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ABBREVIATIONS

| | |
|----------------|---|
| EU | : European Union |
| EC | : European Commission |
| CEI | : Central European Initiative |
| EUSDR | : The EU Strategy for the Danube Region |
| UA | : Ukraine |
| RO | : Romania |
| SK | : Slovakia |
| HU | : Hungary |
| CBC | : Cross-Border Cooperation |
| NUTS | : Nomenclature of territorial units for statistics |
| GDP | : Gross Domestic Product |
| EV | : Electric Vehicles |
| ICT | : Individual Car Transport |
| PPT | : Public Passenger Transport |
| P&R | : Park&Ride |
| MaaS | : Mobility as a Service |
| DRT | : Demand-responsive transport |
| ITS | : Information Technology Services |
| CBP | : Cross-Border point |
| CE | : Carpathian Euroregion |
| ERDF | : European Regional Development Fund |
| IRP | : Internally Removed Persons |
| RT | : Railway Terminal |
| TEN-T | : Trans-European Transport Network |
| SWOT | : Strengths, Weaknesses, Opportunities and Threats |
| TO | : Thematic Objective |
| 3SI | : Three Seas Initiative |
| COP21 | : Conference 21 |

MOTIVATION

The mobility plan was developed as part of the implementation of the Project "MOBI: Modern border infrastructure - a successful Carpathian region", which is implemented with the financial support of the EU under the CBC Program of the European Neighbourhood Instrument (ENI) Hungary-Slovakia-Romania-Ukraine 2014-2020. The "MOBI" project is implemented by an international consortium of organizations, which includes regional and subregional local self-government bodies, experts and specialized professional institutions: Self-Government Body of Szabolcs-Szatmár-Bereg Region (Hungary); Košice self-governing Region (Slovakia); Maramureş County Council and Satu Mare County Territorial Administrative Unit (Romania); International Association of Regional Development Institutions IARDI (Ukraine); Service Of Renewal And Development Of Infrastructure In The Zakarpattia Region (Ukraine).

The overall goal of the MOBI Project was to create a stable platform for effective cross-border mobility of people and goods through the improvement of border infrastructure and relevant border crossing points (especially at the borders with Ukraine); strengthening cooperation of regional and local self-government bodies with expert, professional and project-planning organizations in the target Carpathian border region. The specified joint cross-border cooperation is aimed at qualitatively improving the cross-border mobility of people and goods through the preparation and adoption of relevant agreed decisions and the implementation of infrastructure and technological projects both in the fields of transport and border infrastructure, as well as in the improvement and expansion of international road, railway and aviation services connections in the target Carpathian region.

The cross-border mobility plan was drawn up in a difficult context, given the Russian invasion that began on 24 February 2022, which brought significant changes to the flow of goods and people in the Carpathian region, but also prompted the urgent need for radical reform of the international transport of goods and passengers along the main logistics chains in Central, Western and South-Eastern Europe.

Currently, reformatting of international supply chains of cargo and goods is already taking place, both in terms of logistics and types of transport. The number of passenger transport routes caused by the departure and migration of millions of refugees from Ukraine to European countries is increasing. The load on road and rail freight transport infrastructure in Europe continues to grow, including in the Carpathian region. Uncertainty regarding the duration of military operations on the fronts of the Russian-Ukrainian war, plans for the reconstruction and restoration of post-war Ukraine, European integration processes and plans to join NATO only increase the need for increased transportation through the western borders with the EU countries and, in particular, through the territory of the Carpathian macro-region.

We should also note that the partners of the MOBI Project represent the power structures of their countries mostly at the level of NUT-3 administrative-territorial units: county – Romania and Hungary; region (region) and oblast - Slovakia and Ukraine. Therefore, there is a certain limitation in planning competences, decisions and actions that have an international (cross-border) nature.

