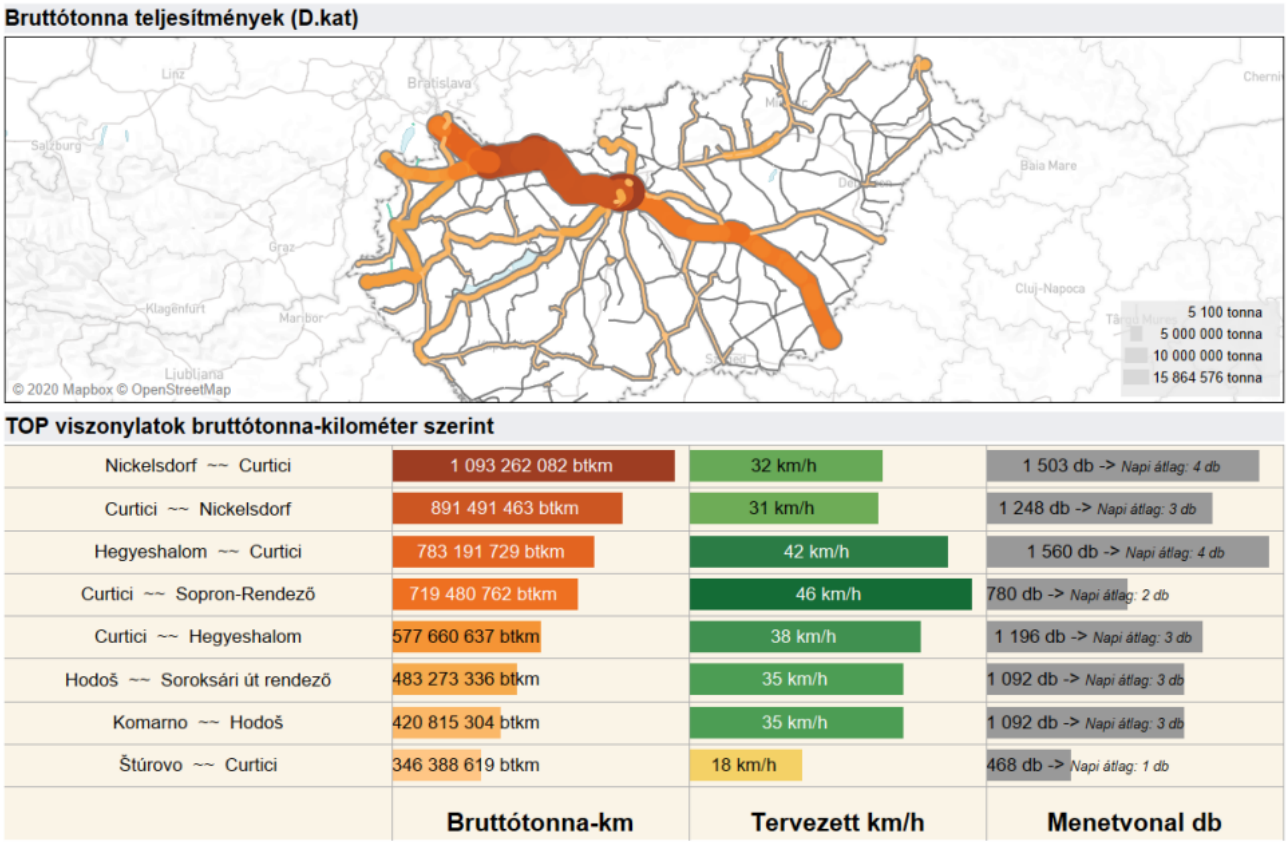

Figure 3 Gross-tonne-km Performance for freight trains on the Hungarian railway network in 2020 (data till 24/08/2020) Source: https://opendata.vpe.hu/tableau_riportok/02_teljesitmeny_adatok/16_arufuvarozasi-szegmens-20_21

In the following, Figure 4 shows the Hungarian household and GDP data compared to the EU28, trends of population, size of households, GDP, and the spending of households. Both the household spending and the GDP are expected to increase continuously. These trends are analogous with the estimated energy need of the different sectors as they are all expected to increase steadily (see Figure 5).

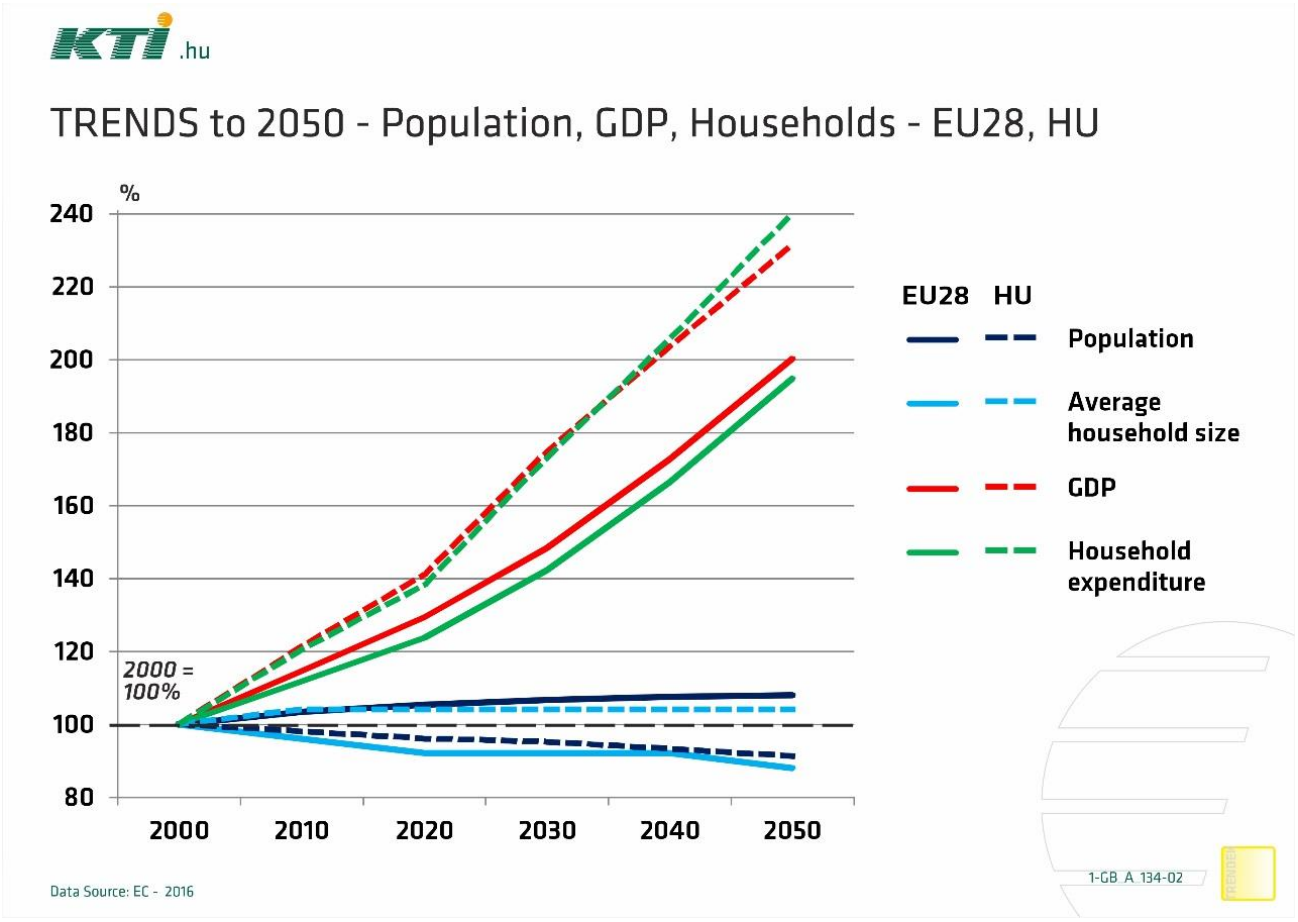

Figure 4 Hungarian and EU household and GDP data (source: https://www.kti.hu/trendek/trendek-2050-ig-nepesseg-gdp-haztartasok-eu28-hu/)

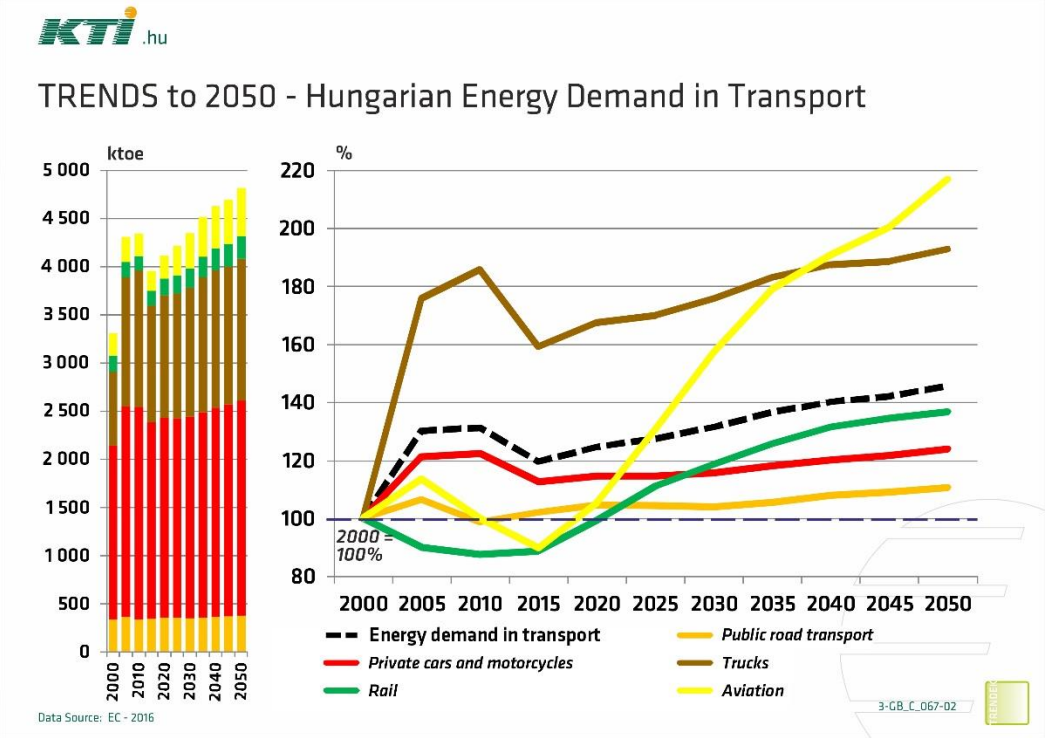

Figure 5 Energy need of Hungarian transport sector (source: https://www.kti.hu/trendek/trendek-2050-ig-magyar-kozlekedes-energiaigenye/)

Based on the above trends (a forecast that already contains the expected measures), it is clear that the greatest relative increase will happen in the aviation sector (yellow); however, the energy need of road transport (brown) is substantial and expected to increase faster than the main energy consumer, passenger cars and motorcycles (red). That is why it is important to strengthen environmentally friendly transport modes, in particular rail (green), and to improve the environmental performance of road transport.

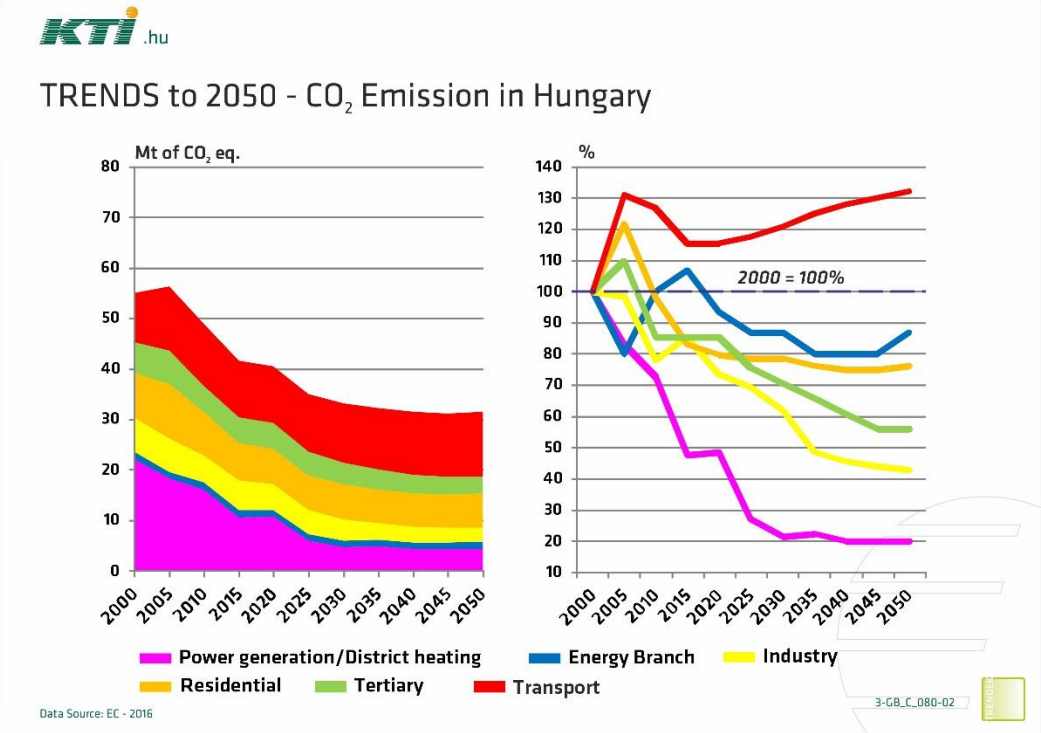

Figure 6 CO_2 emission in Hungary (source: https://www.kti.hu/trendek/trendek-2050-ig-co2-kibocsatas-magyarorszagon/)

In Figure 6 one can observe the CO_2 emissions (a forecast that already contains the expected measures) are expected to increase mostly in the transport sector (red). In the further sectors – energy (blue), industry (yellow), private (orange), electricity production and heating (rose), tertiary (green) – the CO_2 emissions would decrease. In Figure 7 the transport volume trends are shown by transport modes until 2050.

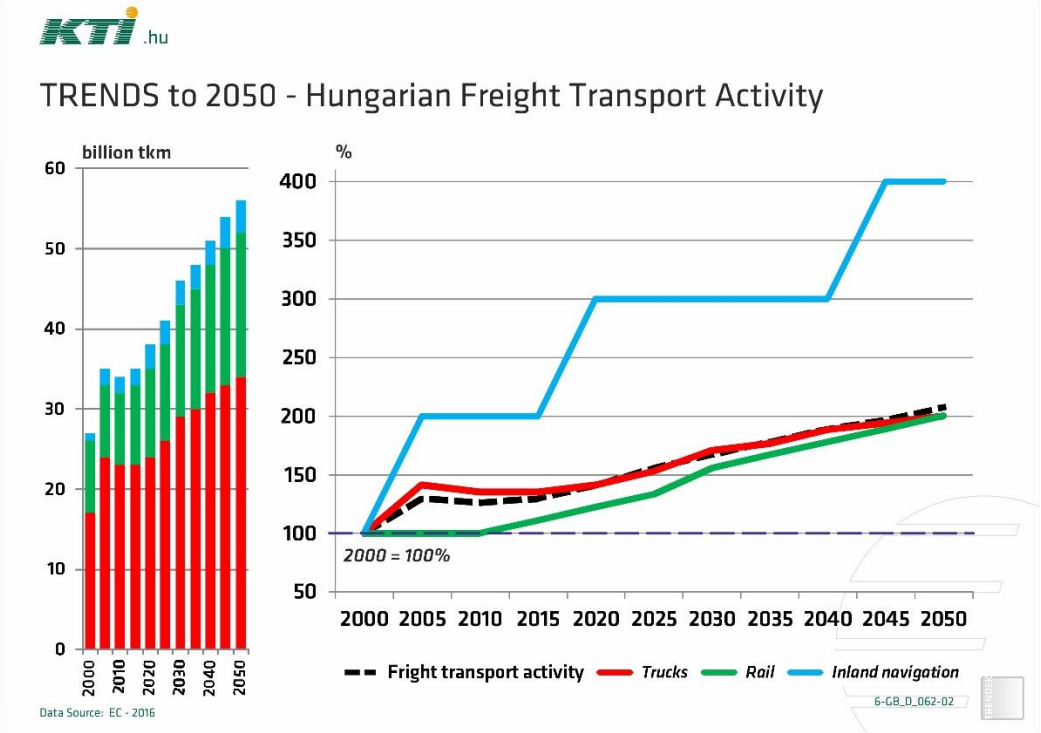

Figure 7 Hungarian transport volume trends by transport modes (source: https://www.kti.hu/trendek/trendek-2050-ig-magyar-aruszallitasi-teljesitmenyek/)

The CSO's 2018 data show that a total of 78% of the goods carried by transport operators registered in Hungary were transported by road (Figure 8). This equals goods of a total of some 169.3 million tons carried by road, involving the use of roads by a total of over 10.5 million freight transport vehicles, up 15% year-on-year (considered as a BAU scenario).