The creation of the Cross-Border Mobility Plan (hereinafter referred to as the Mobility Plan) is aimed at **improving the flow of passengers and goods** while greatly supporting **sustainable mobility patterns** within the Hungary-Slovakia-Romania-Ukraine cross-border region including following administrative units: Szabolcs-Szatmár-Bereg county (HU), Košice and Prešov regions (SK), Maramureş and Satu Mare counties (RO) and the oblasts of Zakarpattia, Ivano-Frankivsk and Chernivtsi (UA). The territory comprising these eight administrative unites will be further referred to as **“cross-border region”** in this document.

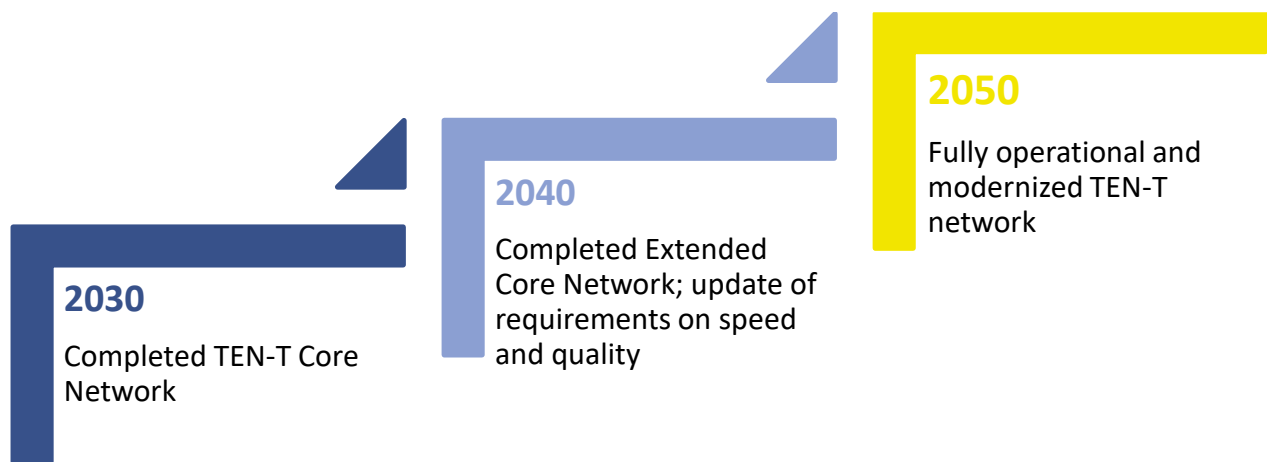
The Cross-Border Mobility Plan is a synergy but also a correlation of the individual (county, oblast, regional level) mobility plans developed within or in parallel with the MOBI project (Modern Border Infrastructure – successful Carpathian Region – financed by ENI CBC Programme Hungary-Slovakia-Romania-Ukraine 2014-2020). The Cross-Border Mobility Plan is not only focusing on the links between the wider European territory and the cross-border region, and how they must adapt to the new transport patterns but is looking especially at the interregional flows aiming to improve cross-border cooperation to foster territorial cohesion, sustainable economic growth and a better quality of life.

STRATEGIC CONTEXT

The **EUROPEAN TEN-T NETWORK** plays a vital role in improving passenger and freight transport flows in and across Europe, being the backbone of the European transport sector. The main task of TEN-T is to stimulate economic growth and competitiveness in the single economic European trade space due to efficient multimodal high-speed routes and barrier-free transit of goods through the territory of project member countries and neighbouring countries. The latest revision of the TEN-T network, of July 2022, includes amendments to improve and extend connections to some third countries (i.e., Ukraine, Moldova) and significantly diminish the interest in the improvement of the connections with others (i.e. Russia and Belarus). The strategic role of Ukraine in international transformation transport processes is confirmed by the inclusion of its logistics routes in the Trans-European Transport Network (TEN-T) and granting Ukraine the status of a candidate for the EU membership and a partner in the Three Seas Initiative.

The network is composed of 9 thematic corridors (see the map) which ensure east-west and north-south connections throughout Europe. Each thematic corridor is composed of individual road, railway and inland waterways corridors, together with corresponding ports, airports and rail-road multimodal terminals. The TEN-T network is composed of 2 layers: the Core network (also including the extended core network) which represents the most important nodes and links of the trans-European transport network, and the Comprehensive network, a Europe-wide network ensuring the accessibility and connectivity of all regions in the Union, including the outermost regions and remote areas. The deadline for finalizing the whole TEN-T network is 2050, with intermediary milestones in 2030 and 2040 (see the table) and these developments are expected to lead to a 0.4% reduction of GHG emissions and a 2.4% increase in GDP by 2050.

FIGURE 1 TEN-T DEVELOPMENT TIMELINE



At European level, the TEN-T network is complemented by the **EUROVELO NETWORK**, which is an extensive network of long-distance cycling corridors connecting multiple countries. Cycling has not been fully integrated into the TEN-T network's guidelines during the 2021 update, therefore the EuroVelo represents the main European network for alternative modes of transport, encompassing 17 corridors and 45,000 km at the moment. The network is envisioned to reach 90.000 km once fully implemented. These corridors have the potential to be a backbone for national and local cycle routes or networks, while also being an attractive brand for cycling tourism in Europe.

The **PARIS AGREEMENT** is a legally binding international treaty on climate change, adopted at the UN Climate Change Conference (COP21) in Paris, France, on December 12th, 2015. The main scope of the agreement is to maintain the global temperature increase “well under” the 2 °C limit and to maintain efforts for limiting the temperature increase to 1.5 °C, compared to pre-industrial values. Building upon the key aspects of this agreement, the EU developed the **EUROPEAN GREEN DEAL**, a new European level strategy for ensuring sustainable development. It focuses on fostering development based on green technologies and sustainable solutions in order to reach the objective regarding climate neutrality by 2050. The pact identifies a series of main challenges for the following decades, such as: clean energy, sustainable industry, construction and renovation and sustainable mobility. Most relevant for the Cross-Border Mobility Plan are the measures and targets set for mobility, i.e. the reduction of transport related GHG emission should be at least 90%, compared to values from 1990, in order to significantly contribute to climate neutrality.

From the perspective of the European Green Deal (EU 2019) and the Paris Agreement (2015), transportation is one of the main drivers of global climate change. The statement made by the EU Transport Commissioner A. Vălean on the day of the announcement of the European Green Deal on December 11th, 2019, emphasizing the need to shift long-distance passenger and freight transport from roads to rail and waterborne transport using multimodal technologies, is of fundamental importance for MOBI. This is crucial for the MOBI project area as it is the zone with the highest overheating among all areas of compact living on the planet, which has been observed over the past decade.

The **SUSTAINABLE AND SMART MOBILITY STRATEGY** has been launched by the European Commission in December 2020, aiming to guide the way in which mobility should be developed at European level, particularly considering the effects of Covid-19 on mobility and the corresponding needs resulting from the pandemic. The strategy is complemented by an Action Plan composed of 82 initiatives meant to guide mobility planning in the following years. The core objectives of the strategy are sustainability, intelligence and resilience, all following the corresponding mobility related objective of the Green Deal. The strategy proposed 3 pillars for achieving the ambitious objective:

- I. All transport vehicles to be more sustainable;
- II. Sustainable alternatives to be made widely available in a multimodal transport system;
- III. Incentives to be developed in order to support the envisioned transition.

These three objectives work and support each other in order to shape a green, connected, automated multimodal and accessible mobility, while also using the crisis created by the Covid-19 pandemic as a means of accelerating the modernization and decarbonisation processes of the entire transport system and mobility, until the year 2050. In order to reach this result, several targets and milestones have been included in the strategy:

By 2030:

- At least 30 million cars with zero emissions in operation on European roads
- 100 climate neutral European cities
- High-speed rail traffic doubled across Europe
- Widespread automated mobility
- Zero emission marine vessels ready for market
- Collective transport planned for journeys under 500 km must have carbon neutral emissions

By 2035:

- Large zero-emission aircraft ready for the market.