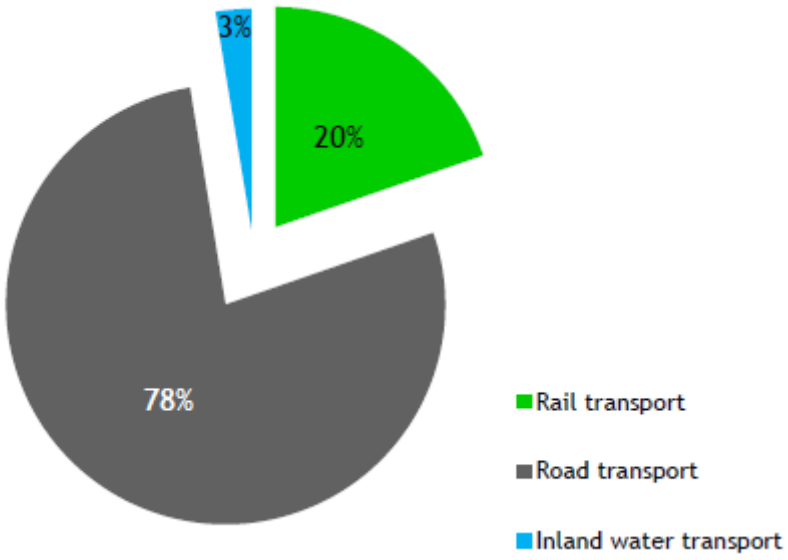

Figure 8 Transport of goods in 2018 by sectors (source: Hungarian CSO/KSH)

2.3. Transport of goods by road – restructuring

According to data published by the Central Statistical Office (CSO) the volume of goods transported by road increased in 2018, after a period of decline in 2016 and 2017, and in the following years (2019 and 2020) declined, perhaps due to the global pandemic. The transportation altogether, in both national and international directions, in 2020 have fallen to the 2016 level; after a promising increase in 2018-19. The main foreign freight flows can be seen on the next Figure 9 .

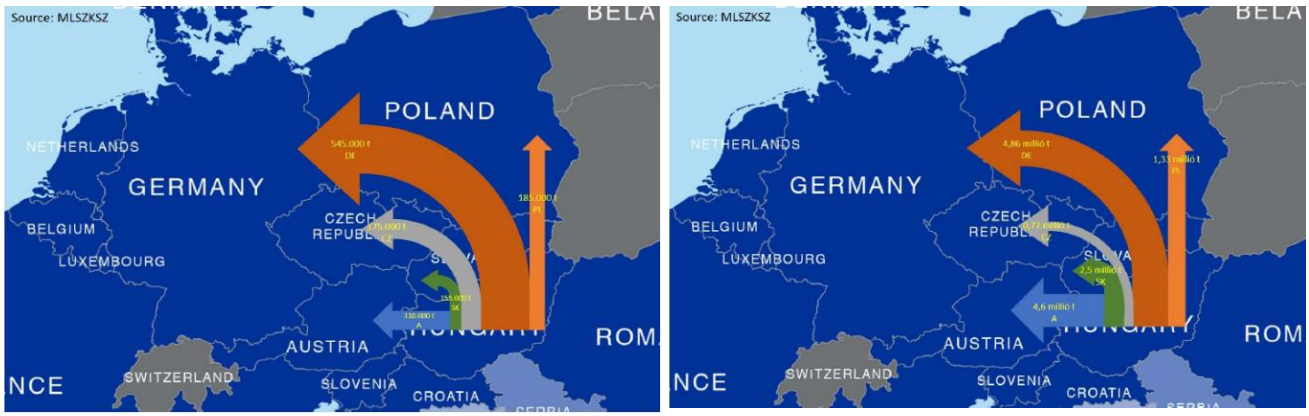

Figure 9 The volume of road (left) and rail (right) freight traffic in 2018 (source: MLSZKSZ[2])

2.3.1. Transport of goods by rail – stagnation

Rail transport had a modest growth rate since 2011 (see Figure 10), but dropped by 0,9% between 2017 and 2018. Overall, about 20% of the total amount of goods were carried by rail in 2018. The stagnation in rail transport resulted most probably due to the track closures required by refurbishment and modernisation projects, delays caused by detours, capacity restrictions and an outdated system of regulations. According to the CSO and MLSZKSZ forecast by 2050 all transport modes are expected to increase significantly (see Figure 10).

[2] MLSZKSZ (2019) – CORCAP – a TEN-T folyosók regionális fejlesztési és logisztikai hasznosíthatósága [Utilisation of the TEN-T corridors in the regional development and logistics)

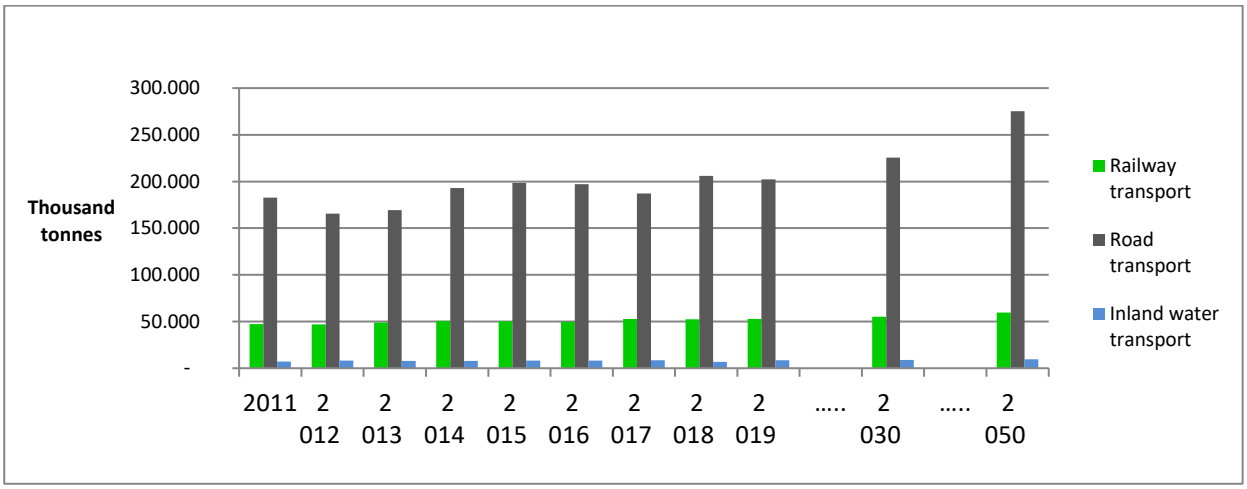

Figure 10 The trends of Hungarian freight transport expected by the forwarders (source: MLSZKSZ[3] calculations based on CSO)

2.3.2. Waterborne transport – room for improvement

One of the outstanding opportunities of the Győr-Moson-Sopron Region is the waterway, as the Danube runs along the county. It is part of the TEN-T Corridor No. VII, the network which traverses Europe on the Rotterdam-Constanta axis. When evaluating shipping, it is important to mention which is the farthest possible point without reloading, as this mode of transport is generally economically worthwhile for long-distance shipments due to high logistics service costs.

[3] MLSZKSZ (2019) – CORCAP – a TEN-T folyosók regionális fejlesztési és logisztikai hasznosíthatósága [Utilisation of the TEN-T corridors in the regional development and logistics)

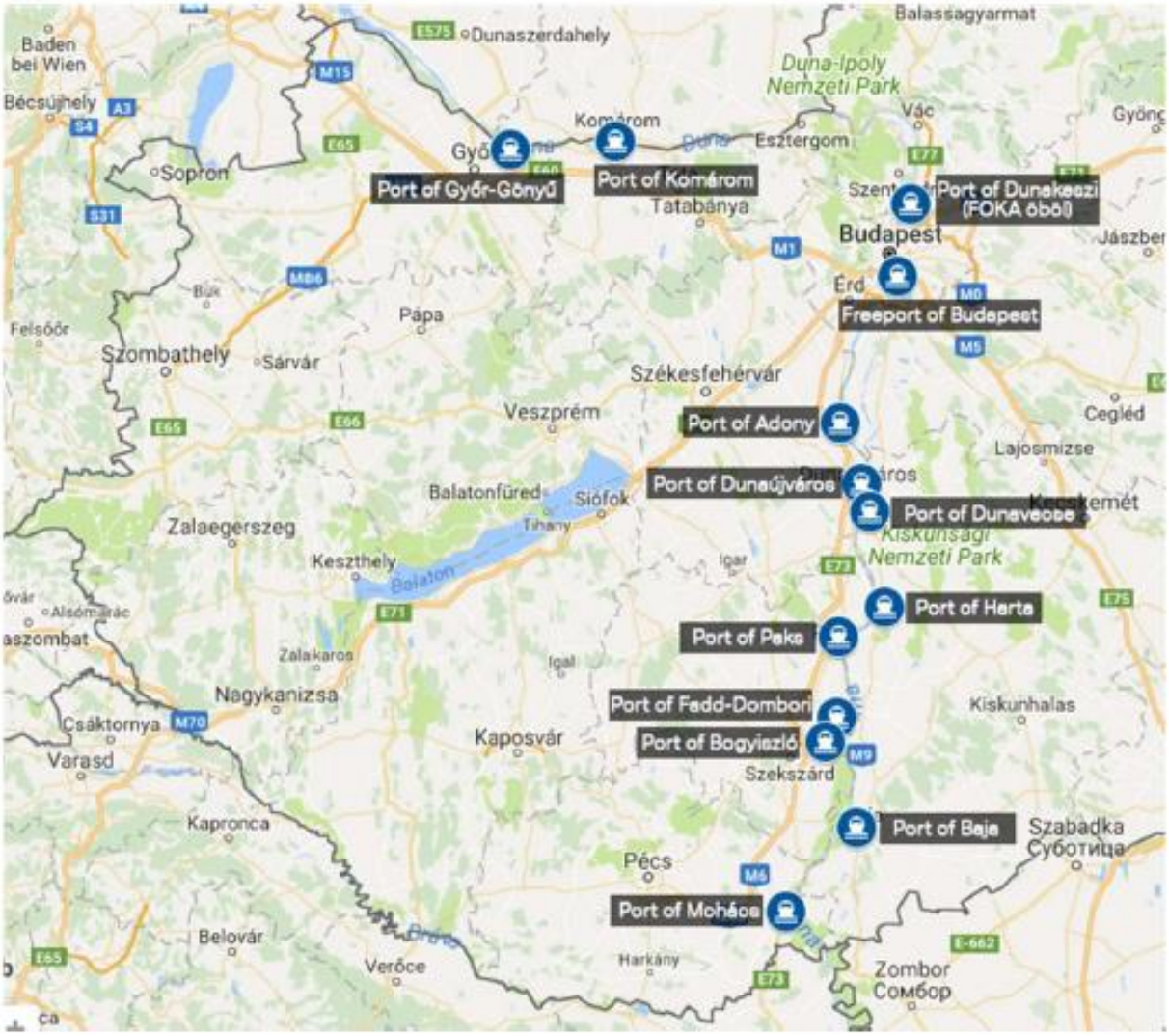

Figure 11 Main Danube fluvial ports of Hungary (source: own edition based on Google Maps)

The river enters the country at the river kilometre (rkm) section of 1850 and exit at 1433 km below Mohács. It is listed as a border river in the region of Győr-Moson-Sopron (Figure 11). From Rajka (1849 rkm) to Szap until 1811, the river is not navigable by large ships, so at this section the large ships use the Bősi / Gabcikovo dam water supply channel, therefore the length of the navigable river section in Hungary is 378 rkm. For the most part the Hungarian Danube section does not comply with the recommendations of the most important requirements of navigable inland waterways. These requirements are specified in the European Agreement on Main Inland Waterways of International Importance (AGN) and by the Danube Commission (DC). The AGN requires 27 dm for 240 days (28 dm at rocky fords) and the recommendation of the Danube Commission is at least 25 dm in the shipping route, for 343 days. Therefore, if the fairway complies with the DC recommendations, it automatically meets the requirements of the Agreement.4

The fairway has been virtually unmanaged on the Danube for 20 years, with the result that navigation at low water levels is limited or at times not possible at all, measured by the European standards. There

[4] Source: Dunai Hajóút Fejlesztési Program II. [Danube Waterway Development Program II.]

are waders and seaway bottlenecks (a total of 59) on the 120 m wide shipping lane in the Hungarian section:

- on the Danube section between Szap - Gönyű (1811,000-1786,000 rkm) there are a total of 12 obstacles to navigation (6 on the left bank, 4 on the right bank), of which 2 can be found on both the left and right banks. This part belongs to the studied region;

- on the Danube section between Gönyű-Szob (1786,000-1708,000 rkm) there are a total of 13 obstacles to navigation (4 on the left bank, 2 on the right bank), of which 7 can be found on both the left and right banks;

- on the Danube section between Szob and Budapest (1708,000-1651,000 rkm) there are a total of 8 obstacles to navigation (1 on the left bank, 4 on the right bank), of which 3 can be found on both the left and right banks;

- on the Danube section between Budapest and Dunaföldvár (1651,000-1563,000 rkm) there are a total of 7 obstacles to navigation (1 on the left bank, 0 on the right bank), of which 6 can be found on both the left and right banks;

- on the Danube section between Dunaföldvár and Kölked (1563,000-1433,000 rkm) there are a total of 20 obstacles to navigation (11 on the left bank, 6 on the right bank), 3 of which are in the middle of the fairway.5

A key factor in the inland navigation system is the capacity of the Danube waterway, which is primarily determined by the prevailing navigability conditions (i.e. the Danube's navigability over a year, in a cost-effective manner, with a fully loaded dive). Navigability has a direct impact on the potential capacity utilization of infrastructure along the river. Provided they have adequate navigability conditions and ongoing maintenance of the waterway infrastructure, the sector provides reliable and competitive freight services. All these are key prerequisites for integrating inland shipping as an environmentally friendly mode of transport into the logistics system of a modern economy. The Danube canals and bottlenecks are significant, which also limits the flow of the Danube-Main-Rhine waterway system. Integrated water management and river management are needed not only for navigation but also for the upset sediment balance, water base protection, groundwater subsidence, backwaters, and flood protection.

One of the most important water gauge on the Danube is in Pfelling (Germany), it is used to determine the low water surcharge to ensure an even cost bearing between the transport service provider and the customer. The year 2016 was considered average in terms of navigability conditions and water level (see Figure 12). The times when the shippers had to restrict their barge capacity were mostly short, and for 70 percent of the year the ships could be used to their maximum capacity. The drought in the second half of the year was around 2m.6

[5] Source: Dunai Hajóút Fejlesztési Program II. [Danube Waterway Development Program II.]

[6] Source: Plimsoll Zrt.

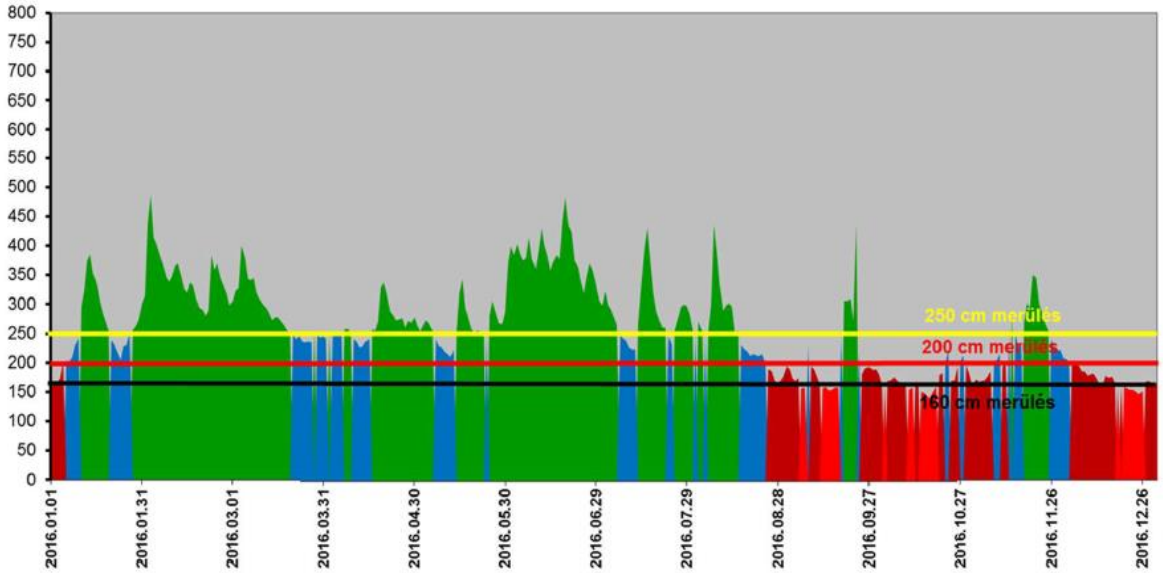

Figure 12. Shipping possibilities on the river Danube 2016 based on the Pfelling water gauge. (Source Plimsoll Zrt.)