By 2050:

- Almost all cars, trucks, buses and heavy duty vehicles to be zero-emission vehicles
- Rail freight traffic doubled
- The multimodal, fully operational TEN-T (Trans-European Transport Network) for sustainable and intelligent transport with high-speed connectivity

The **THREE SEAS INITIATIVE (3SI)** is a politically inspired, commercially driven initiative for improving connectivity between 12 EU Member States located between the Baltic, Adriatic and Black seas. The initiative was proposed starting with 2014, due to a shared interest in developing transport, energy and digital infrastructure connections on the EU's north-south axis. In 2022, five objectives for the 3SI were established, with one of them focused on *Reliable, sustainable and inclusive connectivity*, particularly dedicated to the creation of smart solutions for data exchange and a more efficient and secure use of connectivity networks in the transport, energy and digital sectors. Additionally, in 2019 the **THREE SEAS INITIATIVE INVESTMENT FUND** has been introduced, a commercial fund targeting critical infrastructure investment, which accelerates economic development, improves connectivity and cooperation throughout the region. For the transport sector, the Fund supports the

expansion of transport facilities and financing of new transport connections between Three Seas countries.

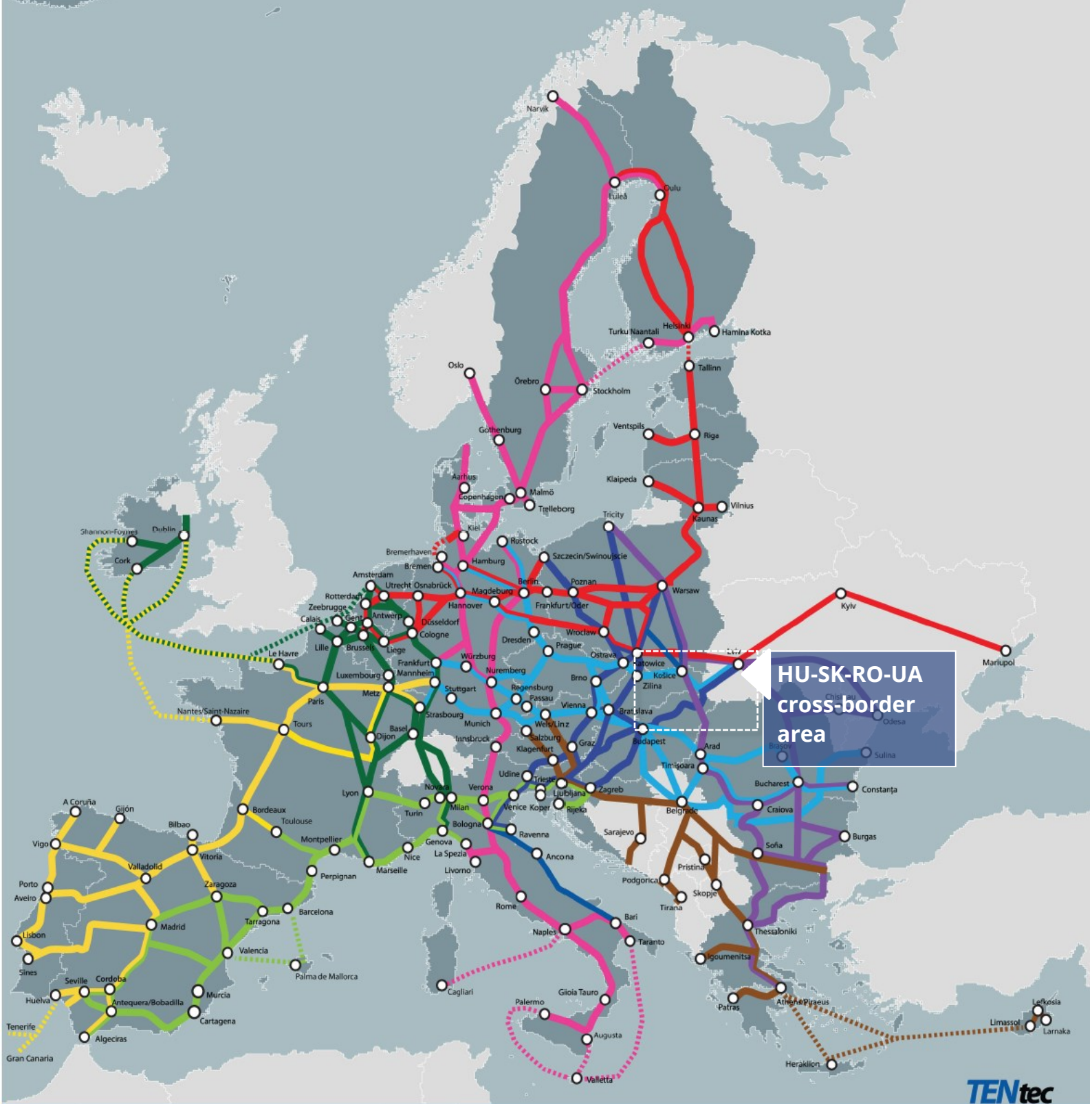
Among the most important factors influencing the formation of the Mobility Plan is the simultaneous acquisition of candidate status for joining the EU and partnership with the Three Seas Initiative (3SI) by Ukraine (as well as Moldova) in the last decade of June 2022. The 3SI includes 12 EU countries and strategic partners such as the United States, Great Britain, Germany, and Japan. In this macroregional structure, actively developing since 2016, MOBI's main tasks fall under Priority #1, which receives over half of the investments attracted for projects in 3SI countries. In the period 2022-2023, 3SI is chaired by Romania. At the same time, in 2021-2022, Ukraine chaired the EU Strategy for the Danube Region (EUSDR), but this opportunity was significantly limited by the war. Despite this, a few key achievements of the project were reflected in the joint review of the development of the railways of the macroregion, developed by the representatives of all 14 countries of the EUSDR.