The most hapless conditions (from the point of view of the inland water transport companies) occurred in 2018 when inland waterway transport became impossible for half of the year after favourable water conditions at the beginning of the year (Figure 13). In the second half of 2018, the entry into the summer low water period at the beginning of July 2018 and the resulting inadequate water levels led to a critical situations in the water supply and significant restrictions on shipping due to the nautical conditions. This mainly affected shipping on the upper and middle Danube, where the maximum continuous draft was less than 20 dm; in some sections, problems even occurred with drafts less than 16 dm. As a result, the ship-owners were forced to maximise their draft at 17.5-18 dm (by being partially loaded), as well as putting barges through shallow sections individually. The unfortunate traffic conditions in the third quarter and the beginning of the fourth quarter, resulted in the worst inland water transportation performance (in cargo volume) for the last five years in 2018 (Table 2).7

[7] Danube Commission https://www.danubecommission.org/dc/de/die-donauschifffahrt/marktbeobachtung-der-donauschifffahrt/marktbeobachtung-der-donauschifffahrt-bilanz-2018/

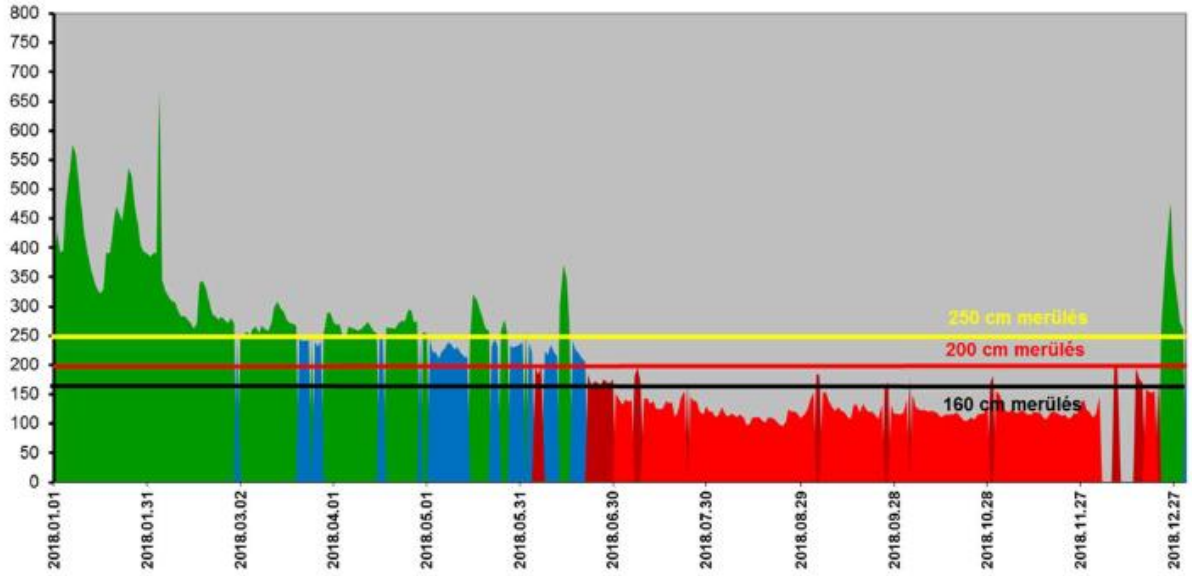

Figure 13: Shipping possibilities on the river Danube 2018 based on the Pfelling water gauge. (Source: Plimsoll Zrt.)

The biggest challenge regarding navigability of the Danube in the future is to ensure the sufficient depth of the riverbed, because with that inland shipping could become a more predictable transportation method.

In the recent years, as a result of the improvements, the Gönyű port has closed 2020 with a great leap in its performance, generating the highest traffic in the past 5 years, however it still lags behind the other two national public ports (Table 1)

Table 1 Cargo volume of the main Hungarian ports (kt) source: Központi Statisztikai Hivatal (CSO)

	Győr-Gönyű National Public Port	Csepel National Public Port	Bajai National Public Port	Other Danube Ports	Total
Loaded (kilotons)					
2016	101,4	441,0	426,1	2 634,3	3 602,9
2017	104,4	417,1	498,3	2 671,7	3 691,5
2018	34,4	246,1	234,6	2 269,8	2 784,9
2019	76,8	341,1	386,5	2 400,0	3 204,4
2020	162,1	478,9	700,7	3 147,5	4 489,0
Unloaded (kilotons)					
2016	62,9	603,9	80,4	1 088,4	1 835,7
2017	63,0	705,3	146,0	1 193,0	2 107,3
2018	71,2	672,1	112,1	1 559,2	2 414,7
2019	148,6	788,5	118,6	1 804,2	2 859,9
2020	118,8	712,8	144,7	1 276,9	2 253,3

Total Cargo volume handled (kilotons)					
2016	164,4	1 044,9	506,5	3 722,7	5 438,6
2017	167,4	1 122,4	644,3	3 864,7	5 798,8
2018	105,6	918,2	346,7	3 829,0	5 199,6
2019	225,4	1 129,6	505,1	4 204,1	6 064,3
2020	280,9	1 191,7	845,4	4 424,3	6 742,3

The Hungarian freight traffic on the Danube, is not comparable to those of the Western European countries with sea to inland waterway connections. The Danube fairway in its current state is unpredictable, so it cannot host a stable traffic. In 2020 the total transport of the European Union was more than 500,000 kt. At the same time on the Danube it was 65,000kt (52,000kt by EU countries, nearly 10,5% of the EU's total freight transport), which shows the importance of the river in for the countries on its banks.8

[8] https://ec.europa.eu/eurostat/databrowser/view/iww_go_atygo/default/table?lang=en

Table 2: Cargo handling in the ports of the Danube countries Source: Danube Commission

Cargo handling in the ports of the Danube countries (kilotons)					
	2016	2017	2018	2019	2020
Germany	2 958	3 314	2 585	3 274	3 511
Austria	7 493	7 981	6 123	6 452	6 645
Slovakia	1 969	2 127	1 542	1 664	1 553
Hungary	5 439	5 799	5 200	6 064	6 742
Croatia	677	632	592	814	948
Serbia	8 412	6 390	7 429	9 735	8 164
Romania	25 096	23 785	24 680	28 474	27 307
Bulgaria	7 013	5 570	4 923	5 385	5 431
Moldova	886	1 591	1 889	1 299	1 185
Ukraine	6 680	6 277	6 067	5 629	4 055
EU	50 645	49 208	45 645	52 127	52 137
SUM	66 623	63 466	61 030	68 790	65 541

What is also important to emphasize about one of the key infrastructure investment of the region is the new lock system. The main goal of the project is to supply water to Győr. On the other hand the mouth of the Mosoni-Danube will be relocated. As a result, it will become Gönyű a port basin, which will reduce the cost of maintenance of the port and provide opportunity to generate additional traffic. The end date of the investment is planned for summer 2022.

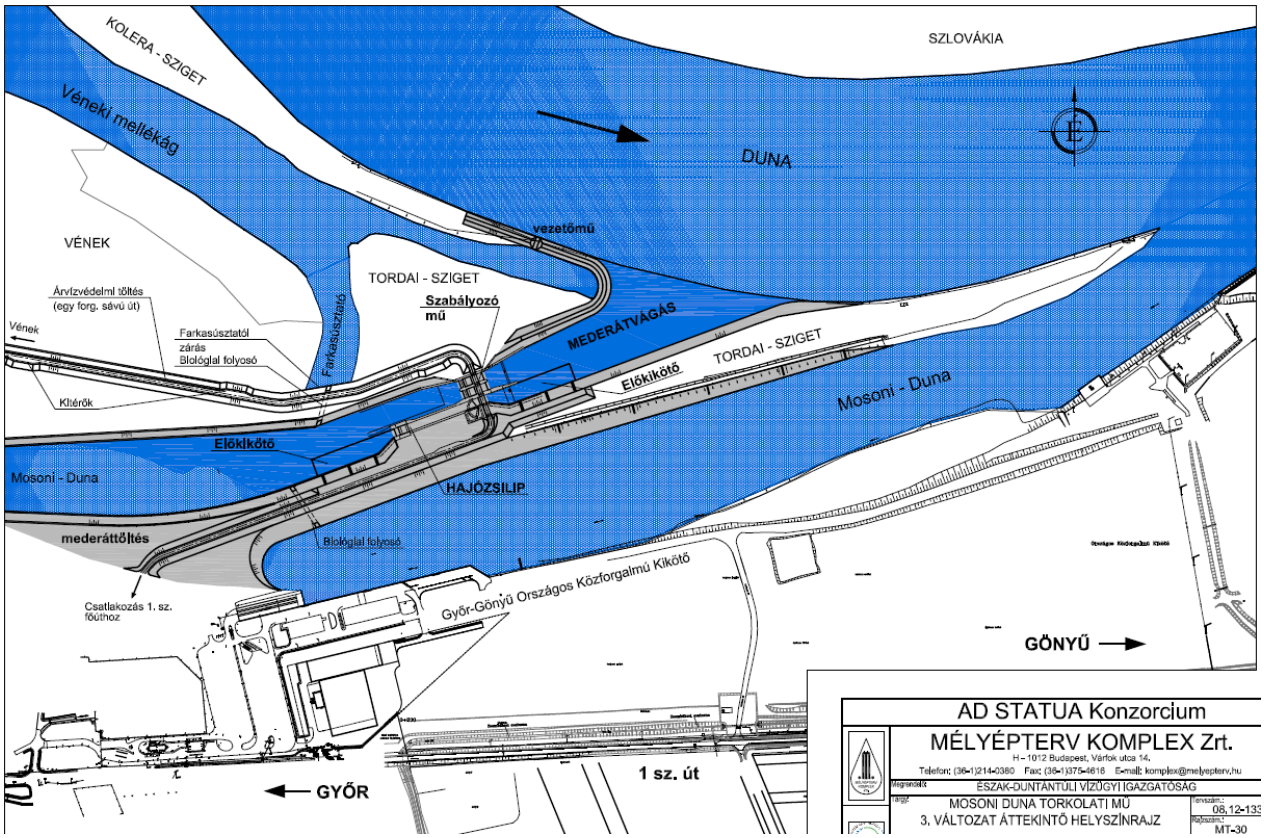

Figure 14 The relocated mouth of the Mosoni-Danube and the port with pool
Source: Észak-Dunántúli Vízügyi Igazgatóság

2.3.3. Intermodal terminals in the area

Győr is the capital and largest city of Győr-Moson-Sopron County. The city has a well-developed industry, the most important employer is AUDI Corp., whose logistics centre is located in Győr. The centre also has a rail connection, providing direct service from the major rail network. In addition, the city has a large industrial park, which is also connected to the national rail network. Also worth mentioning the factory of Rába Járműipari Holding Nyrt. which also has a rail connection.

Sopron is the second largest town in the county. The city is the home of the container terminal of GySEV Zrt., which is one of the main rail logistics centres in Western Hungary. The terminal has 2 cranes and a storage capacity of 40,000 m2 and 2,000 TEU. The industrial district of the city is the home of other smaller companies, but only some of them have a rail connection. The side track network in the western part of the city is no longer used, in the north side of the city a company producing industrial products has a rail connection.

Along the Győr - Csorna railway line, the third town in the county, Csorna, has a railway connection to the milling industry, and in Petőháza the sugar factory had a larger rail traffic. The factory has a railway connection and wagons were loaded until 2007 on the factory premises. In Pinnye, a wood processing company has a rail connection. Generally speaking it can be said that along the main corridors there are still many industrial and logistic sites which could be served directly by rail with shorter industrial branch lines construction. In certain cases there is still in place some not operational rail connection which could be easily revitalised. On the other hand there is a growing logistical attractiveness along the newly built

motorway sections (M85 and M86) and some other by-pass roads which are located far from railway lines. The new green-field development industrial-logistic developments are not desired among them unless an economically and environmentally sustainable railway connection could be built to them. This paradigm should be reflected in all local and regional spatial planning documents and should be strengthen by the EU and national legal background.

There are several logistics service centres located in Győr-Moson-Sopron county (see Figure 15) The Hungarian logistics centres were classified by the MLSZKSZ (Magyar Logisztikai Szolgáltató Központok Szövetsége; Association of Hungarian Logistics Service Centres). The largest is marked with red near Sopron, which is an intermodal logistics hub that belongs to the Gysev Cargo Zrt. The only regional logistics hub Győr-Gönyű National Public Port is marked with yellow are and in blue there are five local logistics centres. The figure also shows that the heart of the regional network is Győr and the only terminal out of 50 km range from Győr is in Sopron. In the region the density of the rail network is rather high compared to the country average. Only one logistic centre, Innovativ Special Transport Kft. has solely road connection (at 9012 Győr Zsigmond Király út 21. along the M1 motorway), all the other centres have access to the rail network.

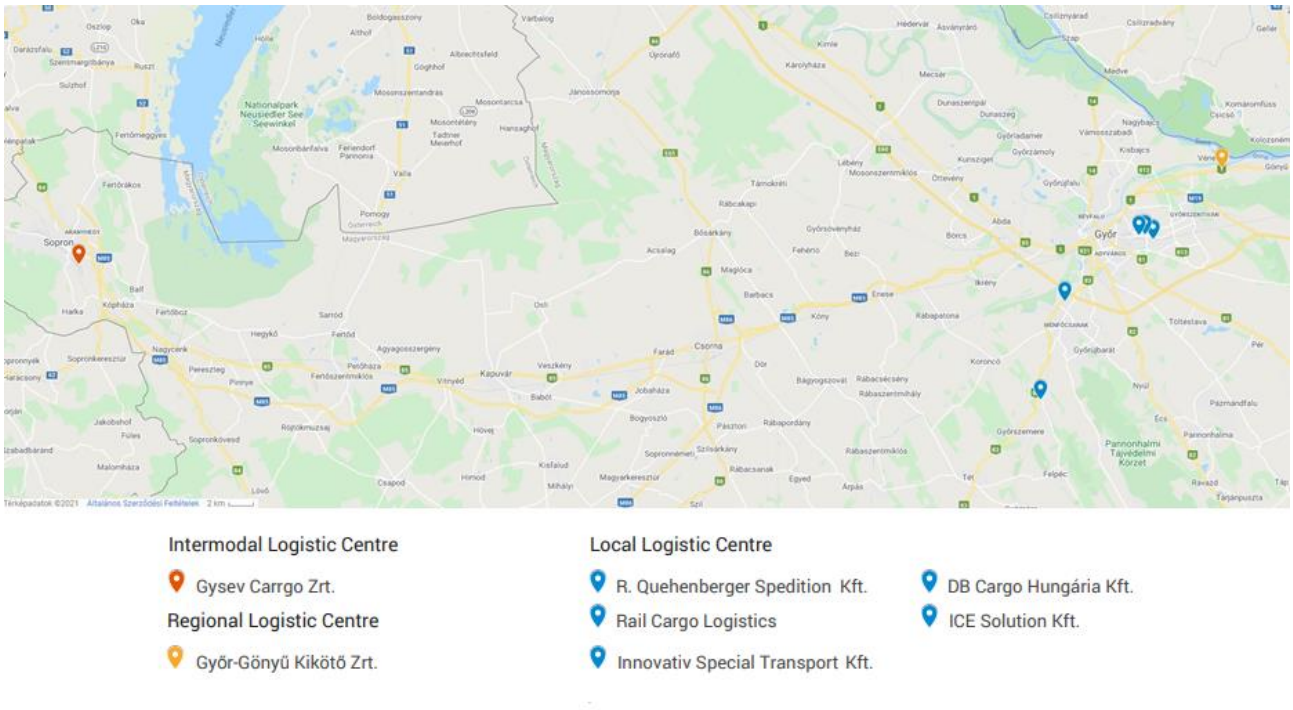

Figure 15 Logistics service centres in Győr-Moson-Sopron county (own edition on GoogleMaps).

In the region of Győr-Moson-Sopron county and the surrounding territories the only intermodal container terminal operated by GYSEV is located in Sopron (Figure 16) and offers the following services:

- moving, storage (deposition), loading/unloading, re-expedition, repair and cleaning of multi/intermodal transport equipment;

- Block train composition, organization of pre-and on-carriage with defrayal, storage of dangerous goods, comprehensive customs logistics, asset protection and security services.
- In the container terminal 72.000 containers can be handled yearly (240pcs/day) by two gantry cranes and one mobile crane. The storage capacity is 2.000 TEU. Further logistics services offered by the Logistics Service Center include:
- 60 000 m^2 open storage area
- 28 000 m^2 indoor warehouse area with direct access to road and rail routes
- Warehouse logistics
- Un-/loading of goods from/into wagons/trucks
- Road/rail transport organization (pre and post-carriage)
- Organization of domestic and international transport
- Sheeted trucks up to 3.5 – 24 tons
- Container carrying vehicles (containers up to 20 – 45')
- Moving and storage of containers
- Comprehensive customs clearance
- Hub function
- Transport preparation
- Finishing services, unit load composition
- Rental of warehouse resources
- Transshipment road/rail[9]

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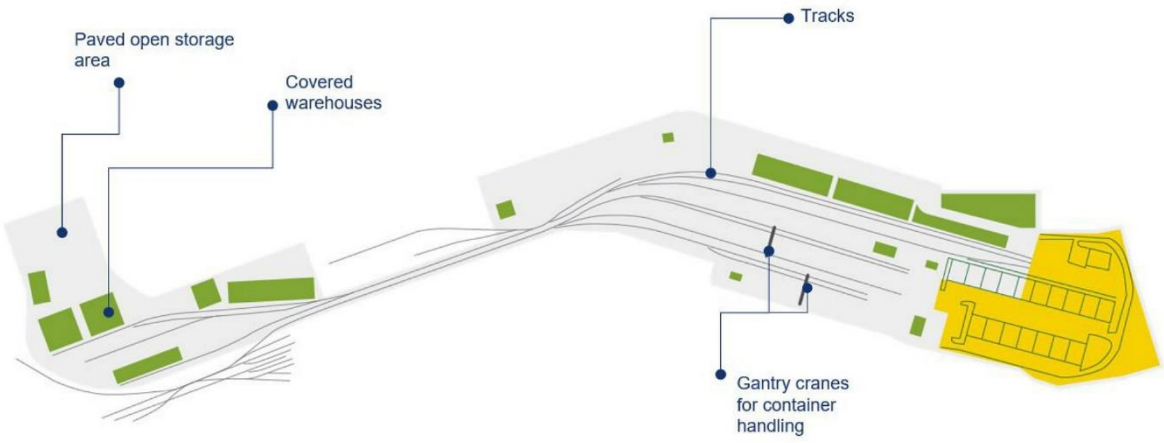

Figure 16 Sopron Container terminal (source: https://www.gysevcargo.hu/en/services)

In the catchment area there are more terminals for the combined traffic:

[9] https://www.gysevcargo.hu/hu/szolgaltatasok

On the Austrian side on the way from Sopron and Ebenfurth there is a combined container terminal Wien Süd/Inzersdorf (Austria).

In Dunajska Streda, Slovakia there is a METRANS hub, its infrastructure includes:

280,000m^2 terminal area;

250.000 m^2 stacking area;

5*650m and 4*550m rail tracks;

3 RMG cranes, 6 reachstackers 45t, 9 reachstackers 12t; anda fleet of 190 trucks through subcontractors.

The several services are offered on site:

Customs office;

Reefer plugs – PTI incl. small repairs;

Depot for empty containers – capacity 15.000 TEUs;

Covered repair shop incl. container cleaning; and

Instalment of liner bags or hangertainers.

METRANS is establishing its newest intermodal container terminal in Zalaegerszeg that is planned to handle cargo movements from the ports of Koper, Rijeka, and Trieste. The specific planning parameters such as size, equipment, throughput are not disclosed yet (Figure 17); however the planned date of commencing operations is 2023 and it will allegedly be one of the most important logistics centres for international Combined Traffic in the wider area.[10]

[10] https://iho.hu/hirek/terminalt-epit-a-metrans-zalaegerszegre

Figure 17 Visual design of METRANS container terminal in Zalaegerszeg (source: https://iho.hu/hirek/terminalt-epit-a-metrans-zalaegerszegre)

2.3.4. Intermodal transport of goods – marked growth

Intermodal transport in Hungary has been growing steadily in the last 6 years, with a 10% increase between 2017 and 2018. The share of domestic intermodal transport in rail transport increased in 2018 to over 20%, which is regarded as a favourably high level, as we have reached the lower end of the 20-25% range that is characteristic of West European countries. The increase, of a ratio exceeding the ratios recorded in earlier years, was a result of the attraction of the new METRANS terminal in Csepel: 2018 was the first full business year of the combi-terminal delivered in 2017.

The expected growth of Hungarian intermodal traffic is illustrated in the Figure 18.

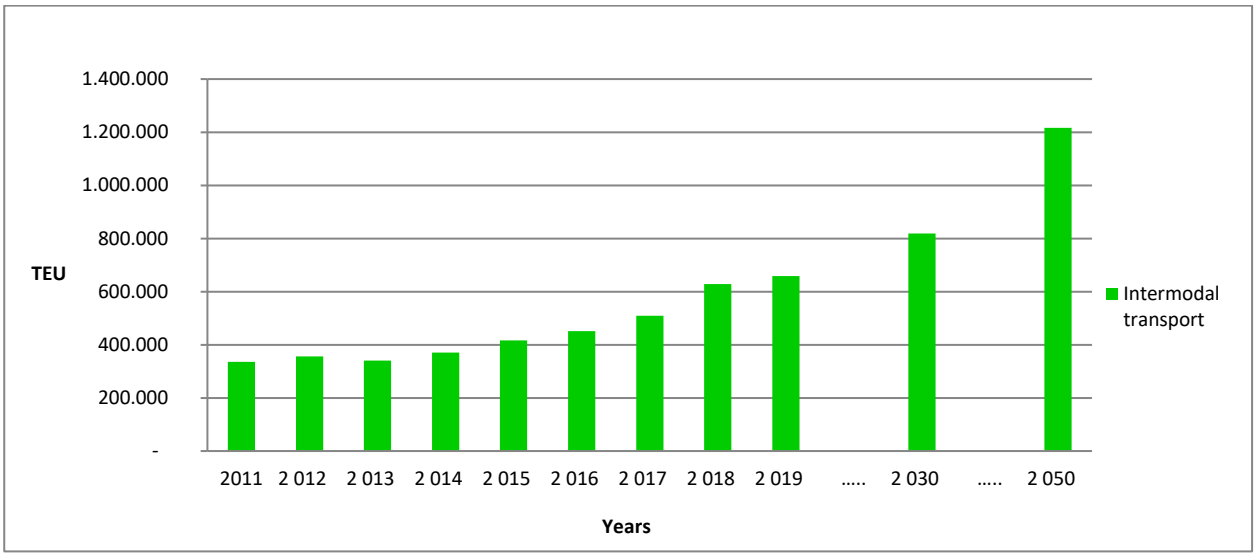

Figure 18 Container transport in Hungary (TEU) expected by the freight forwarders (source: MLSZKSZ[11])

The increase resulted in part from an upswing in the overall economic output (with a 4.9% growth in GDP in 2018) and partly from an increase in the transport of goods suitable for containerisation and the increase in the quantity of goods transported through the METRANS combi-terminal in Csepel. AHLSC data show that the combi-terminals of the logistics service providing centres in Central Hungary manage practically the entire intermodal transport taking place in Hungary. This is where international cargo trains arrive and depart from. Törökbálint Kombiterminál was closed down in 2019, its traffic has been redirected to Mahart Container Center. Of the terminals in rural Hungary the traffic through the one in Sopron has decreased by 14%, while the container traffic through Záhony Terminal plummeted by 27%. The traffic through Záhony and Sopron typically involves reloading, with only a small proportion of the goods being carried further locally on road.

Therefore, operators are thinking in terms of new solutions. Particular attention is paid in designing new combi-terminals to enabling the carrying of road trailers by rail (including non-craneable trailers). One of the solutions for handling non-craneable trailers is the so-called LOHR technology. The most characteristic feature of this solution is the use of rail carriages that can be turned out in the middle and a special terminal where there is no need for vertical loader machinery or high load bearing capacity outdoor pavement (Figure 19). Non-craneable trailers are moved onto and off rail carriages with the terminal's tractors.

[11] MLSZKSZ (2019) – CORCAP – a TEN-T folyosók regionális fejlesztési és logisztikai hasznosíthatósága [Utilisation of the TEN-T corridors in the regional development and logistics)

Figure 19 Train loading with the LOHR system (source: Efficient LOHR Railway System (timelapse) https://www.youtube.com/watch?v=MTvSOrTXFzw)

The total cost of constructing a terminal with horizontal loading capability is only 40-50% of that of a horizontally loaded terminal. The cost of a rail wagon with movable mid-section is 160-170% of the cost of a normal pocket wagon. Thus, on the one hand, the terminal is cheaper to construct but on the other hand, the railway wagons are more expensive. This trade-off shall be considered, nonetheless, the economic benefits can be validated through adequate facility placement and sizing, taking into account the current and forecasted road/rail combined traffic volume. There are further technologies targeting the market of non-craneable trailers, for example NIKRASA. Each of these technologies have specific features and cost structures and thus to a high extent defining their use-cases and market niches.

As to the future, the ratio of intermodal transport in the total quantity of transport will increase (see Figure 20) due to the following reasons: Up to 1,200 km can be covered in 24 hours by rail (the delivery time is somewhat longer by water), it can be well-organised, with competitive transport costs, favourable total costs, substantially lower environmental pressures, reduced risk of illegal migration, reduced stationery time/exhaust emissions on congested roads, increased efficiency of the corridor.

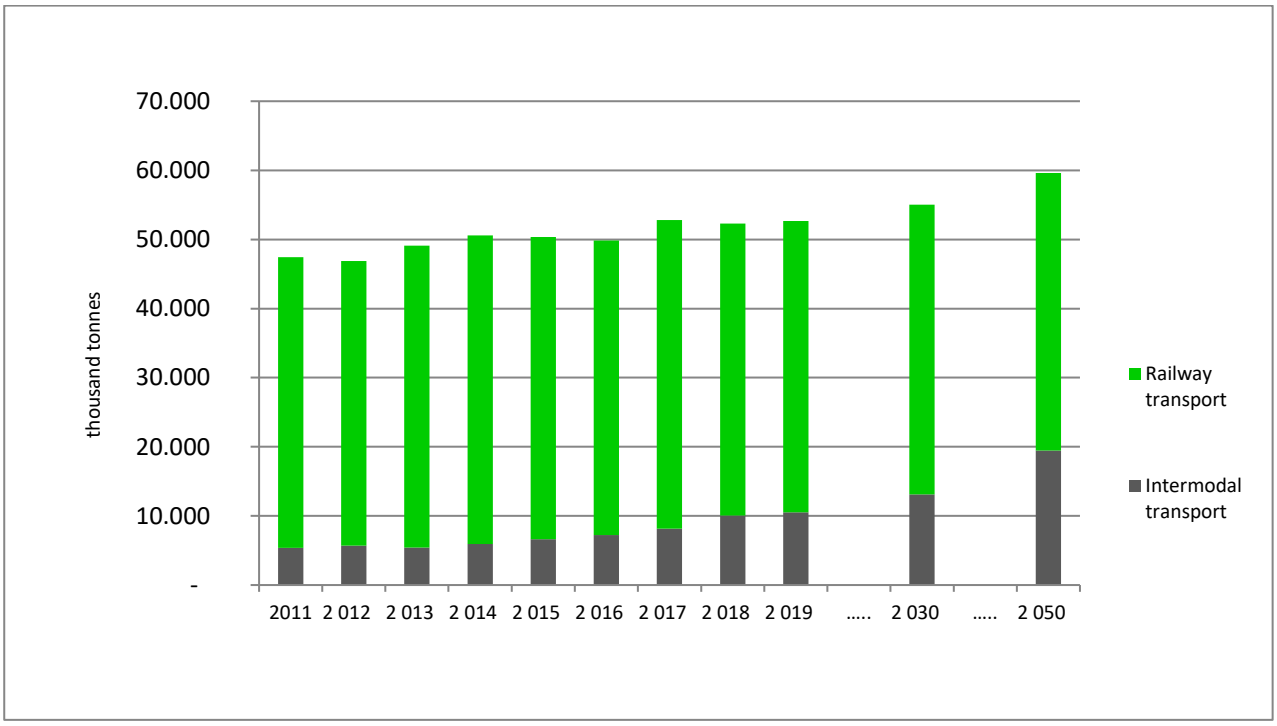

Figure 20 Rail transport of goods in Hungary, including combined transport (source: CSO and MLSZKSZ)

2.4. Strategic documents concerning transportation in Győr-Moson-Sopron County

2.4.1. National Development and Regional Development Concept

The 1/2014. (I. 3.) Resolution of the National Assembly on National Development 2030 - National Development and Regional Development Concept12 contains the strategic concept of national development up to the next decade. According to its contents, the main goal is to ensure connections from small and medium size towns to major towns, while dampen the highly centralised nature of Hungarian transport networks. This includes the development of the main road network (especially high speed roads) as well as making the passenger transport by rail (complemented with bus connections) competitive to the individual transport modes (passenger cars). The development of the highways would reduce the externalities of the road freight transport in urban areas and the secondary road network. Improvement of cross-border connections and development of the bike road network are also among the priorities (**Figure 21**) shows the system of the strategic connections, including the connections to be developed

[12] https://net.jogtar.hu/jogszabaly?docid=a14h0001.ogy&txtreferer=a1600007.nfm

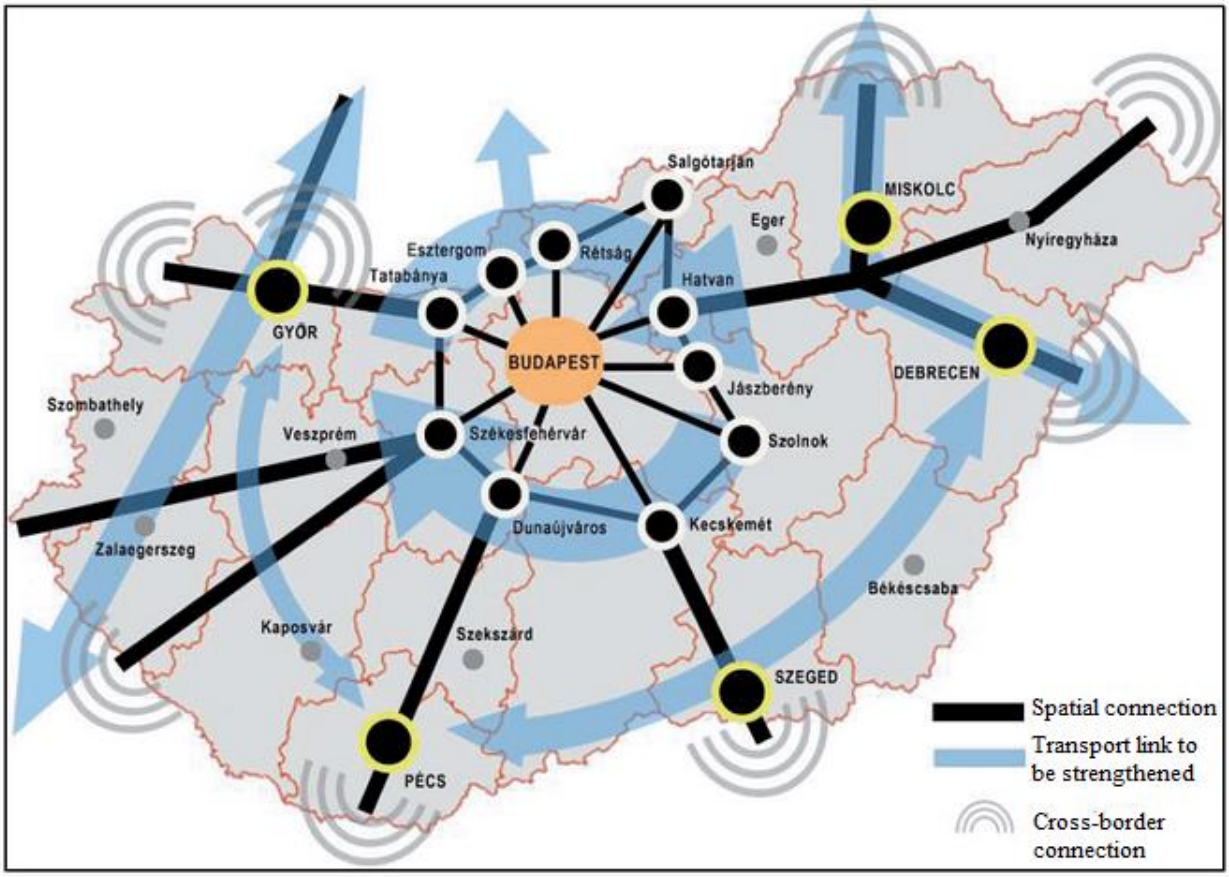

Figure 21 Structure of the strategic connection (source:

https://net.jogtar.hu/jogszabaly?docid=a14h0001.ogy&txtreferer=a1600007.nfm)