The only multi-level governance mechanism covering the whole of the Carpathian area is the Framework Convention on the Protection and Sustainable Development of the Carpathians (**CARPATHIAN CONVENTION**), adopted by seven countries in May 2003 in Kyiv, Ukraine. This convention is the second sub-regional treaty-based regime for the protection and sustainable development of a mountain region at European level. Building on the Carpathian Convention, the proposal for a **MACRO-REGIONAL STRATEGY FOR THE CARPATHIAN REGION** has been submitted in 2018 to the EC. The strategy's main objective is to strengthen the competitiveness and attractiveness of the Carpathian macro-region, based on its unique natural and cultural heritage and internal development potential. The strategy is composed of four main priority areas, one of which focuses on mobility, i.e., 3. Cohesive Carpathians: Increasing the functional accessibility of the Carpathians, particularly on initiatives to increase transport accessibility and digital accessibility and develop mobility e-services. The basic document of the Convention on the tasks of the MOBI project is the Transport Protocol, adopted in 2014.

At the same time, the MOBI project area is located within the territory of the **PILOT EUROREGION "UPPER PRUT"**, which, by the decree No. 59-r of the Cabinet of Ministers of Ukraine dated February 14th, 2002, No. 59-r, is responsible for "experimental development of mechanisms for cross-border cooperation as elements of the process of European integration and regional policy building", and the first priority of which was defined in 2000 as "development of transport and communication infrastructure at the levels of trans-European corridors and local connections". Moreover, the place of convergence of the administrative borders of Ivano-Frankivsk and Chernivtsi regions of Ukraine and Suceava county of Romania (which are part of both Euroregions - "Carpathian" and "Upper Prut") with Maramureş County on the Ukrainian-Romanian border is located 60 km away from the aforementioned geographic centre of the European continent in Zakarpattia, but it is almost the largest cross-border "white spot" in the entire Carpathian-Danube region.