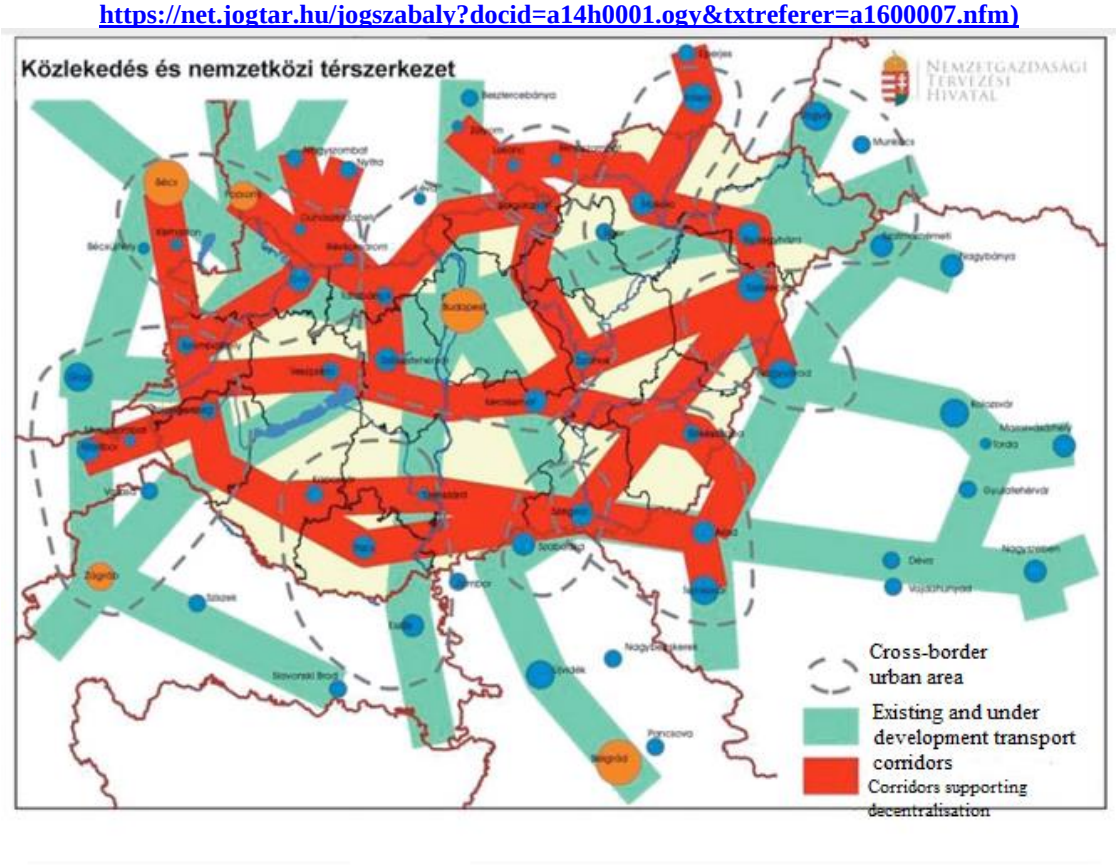

Figure 22, red lines representing the links in support of the decentralisation plans.

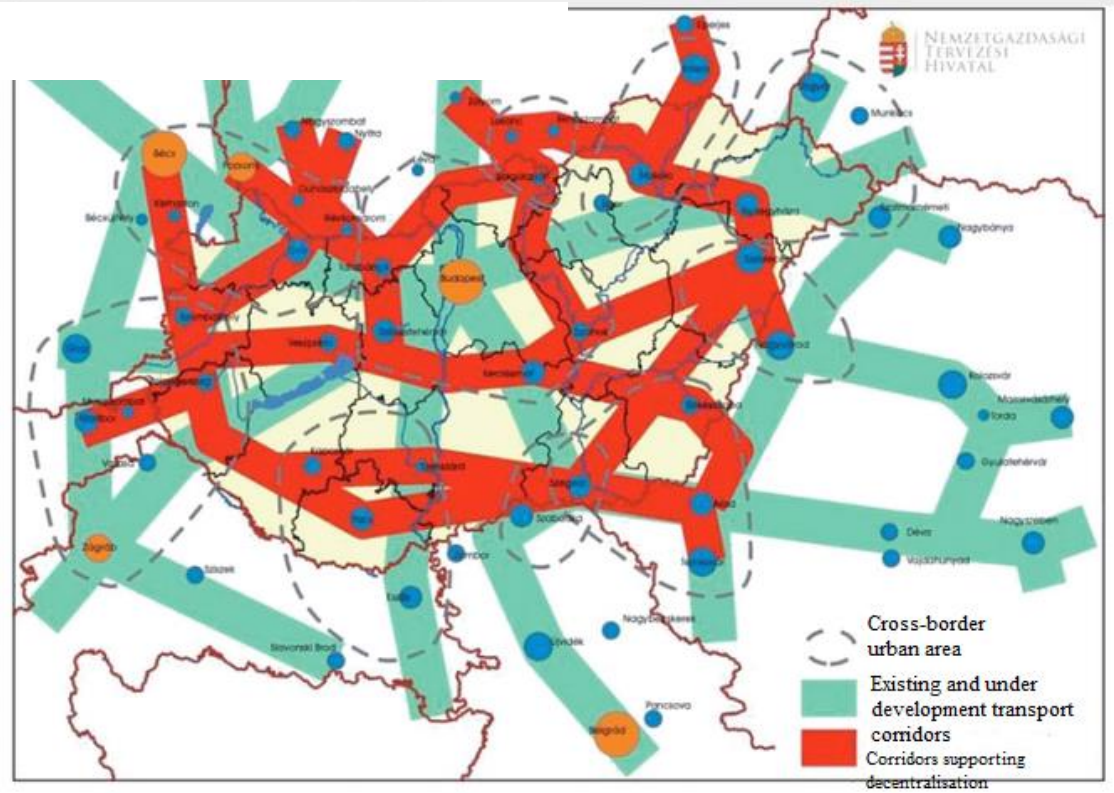

Figure 22 Transport and international spatial structure (source: https://net.jogtar.hu/jogszabaly?docid=a14h0001.ogy&txtreferer=a1600007.nfm)

The National Development 2030 contains development visions on each individual county. The following list summarises the main points of it regarding Győr-Moson-Sopron couty:

Accelerate the infrastructural development of the national and international transport (TEN-T) corridors (road, rail and water) of the region, understanding here the multimodal logistics centres and ports too.

Preserve natural resources (quality soil, thermal-, therapeutic-, sweetwater reserves).

Improve environmental quality: waste management program and shifting to alternative energy sources

Enhancement of tri-city connections (Bécs-Bratislava-Győr) and cross-border links

Establishment of transport networks among Győr-Tatabánya-Komárom-Mór-Székesfehérvár-Dunaújváros-Paks-Kecskemét industrial/logistics clusters.

In his presentation at the Hungarian Transport Development Conference (14 May 2019 Siófok, Hungary) the Secretary of State for Transport Policy László Mosóczi, PhD presented the ongoing rail development projects scheduled between 2018-2023[13], listed below:

- Construction of ETCS L2 railway safety equipment system on GYSEV Zrt.'s Sopron-Szombathely lines 15 and Szombathely-Szentgotthárd lines 21;
- Upgrading of the Almásfüzítő-Komárom line section on railway line 1 (replacement of bottlenecks);
- Modernization of the Szombathely-Kőszeg railway line 18;
- TEN-T network track development for the Zalaszentiván delta track;

[13]http://www.fomterv.hu/mmk/sites/default/files/Siofok-2019/01_mosoczi_laszlo_mmk_kozlfejlkonf_20190514_A.pdf

- TEN-T network track development between Győr-Csorna.Further projects include the preparation of highspeed railway from Budapest to Warsaw:

The feasibility study is under development in all four countries of the Visegrád Group by their respective workgroups based on the letter of intent signed by the ministers of the V4.

The feasibility study examines 3 main alignment variants, track speed between 250-300 km/h;

Exploring options to improve existing sections or building new tracks.

Building permit drawings by the end 2021-27-period, implementation in the following period

Figure 23 Planned high-speed railway alignment from Budapest to Warsaw (with possible extension to Romania)

2.4.2. Spatial Development Concept of Győr-Moson-Sopron County (consultation version 2021-2027)

Planned/ongoing infrastructural developments in the county:

- Electrification of railway line 10 (Győr-Celldömölk) as an alternative route to the trans-European freight network
- Double track of line 8 between Győr and Csorna on the Győr-Sopron line (currently the busiest single-track line in Hungary)
    - Vienna-Budapest high-speed railway, the feasibility study of which is also an ongoing topic.
    - The water level rehabilitation of the Mosoni-Danube estuary section is also ongoing, with the estuary at the Elders aims to improve the navigability of the Moson section of the Danube. M1 motorway is planned to be broaden to 2*3 lanes due to the high international (transit) routes
- North-south expressway connections shall be developed between Győr-Székesfehérvár, Komárom-Kisbér-Székesfehérvár, Győr-Pápa, Mosonmagyaróvár-Csorna. As of 2021 only M83 is under construction between Győr and Pápa.
- M85 at Sopron-Fertőrákos to the border has been open mid-2021 and the development of further expressway sections are planned M85, M86 and M9.

- Intermodal infrastructural connections to the airfield of Pér (Győr – Kisbér railway, airport logistics infrastructure) and the port of Gönyű are deemed necessary, but no relevant steps had been done so far towards their integration into the transportation system of Győr.

2.5. Bottlenecks, barriers

Road transport in its current state is not sustainable: due to the continuously growing freight transport demand not only the recruitment of truck drivers is one of toughest challenges of road transport in Europe, but the increased use of heavy vehicles' on roads results in increasing demand for road maintenance, putting a strain on the budget of each country, in addition to the environmental effects which is the most important long-term factor in terms of any kind of sustainability plans and priorities. The Association of Hungarian Logistics Service Centres (AHLSC/MLSZKSZ) argues that up to 50,000 trucks could be kept off of Hungarian roads by improved cooperation among the road, rail and water transport segments. By legal and financial initiatives such as the single wagon transport support scheme introduced by Hungary with EU support could help to shift the growing transport demand to environmentally more sustainable less pollutant and less workforce demanding sectors such as rail and where there is a navigable waterway the improved inland waterway transport. This could provide rail and water transport operators with new business and enable road transport operators to focus their business on the feeder and only road transport able freight transport segments. Moreover, the actions so taken would provide an answer to the expected tightening of requirements in the EU Mobility Package. Another important requirement is that logistics operators should remain independent in terms of their business activities and organise more efficient and more economical carriage processes on the basis of a new approach, with lower environmental pressures.

2.5.1. Road

The roads of the region are used by many commuters, living in Győr-Sopron County, working in Burgenland and Vienna. There are peak time traffic jams in and around the bigger cities like Győr and Sopron. Győr can be by-passed on the M1 motorway but with toll. In case of Sopron, the congestion is further increased by the fact that the traffic from Austria to Lake Balaton also burdens the city especially during summer time.

In Burgenland the traffic jams are not typical, since the millennium several important settlement by-pass sections have been built the capacity of the roads is generally sufficient for the car traffic.

2.5.2. Railway

The railway line Budapest – Győr – Rajka is a double track line between Budapest and Hegyeshalom, and a single-track line between Hegyeshalom and Rajka. The line is electrified with DC 25 kV 50 Hz, and equipped with automatic block system. The up-to-date safety system ETCS level 2 is under construction. The maximum speed of the line is 160 km/h. The trains cannot run with this speed the whole line, but the 100 km/h speed for the freight trains is allowed in full length.

The neuralgic point of the railway traffic is the station Győr and to some extent Sopron. If the Győr station cannot handle any train it results in disturbances of major parts of the rail traffic between Austria and Hungary. Győr cannot be by-passed by rail, so the capacity of the station is a key issue in the train traffic.

There are further major bottlenecks in the rail network of the region:

The main East-West rail freight route runs via Hegyeshalom, but the route via Sopron provides an alternative, which is used by some international traffic Central Europe – South-Eastern Europe, and to connect the Sopron

terminal, which has its catchment area in Western Hungary and Burgenland and functions as a gateway for rail transport between Western and South-Eastern Europe.

Line 8 (Győr- Sopron), Hungary's busiest single-track line, carrying long-distance international freight traffic, Intercity-traffic and regional trains

Sopron node (passenger station and terminal), with high peak demands for capacity due to the introduction of integrated system timetables in both Hungary and Austria.

Lack of a triangle track in Ebenfurth, forcing all train between Sopron and Vienna to change their direction of travel. This also applies to practically all freight trains (except trains to/from the Semmering line, which are in the minority however).

Lack of implementation of TEN-T minimum standards, in particular 740m train length and 22,5 t axle-load on major parts of the GYSEV network; currently many line sections are restricted to 600/650m train length and 20,0 t axle-load.

Lack of electrification of the Sopron – Wiener Neustadt line

The GYSEV North-South route has developed positively during the past decade in terms of (freight) traffic volume, in particular following electrification. It provides now a fully electrified, flat North-South route by-passing the Alps to the east and is also feeding traffic from i.a. Koper into the OEM-corridor with destination Budapest or beyond. However, the lack of a triangle track at Zalaszentiván, just south of the Győr-Moson-Sopron county, and similarly the absence of triangle tracks in the Komárom-Komárno double node just east of the region, still hamper the exploitation of the full potential of this route.

The railway line Győr – Sopron - Ebenfurth is a single-track line, is electrified and equipped with automatic block system. The line Zalaszentiván – Szombathely – Csorna – Hegyeshalom – Rajka – Bratislava is single track and electrified throughout from Slovenia to Slovakia. In direction to Croatia electrification is still missing south of Zalaszentiván.

2.5.3. Inland waterway

A key factor in the inland navigation system is the capacity of the Danube waterway, which is primarily determined by the prevailing navigability conditions (i.e. the Danube's navigability over a year, in a cost-effective manner, with a fully loaded dive). Navigability has a direct impact on the potential capacity utilization of infrastructure along the river. Provided they have adequate navigability conditions and ongoing maintenance of the waterway infrastructure, the sector provides reliable and competitive freight services. All these are key prerequisites for integrating inland shipping as an environmentally friendly mode of transport into the logistics system of a modern economy. The Danube canals and bottlenecks are significant (Figure 24), which also limits the flow of the Danube-Main-Rhine waterway system. Integrated water management and river management are needed not only for navigation but also for upset sediment balance, water base protection, groundwater subsidence, backwaters and flood protection.

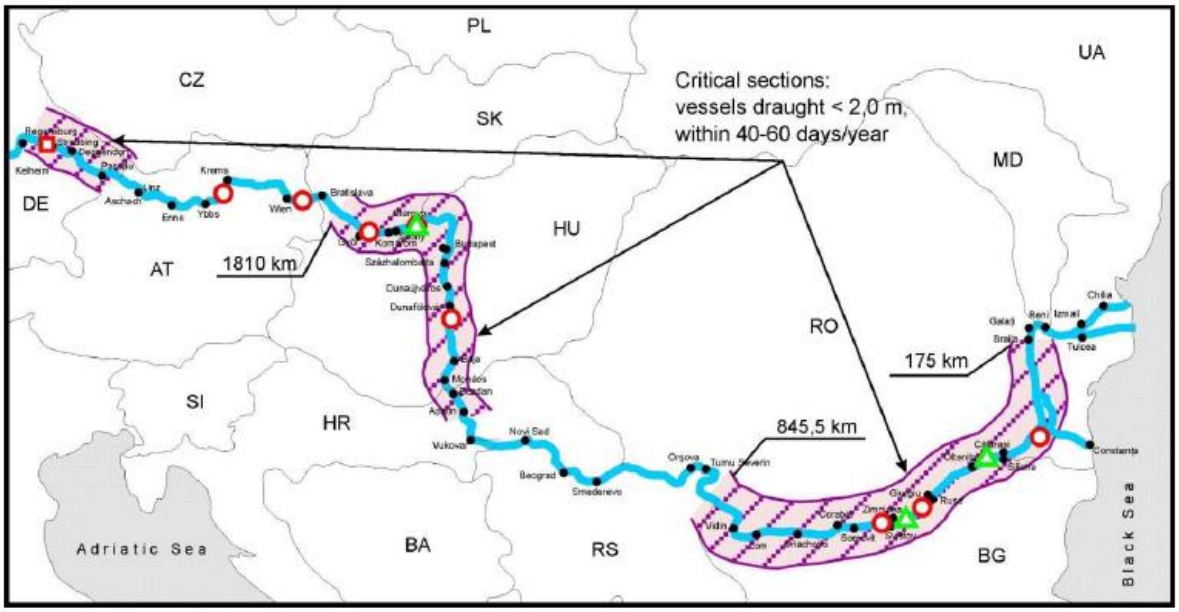

Figure 24. Critical navigation sections of the River Danube

There are three critical sections of the Danube where the depths of vessels are less than 2 meters for 40-60 days a year (Figure 24. Critical navigation sections of the River DanubeFigure 24). One of them is the Danube section of Hungary. In the Hungarian and Hungarian-Slovakian Danube sections, at low navigable water levels, there are 21 wading and 28 seaway bottlenecks and 6 ice barrier sites at 378 river kilometres, which create a serious constrain, due to an average depth of 50 cm (50-100 m wide) shipping. The fairway has been virtually unmanaged on the Danube for 20 years, with the result that navigation at low water levels is limited or at times not possible at all, with European standards. The other two sections are less relevant for the regional project activities in the Bavarian Danube section and also on the lower Danube divided between Bulgaria and Romania but they still influence the long-distance inland waterway freight transport's competitiveness.

Air traffic

The airport Győr-Pér only has a regional role. There is no scheduled traffic, only charters are landing for the Volkswagen group (Audi Hungaria Ltd). Because of the regional formation of the airport, bigger aircrafts cannot use the runway and the capacity is not enough for a bigger traffic.

2.6. Possible new connections

Possible directions for road and rail connections along the OEM corridor:

East: Turkey, Bosnia, North-Macedonia

South: Greek ports

There is also an important growth potential for rail in port-hinterland traffic between the Adriatic Seaports and the northern part of Central-Eastern Europe (Hungary, Slovakia, Poland) on a flat north-south route east of the Alps. This route is served by the Amber Rail Freight Corridor, which connects and in its central section overlaps with the Orient/East-Med Rail Freight Corridor.

2.6.1. Presentation of future capacity utilization and modal shift

Combined freight traffic is currently experiencing a 3-6% annual increase in turnover. However, the available capacities also allow a 10% annual increase of traffic in certain sections, however there are bottlenecks in others. Following the introduction of the state incentive scheme for combined transport in 2022, the share of combined transport in the freight market share is expected to reach 20%. This target could be reached by 2030, which is also a governmental expectation

2.6.2. Improvement of regional and cross-border accessibility (opportunities provided by the rail sector)

The inclusion of traffic is a transport policy decision, and the rebuilding of tracks is already a financial issue. From the point of view of CORCAP, i.a. the Ebenfurth – Sopron – Győr rail line, the Zalaszentiván and Komárom - Komárno railway nodes should be developed. On both GYSEVs East-West and North-South axis full implementation of the TEN-T minimum standards should be ensured. Joint investment of the Hungarian and Slovak states is needed to exploit the full potential of the North-South route.

2.6.3. Possible schedule of developments

Among the most important railway investments in the region would be

- the reconstruction of the Hegyeshalom – Rajka line section
- the upgrading of the Sopron node, including its terminal
- the triangle tracks in Ebenfurth and Zalaszentiván
- the implementation of 740m train length and 22,5 t axle-load on the entire Ebenfurth –
- upgrading of the Zalaszentiván – Szombathely – Csorna – Hegyeshalom –Bratislava line
- the double-tracking of the Sopron – Győr line
- the upgrading of the Komárom - Komárno node, including new connecting curvestracks

2.6.4. Description of solutions

Planned projects

In Győr, there have long been plans to use the city's rail ring line for passenger transport. This requires the construction of a minimum length of track linking GYSEV freight station with Győrszabadhegy station via new stop at Marcalváros densely populated bloc of houses district and at Adyváros on the existing line no. 10&11. Two stops would be built on the ring line around the large housing estates to provide rapid access to the city centre and also regional/suburban trains destinations for residents. Győr's and the county's main hospital is located to the planned new stop at Adyváros too (Figure 25). The total cost of the development is 30.5 billion HUF (source: Creating a modern city-rail system in Győr and its suburbs, VEKE, 2012.)

After the completion of the civil group VEKE study in 2012, no substantial progress has been made in the implementation of the project.

Figure 25 Planned Győr hub loop railway network Source: veke.hu

Intermodal transport will be facilitated by the proposed development in the Komárom and Komárno areas, which would connect railway lines in both Hungary and Slovakia with delta tracks, allowing trains to reach the METRANS logistics centre in Dunajska Streda without changing direction. The development will create a direct rail link between the Adriatic ports and Dunajska Streda. The project is still in the proposal phase and is expected to be completed after 2030.

Another important rail investment is the complex development of the Győr - Sopron railway line. The current single track has significant train traffic and the Győr - Csorna section is no longer able to handle more trains during the day, so the development is necessary. The development will take place in 3 phases. The investment includes the following elements:

  - construction of a second track
  - track speed increase to 160 km/h
  - Reduction of the environmental impact of the railway in the city of Sopron
- a common rail axis in the city
- separate level crossings
- passive and active noise protection improvements
- relocation of the depot outside Sopron
- improvement of safety equipment

Preparation of the project started in 2011, the planning phase is currently in progress and full implementation is expected after 2030.

- Description of solutions

The priorisation of investments should be based both on the maturity of the projects and the importance of the investments for traffic operations. It should be noted that some of the investment needs identified above are already in the process of being addressed by on-going projects - though none of them with financing for full implementation ensured - while others have not been addressed yet even on the level of idea studies; this applies for example to measure proposed in this study for the Komárom-Komárno node.

Taking into account the above considerations, a *potential* priorisation or grouping into time horizons for implementation could be as follows:

Indicative time horizon / priority	Project
Short-term	- Reconstruction of Hegyeshalom – Rajka line section - Triangle track at Zalaszentiván - Upgrading of the Sopron Node
Medium-term	- Upgrading of the Zalazentiván – Szombahtely – Csorna – Hegyeshalom – Bratislava line - Triangle track at Ebenfurth - Double-tracking of the eastern section Győr – Csorna of the Győr – Sopron line - Implementation of full TEN-T standards for freight on the GYSEV North-South- and East-West lines - Electrification of the Sopron – Wiener Neustadt line
Long-term	- Double-tracking of the western section Csorna – Sopron of the Győr – Sopron line - Upgrading of the Komárom-Komárno node, incl connecting curves

It should be noted, that the order of implementation may change depending on the availability of targeted funding.

What appears of highest importance for all projects, however, is that these are already now properly taken into account in regional and local spatial planning with a view on ensuring that possible land requirements - especially if the projects involve construction of railway lines in new alignments - can be met. This concerns even projects with only medium- or long-term prospects of implementation. Non-inclusion of such projects involves a risk of reducing or even eliminating the chance of implementation.

2.7. Burgenland federal state of Austria

Burgenland, as the easternmost least populous state of Austria, is connected directly to the western border of Hungary – the length of the common border section is 432 Km.

Burgenland consists of two statutory cities and seven rural districts, with a total of 171 municipalities. It is 166 km long from north to south but much narrower from west to east. The region is part of the Centrope Project see key statistical indicators at Table 3.

State Burgenland has basically agricultural and tourism/vacation characteristics and particularly its more urbanised Northern part is also the hinterland of Vienna's workforce while the Southern more rural part gravitates to Graz, Styria. The province also has a number of small and medium-sized industrial plants, but their demand for freight transport is not significant.

However, significantly lively in north-south and north-east direction (Vienna-Wiener Neustadt, Vienna-Ebenfurth-Sopron) the railway transit traffic.

Table 3 Important statistic data Source: KSH, EUROSTAT

	Burgenland	Győr-Moson-Sopron county
Area (km²)	3961	4208
Population (thousands)	294	473
Capital city	Eisenstadt	Győr
GDP, millons of EUR: (2018)	9006	7890
Employment rate (%)	74,7	68,1

The Railway network and important features of Burgenland

Burgenland's railway network is developed, with 4 main-, and 6 branch railway lines:

Main lines

- (Wien Südbf.) – Bruck/L. – Staatsgrenze n. Nickelsdorf (ÖBB, direction to Győr-Budapest) double tracks, electrified
- Parndorf- State border n. Kittsee (ÖBB, direction to Bratislava-Petrazalka) single tracks, electrified
- (Graz) – Jennersdorf – State border at Mogersdorf (ÖBB, direction to Szentgotthard-Körmend) single tracks, Diesel
- (Sopron) –State border n. Baumgarten – Mitte Leithabrücke – (Ebenfurth) (Raaberbahn/GySEV) single tracks, electrified

- Branch lines:

- Wulkaprodersdorf- Abzw. Bruck a.d. Leitha (ÖBB) single tracks, electrified
- (Wr. Neustadt) – Neudörfl – Staatsgrenze n. Loipersbach-Schattendorf (ÖBB, direction to Sopron-Deutschkreutz) single tracks, Diesel
- State border Deutschkreutz – Oberloisdorf (ÖBB, direction to Sopron – Wiener Neustadt) single tracks, electrified between border point and Deutschkreutz
- Rechnitz-Pinkafeld (ÖBB) single tracks, Diesel - out of service
- Friedberg-Altpinkafeld (ÖBB) single tracks, Diesel - out of service (track lifted in 2020)
- (Fertőszentmiklós) - Staatsgrenze n. Pamhagen – Neusiedl am See (Neusiedl See Bahn) single tracks, electrified

Long-term Transport Strategy of Burgenland

Burgenland has a long-term transport strategy (Die Gesamtverkehrsstrategie Burgenland 2012). The main elements of the strategy deal almost exclusively with passenger transport. The strategy identifies the following implementation areas:

• Direct Connections To The Centers Efficient: connections to the main centers in individual (private) and public transport

• Simply To Your Destination By Bus And Train: Optimized and coordinated public transport in the region

• Flexible Solutions In Rural Areas: Demand responsible transport and sustainably financeable mobility offers for rural areas "micro-public transport"

• Everyday Bicycle: The bicycle should continue to be promote as the most suitable means of transport for many short everyday trips.

• With Security! The Burgenland traffic system should become even safer through consistent road safety work.

• Move Into The Future: Innovative organizational models and technical solutions for the mobility of the future

•Know How! Comprehensive mobility information, mobility advice for all target groups and awareness-raising initiatives as a key element in achieving the goals set

• Pulling In The Unit: Cooperation and coordination of all experts, specialist departments and interest groups

The railway development plans for Burgenland

The general transport development plan of the Austrian Federal Ministry for Transport, Innovation and Technology prevised railway developments in the Northern wider Burgenland area (Figure 26), such as:

- Upgrade of the access railway routes from Vienna and Wiener Neustadt area to provide high-capacity access the new Semmering basis tunnel and also to the new Koralmbahn towards Klagenfurt and Italy (18-19)
- Full operational and functional urban development around Vienna Main Station (20)
- Reconstruction of the Südbahn Wien - Wiener Neustadt section into four tracks (21)
- Upgrading and increasing the capacity of the (Wien) - Parndorf - Kittsee - (Bratislava) line and terminal development (22)
- Upgrading of the Wien – Breclav-(Brno) line (Nordbahn) (23)

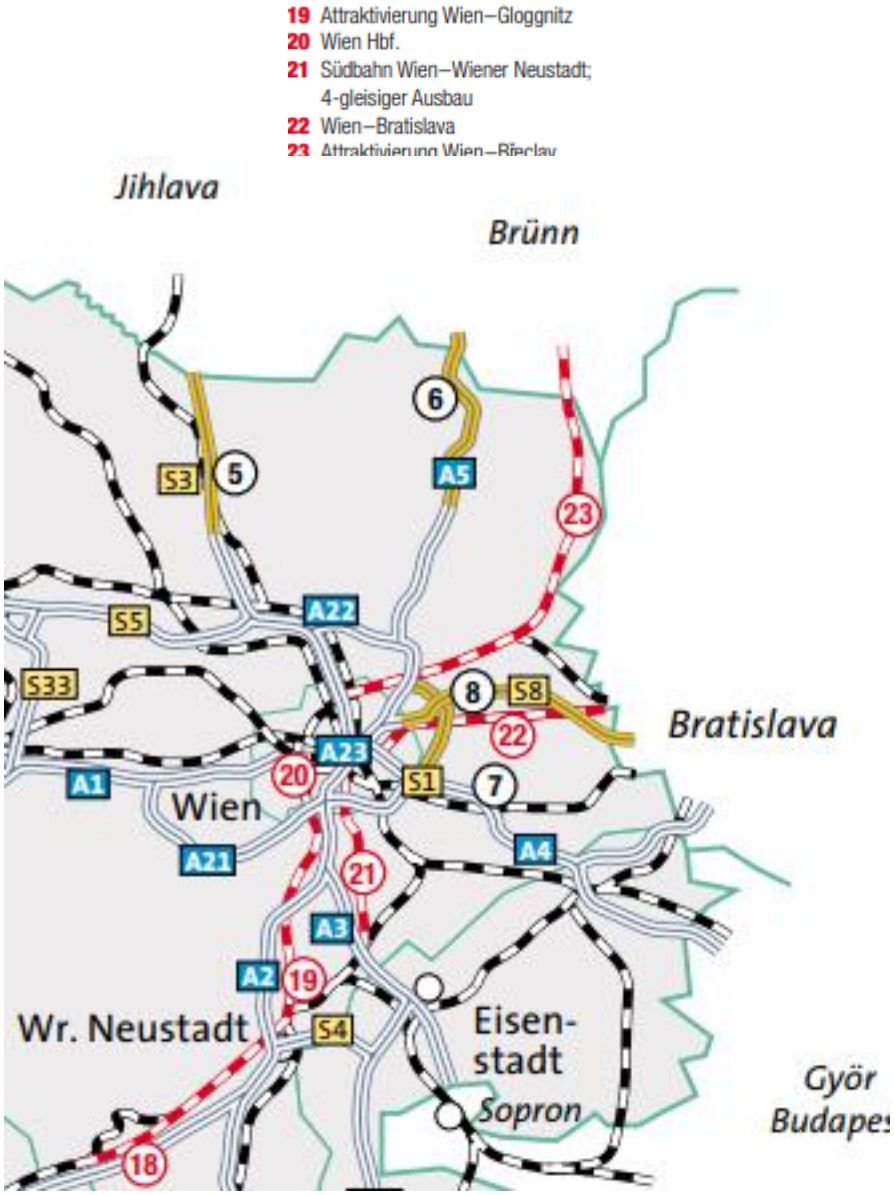

Figure 26 Railway infrastructure developments in VOR area close to Burgenland region

Separate GYSEV/Raaberbahn development plan in the Burgenland area

The Hungarian-Austrian rail company has several concepts and plans for improvement of the rail service. The important infrastructure developments are listed below.

The rebuilding the Sopron-Ebenfurth main line to double track

The expected traffic increase requires the expansion of the line capacity of the entire GYSEV/Raaberbahn main line (Figure 27).

This can be full-or partial double track construction between Sopron and Neufeld. The aim of the development is to raise the service of level of passenger and freight traffic: frequent scheduled timetable (Taktfahrplan) for passenger and higher capacity for freight trains. These goals cannot be achieved without the second track.

Figure 27 Double track development on GYSEV/Raaberbahn main line

Construction of a delta tracks

For trouble-free and fast connection must be built delta tracks in Ebenfurth- and Wulkaprodersdorf areas in the interest of direction changeless train traffic. So the trains in direction Sopron-Vienna and Eisenstadt-Vienna can running faster and trouble-free, and it also means increasing capacity. Plans for the delta connection were developed in the Grenzbahn project in 2014, as shown in Figure 28 and Figure 29.

The primary goal of the development is to establish a direct connection without train's change of direction in the Sopron-Wien relation, thus expanding capacity and increasing LoS.

New trail in Hungarian section (Sopron-state border)

The consequence of the increasing train traffic is the disturbance of the environment in the city of Sopron. This can be solved by moving the trail of GYSEV line next to the Sopron-Wiener Neustadt line (Figure 30)

The rail company has prepared a plan that includes three trail versions. The plan has been agreed with the city, a decision has not yet been made.

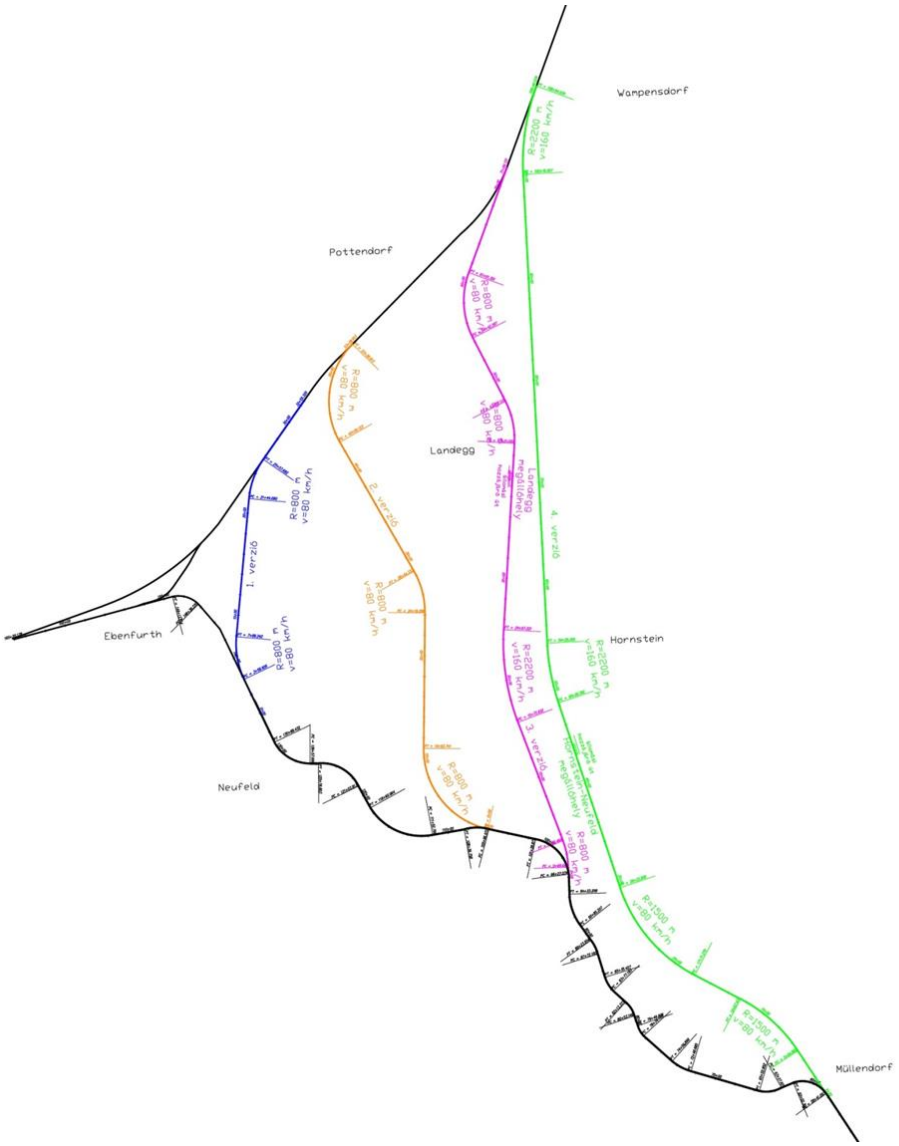

Figure 28 Plan variants for Ebenfurth delta track

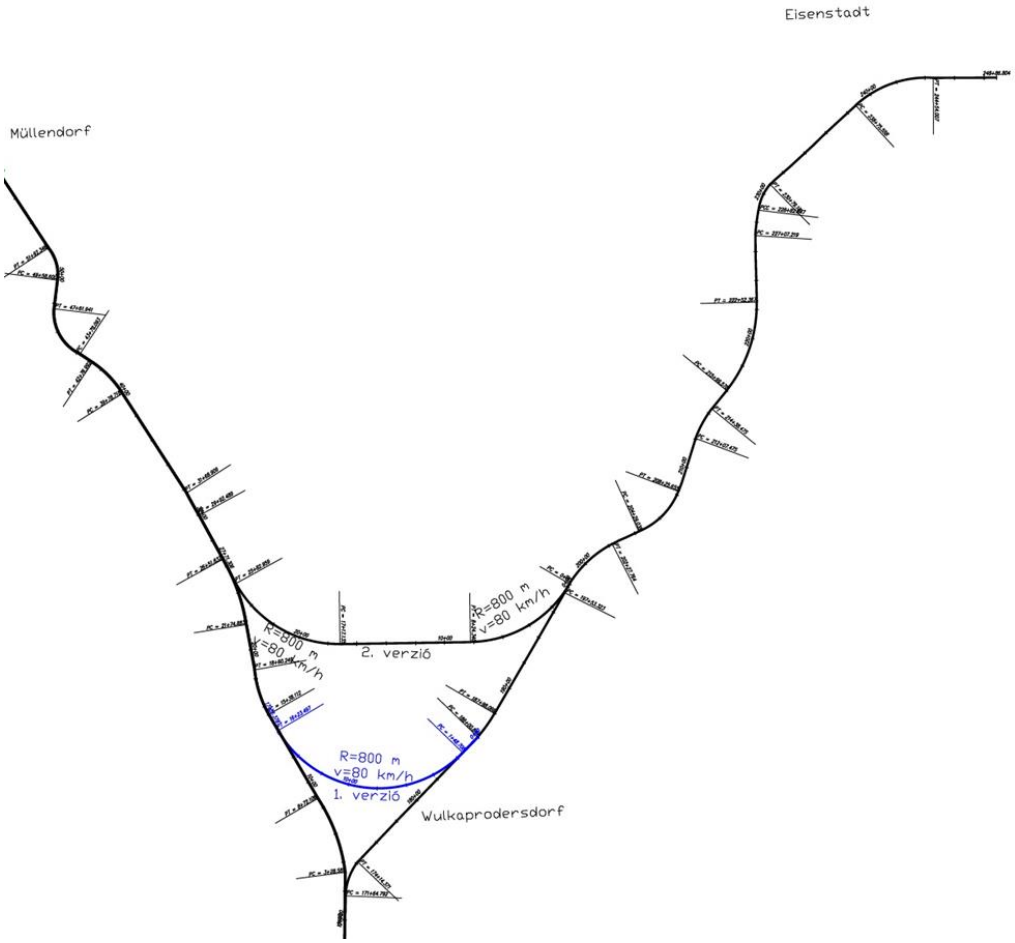

Figure 29 Plan variants for Wulkaprodersdorf delta track

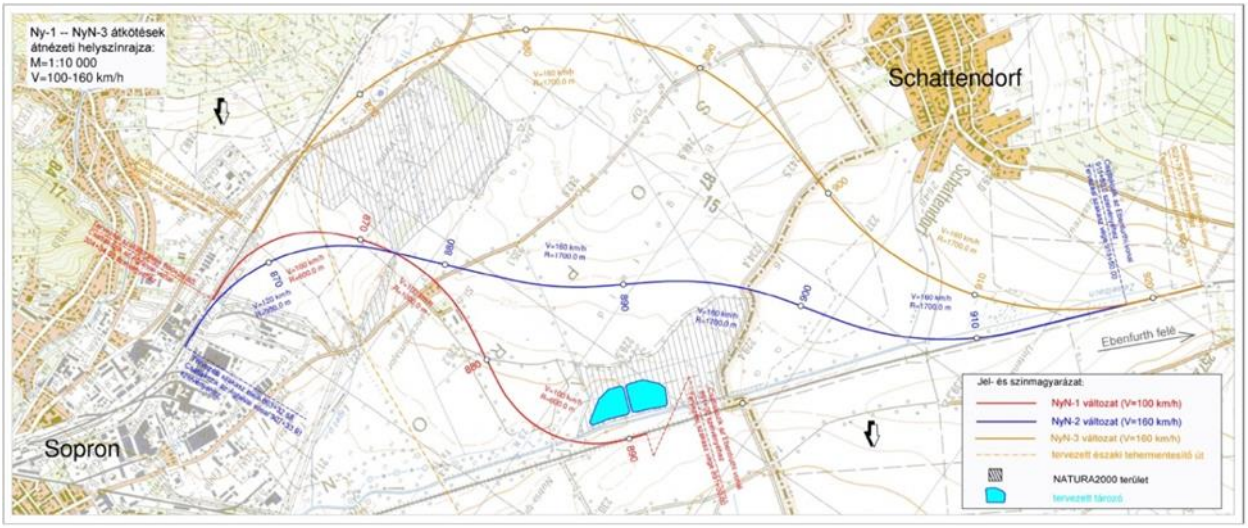

Figure 30 Three new trail variants in Sopron-West area

3. Connectivity to other corridors in the Western Hungary-Burgenland region

3.1. Description of corridor sections

In the Győr-Moson-Sopron and Burgenland region the OEM-corridor is connecting to – and partly overlapping with – several other international transport corridors. The region comprises intersections of the following EU Rail Freight Corridors:

- the Orient/East-Med Rail Freight Corridor (RFC OEM)
- the Amber Rail Freight Corridor (RFC AMBER)
- the Rhine-Danube Rail Freight Corridor (RFC RHD)
- the Baltic-Adriatic Rail Freight Corridor (RFC BA)

While the Rhine-Danube RFC is almost entirely overlapping with the Orient/East-Med RFC in the region and thus both are running in a North-West – South-East direction, the Amber RFC is almost orthogonal to these running in a South-West – North-East direction, connecting the seaport of Koper at the Adriatic Sea with Slovakia and Poland and providing a link to the Polish-Belarusian border. The Baltic-Adriatic RFC is running parallel to the Amber RFC, but more westwards. Thus, the Baltic-Adriatic RFC concerns only the Austrian part of the region, while the Amber RFC the Hungarian part.

Just south of the region there is also the Mediterranean Rail Freight Corridor, running in an east-west direction; this corridor connects to the OEM-corridor in Budapest.

To be mentioned is also the Alpine – Western Balkan RFC (RFC AWB), which is running somewhat west of the region, connecting Austria with South-Eastern Europe via the Western Balkan countries.

Both RFC AMBER and RFC AWB are EU Rail Freight Corridor established on the initiative of the countries concerned, after the setup of the nine initial RFCs. Therefore, both RFC AMBER and RFC AWB are lacking corresponding Core Network Corridors, while the other RFCs – RFC OEM, RFC RHD and RFC BA – also have Core Network Corridors largely mirroring the geography of the respective Rail Freight Corridors (however, not being exactly identical, since RFCs also can contain section not belonging to the Core Network). For the work and role of RFCs this difference has, however, no relevance. The competences, tasks and obligations of all RFCs are identical.

Figure 31 ***Schematic map of RFCs (green* = Orient/East-Med Rail Freight Corridor (RFC OEM)*; orange* = - *Amber Rail Freight Corridor (RFC AMBER); light-blue* = Rhine-Danube Rail Freight Corridor (RFC RHD)*; dark-blue* = Baltic-Adriatic Rail Freight Corridor (RFC BA)*; grey-green = RFC MED; violet = RFC AWB). Source: RailNetEurope; modified.***

The high density and connectivity of corridors in the region is also reflected by the fact that more than 70% of GYSEVs rail network forms part of one or several EU Rail Freight Corridors, putting GYSEV in a top position among European rail infrastructure managers when it comes to the designation of lines to RFCs (see Figure 31 and Figure 32).

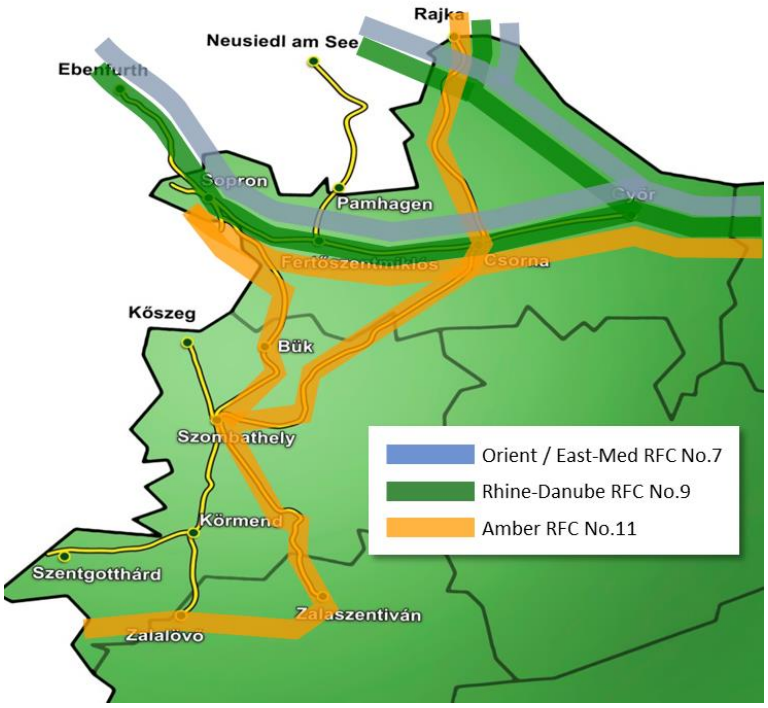

Figure 32*: EU Rail Freight Corridors running via the GYSEV rail network in Western Hungary.*

3.2. Description of solutions for improved connectivity

While from a geographical point of view a good connectivity of the OEM corridor with other corridors is already existing in the region due to many contact points of the corridors and even overlapping sections, the connectivity is still in need of improvement from a technical point of view and with regard to the network layout in several nodes.

Generally it can be said, that the measures presented and proposed earlier in this study for the elimination of bottlenecks within the region also will have a major positive impact on the connectivity to other corridors as they would provided additional capacity for freight traffic based on the integrated periodic timetable structure infrastructure needs. The planned small and medium sized infrastructure projects listed here are planning to resolve the short and medium term problems of railway freight transport increase goals in the already heavily used Centrope area.

In the specific context of improved connectivity in particular to be mentioned here are:

- a triangle track at Ebenfurth (→ improving connectivity between RFC OEM/RHD and RFC BA)
- upgrading of the Sopron node (→ improving connectivity between RFC OEM/RHD and RFC AMBER)
- electrification of the Sopron – Wiener Neustadt line (→ improving connectivity between RFC OEM/RHD and RFC BA)
- upgrading of the GYSEV North-South route (→ improving connectivity between RFC OEM/RHD and RFC AMBER)

While the importance of these measures for the connectivity of corridors should not be underestimated, they will not be presented in this chapter, since they already have been tackled earlier in this study.

However, beyond those projects there are two major measures to be mentioned, which are slightly outside the region, but whose implementation would have a major positive impact on the connectivity to other RFCs and would thus also benefit the Western Hungary-Burgenland region. These measures are the following:

- Zalaszentiván triangle track
- Improvement of the Komárom-Komárno node

While the Zalaszentiván triangle track can be said being “in the pipeline”, i.e. its implementation has been initiated (with land acquisition finalised and preparatory works started), the other proposed measure can be considered as “new” and not having been subject to any studies so far.

3.2.1. Zalaszentiván triangle track

The Zalaszentiván triangle track is connecting the GYSEV line Szombathely – Zalaszentiván with the MÁV-line section Zalaszentiván – Hodos (Figure 33). Its importance is stemming from the fact that it avoids the change of direction of travel for freight trains between Slovenia (mostly the port of Koper) and Slovakia (i.a. Dunajska Streda) / central Hungary (Budapest). This traffic has seen a substantial growth after the electrification of the GYSEV North-South route, leaving Zalaszentiván as a major bottleneck in terms of operations efficiency (note that traffic between Slovenia and Slovakia via Komárom is actually affected by both, the Zalaszentiván bottleneck and the Komárom/Komárno bottleneck).

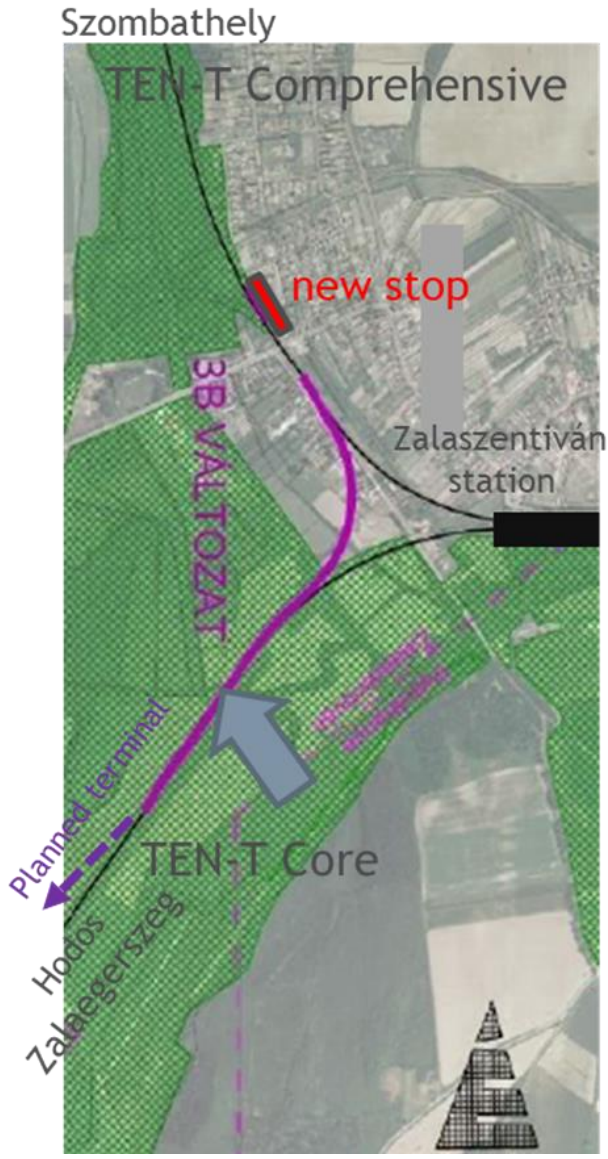

Figure 33: Location of the Zalaszentiván triangle track, connecting the lines Szombathely – Zalaszentiván with the line Zalaszentiván – Hodos.

The implementation of the project has already started with land acquisition finalized and preparatory ground works on-going. However, a financing decision for full implantation of the project is still pending. Taking into account the advanced stage of the project, it would be desirable to ensure the implementation of the project in a near future.

From the Zalaszentiván triangle track would also benefit the new intermodal terminal at Zalaegerszeg, currently under establishment by intermodal operator Metrans and located at short distance west of the triangle track.

3.2.2. Improvement of the Komárom-Komárno node

The Komárom – Komárno "double node", extending to both sides of the river Danube on the territories of Hungary and Slovakia is characterized by a complex layout, with practically two railway lines running on

both shores parallel to the Danube and with a station each. The two stations on both sides are connected by a railway line crossing the Danube on a bridge. All lines in the area are single track, with exception of the line Budapest – Győr on the south side of the river (Figure 34).

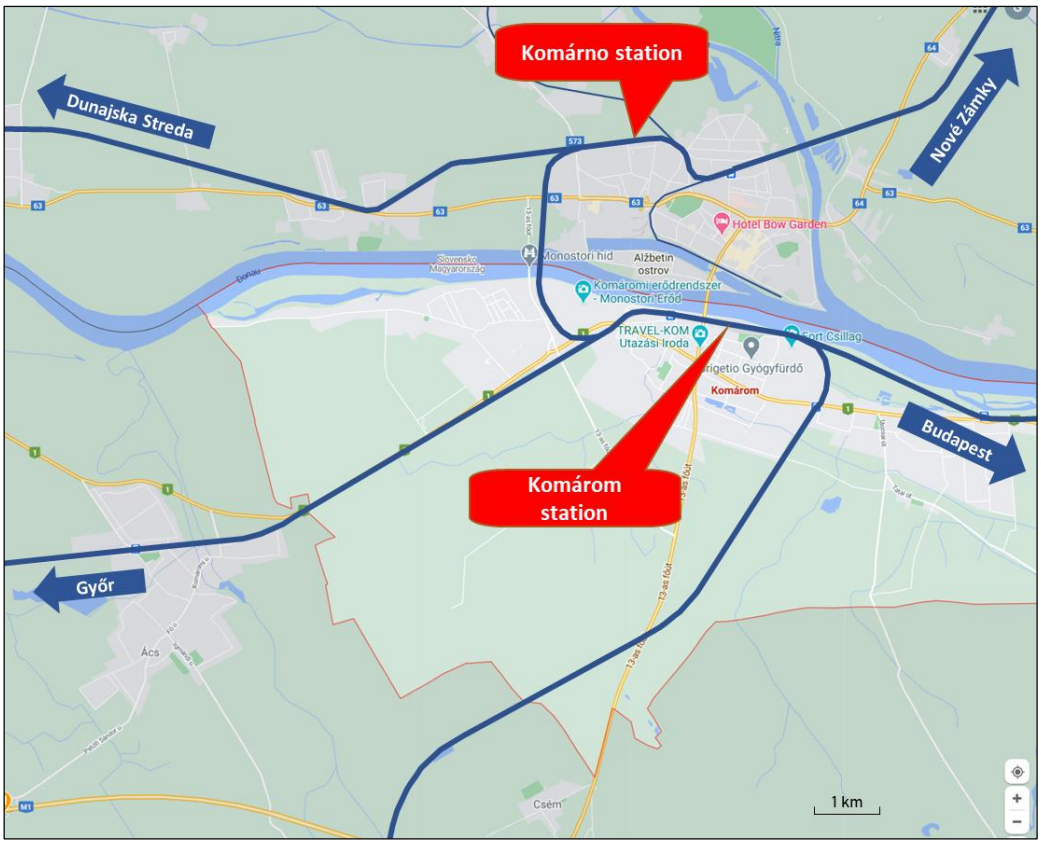

Figure 34*: Current layout of the rail network in the Komárom-Komárno node.*

The Komárom-Komárno node forms a bottleneck, since it requires freight trains in many cases to change their direction of travel when crossing the border. In the traffic relation from Győr towards Dunajska Streda, used by several freight trains daily from and to the Dunajska Streda intermodal terminal, freight trains even have to change the direction two times within a few kilometres (Figure 35).

The only traffic relation in cross-border traffic, which does not involve a change of travel direction is from Budapest towards Nové Zámky – which, however, is the least important relation in terms of traffic volume, since Nove Zamky is from Budapest also and in many cases better reached via another line via Sturovo.

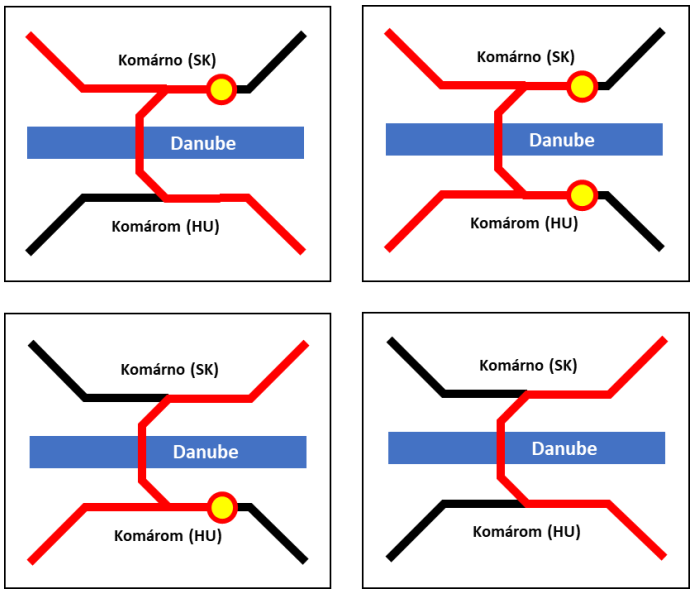

Figure 35*: Schematic maps indicating the need for changes of travel direction in different traffic relations in cross-border traffic through the Komárno-Komárom rail node.*

A possible solution eliminating the need for changes of travel direction would include the following elements:

On the Slovak side: Construction of a short triangle track of ca. 1,1 km length west of Komárno station. The curve would run over open field. (Important note: Road construction is on-going or planned in the vicinity of the site, potentially affecting the feasibility of this solution. It is therefore highly recommended to take into account a triangle track in connection with planning of any further road developments in the area!)

On the Hungarian side: A triangle track directly connecting the Komárno – Komárom line across the Danube with the Komárom – Győr line is not easily feasible or would probably become excessively expensive due to built-up areas and a new road. Thus, on the Hungarian side the following solution is suggested: A new connecting line of slightly less than 6 kilometres would be built over open field between the Győr – Komárom line and the Székesfehérvár – Komárom line approaching Komárom from the south and running in this part almost parallel to the Győr – Komárom line. Further, the Székesfehérvár – Komárom line would need to be electrified from the junction point until Komárom station on a length of ca. 6,3 km (Figure 36).

This proposed solution would naturally need to be subject to a more detailed feasibility study. However, the initial assessment is, that this solution might be able to eliminate the need for changes of direction of travel in all traffic relations in the Komárom-Komárno node at relatively low cost.

An additional benefit would be, that with freight trains not any longer required to change their direction of travel at Komárom station, space could be freed up for alternative use, e.g. for the establishment of an intermodal transshipment site utilizing parts of the current freight yard. This would also mean that the freight yard could be developed in such a way, that it would deliver a bigger local benefit instead of primarily serving railway internal operational purposes as it does today. The vicinity of the Danube river could be of particular interest in this context.

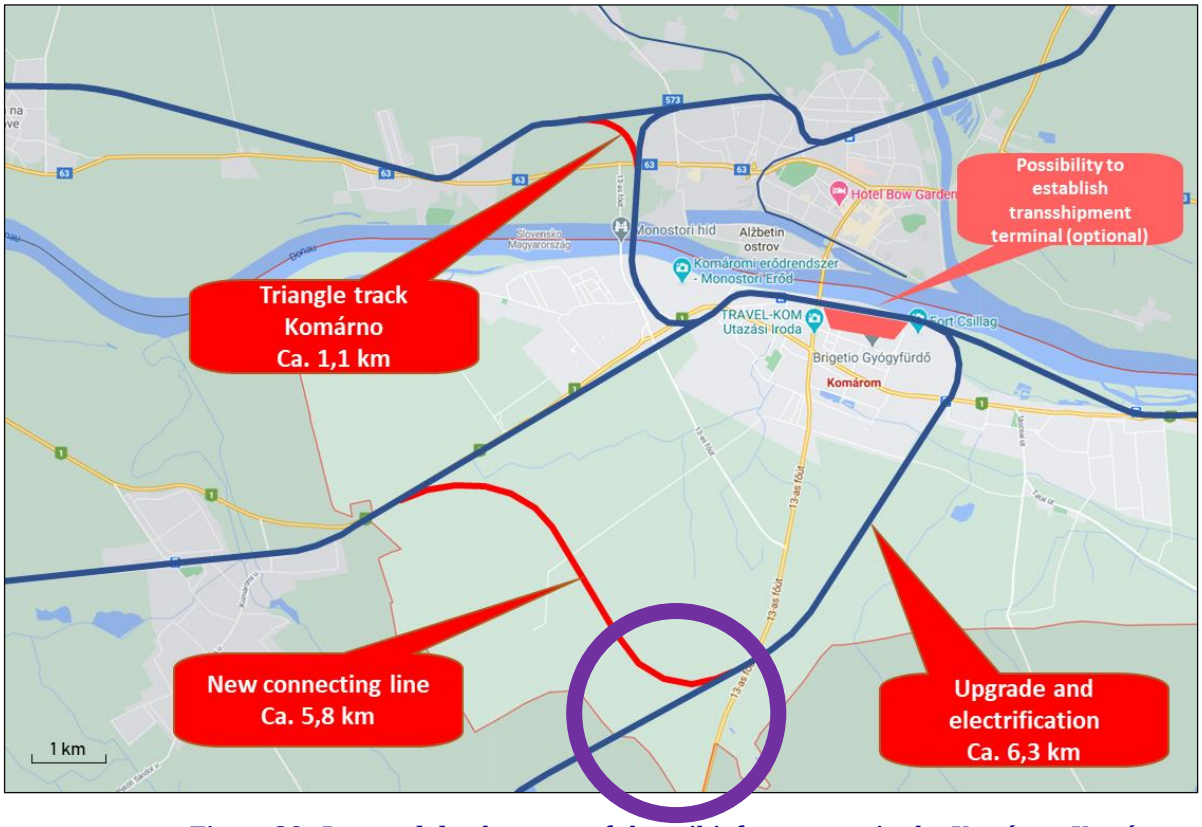

Figure 36*: Proposed developments of the rail infrastructure in the Komárom-Komárno node. Shown alignments are indicative.*

The implementation of the measures proposed here for the Komárom-Komárno node in combination with the aforementioned triangle track in Zalaszentiván would have major combined positive effects for port-hinterland traffic between Koper and destinations in Slovakia. In certain cases, this would mean that freight trains could avoid three changes of travel direction on a distance as the crow flies of less than 120 km.

It is important to stress out the further delta track construction option marked by a violet circle on Figure 36 which would allow direct (freight) train access from Győr area towards Székesfehérvár without taking capacity out of Komárom station and on the mid-term it could be a key by-pass route if the V0 railway line would be built South of Budapest to by-pass it as it was discussed in more details in the Budapest regional corridor capitalisation plans.

3.2.3. Supporting measures

The aim of improving the connectivity between corridors in the Western Hungary – Burgenland region could be supported by revising the current designation of the TEN-T network in the region.

It this context it should be considered whether the GYSEV North – South route and/or its East – West route could be included in the Core Network. This might be of interest in particular with a view on facilitating the implementation of above improvement measures – with major positive network effects for several corridors – and with a view on the implementation of the TEN-T minimum infrastructure standards for rail freight.

4. Overall conclusions and recommendations

In Győr-Moson-Sopron County transportation plays a significant role in the economic structure. There are infrastructural bottlenecks in case of all three transport modes, missing links (rail and road) or weather dependent obstacles. In the referenced strategic documents, there are several projects listed for the future or ongoing developments, all of them targeting the improvement of traffic flows regardless of modes, even intending to create intermodal connections.

Another issue mentioned by the documents were the less-than-ideal cross-border links. To embrace international and intermodal cooperation these links shall be emphasised more in the near future.

In the documents we could not identify development projects directly connected to environmentally friendly transportation solutions or intent to the usage of alternative energy sources. To reach the very ambitious European CO_2 emission targets, such solutions shall be explored and considered by the stakeholders of TEN-T corridors.

Development of a digital infrastructure can also enhance the cooperation between national logistics providers and infrastructure operators, which can ultimately facilitate the faster and more efficient greener intermodal transport.

It is advisable to detail and systematize the general development aspects so that the results can be better managed. It is clear that development resources need to be managed by a complex method, so the best synergy will be between the economy, transport and the environment. The aim is to systematize transport networks, transhipment points and logistics centers in order to eliminate existing bottlenecks and increase the level of service.

In transport sector:

- Inland waterway development's main problem the Danube safe- and economical navigability in Hungarian river section, which is not a national/regional but an international development task. The role of Hungarian Danube ports strongly depends on this factor. The most important port in the region the Győr-Gönyű Port it has very good rail- and road connection and it is a logistics centre too. Close to the design area in Komarom/Komarno – where both cities have a river port with good road and rail connections, plus these can play an important role in the Slovak-Hungarian first of all in the rail-waterway relation.

- The development's tasks of road sector are many varieties. The expressway network is almost complete (M1, M15, M85, M86), M83 is being built, only one is missed: the M85 – A3 cross-border section between Sopron and Eisenstadt. The condition of highway network is appropriate; there are no significant development needs except for the planned upgrade and capacity increase of the M1s Budapest-Győr section. There is a local development task for the Corcap project: to create a new road connection to the Sopron Logistics Centre without disturbing the city's daily life.

- The railway network has greater development needs. These needs are intended to complement the network in order to improve rail traffic and resolve bottlenecks. The construction of new delta rail connections in Győr and Komárom / Komarno area (plus in Zalaszentivan for Baltic-Adriatic traffic) would significantly increase the capacity and level of service not only on Corcap corridor, but also in the North-South connections of the wider area.

Synergic points

Three Rail Freight Corridors pass through the Western Hungary region. These are:

RFC 7 Orient/East-Med

RFC 9 Rhine-Danube

RFC 11 Amber

The aim of the RFCs is to promote rail freight and increase its share on the continent. The CORCAP project aims to promote environmentally friendly freight transport. One possible solution is to strengthen rail freight transport. The objectives of CORCAP and the RFCs have synergies on this point, and the development plans of the RFCs are therefore acceptable objectives for CORCAP.

The list project recommendations should help other ongoing initiatives and effort with in the Corcap project's Transnational Strategy as well as other external studies. An important example is an official study which was carried out on the bottlenecks in the Amber Corridor and its proposals for measures to resolve them are in synergy with CORCAP's development objectives. The proposed actions are:

- removing line bottlenecks

- station and border station improvements

- removal of operational and administrative barriers

Summa-summarum: The development ideas and plans related to Győr-Moson-Sopron County can serve the objectives of Corcap well, only a few small additional plans are needed to achieve the goals. The study also proved that more attention should be attend not only to the Austrian relations of GYMS County, but also to the Slovak relations.