Finally, according to its historical purpose, confirmed in two World Wars, connectivity through this cross-border region, which was previously developed within a single state, is also important for ensuring military mobility. The territory of the MOBI project (where the geographical centre of the European continent is located alongside the railway crossing the Ukrainian-Romanian border in Dilove-Valea Vişeuului) is completely within the scope of the **EU STRATEGY FOR THE DANUBE REGION (EUSDR)** and the Central European Initiative (CEI - the

headquarters of the V Pan-European Corridor, which crosses this region, is located in the CEI Secretariat in Trieste, whose countries signed the Ministerial Declaration "Towards Sustainable Transport in the CEI-Countries" in 1999). Moreover, the objectives and tasks of MOBI fully fall under priority 1b of the EUSDR (road, rail, and air transport), and its Supervisory Group, which includes representatives of all participating countries in MOBI, has developed relevant reviews to identify perspectives and development tasks for these transportation systems.













TENtec

- ATLANTIC
- NORTH SEA - ALPINE
- NORTH SEA - BALTIC
- SCANDINAVIAN - MEDITERRANEAN
- BALTIC SEA - ADRIATIC SEA
- RHINE - DANUBE
- MEDITERRANEAN
- WESTERN BALKANS
- BALTIC - BLACK - AEGEAN SEAS

Map as proposed by the Commission in the proposal for the revision of the TEN-T Regulation (14 December 2021 - COM (2021)812) and amended (27 July 2022 - (COM(2022)384)

VISION – 2040

THE TRANSPORT SYSTEM OF THE HUNGARY-SLOVAKIA-ROMANIA-UKRAINE CROSS-BORDER REGION

-  • A region well linked to the main EU transport framework but with efficient and sustainable internal connections.
-  • A network of coherent cycling routes developed along rivers, agricultural roads, roads with low traffic or even as dedicate cycling lanes linking major touristic attractions to main cities.
-  • A complete network of railways, mostly electrified and with travel speeds above 160 km/h on main lines.
-  • A vast network of rivers, an ecological backbone of the region – used for freight and passenger transport (especially tourists) and cycling tourism.
-  • A network of motorways and safe express roads linking major cities.
-  • A vast network of “complete”* county roads linking remote areas to main urban nodes and small and medium sized cities.
-  • A network of regional airports with good access to EU gateway airports and with intra regional low emission commercial / business flights.
-  • Increased cross-border connectivity supported by a large variety of border crossings and efficient border control units supporting a free flow of goods and persons.
-  • A wide availability of fast charging stations along main transport corridors and cities served mostly by zero-emissions public transport fleets.
-  • Larger cities along the border benefit of coherent cross-border public transport services (rail or bus).

* County roads based on design features that pay more attention to pedestrians and cyclists



1. ACTIVE MOBILITY (CYCLING AND PEDESTRIAN INFRASTRUCTURE)

1.1. MAIN CHALLENGES

A well-synchronized and collaboratively developed, targeted cycling infrastructure will greatly contribute to the development of the entire cross-border region. In addition to being an ideal mobility tool for tourists, its direct effects can be felt in public, social cohesion, in the development of the local economy, and in the improvement of the quality of life. The development of bicycle traffic is at the same time an effective tool for economic development, it is attractive for visitors and tourists as well, as it simply provides a convenient way to get to know a particular area at a low cost. In the cross-border region, organized bicycle tours and collective bicycle tourist trips are becoming more and more popular.

The development of bicycle tourism is hindered by the lack of basic infrastructure, therefore, according to the players in tourism, in order to achieve the success of local tourism, it is necessary to develop the infrastructure of the bicycle transport system. Thus, one of the reasons for the low regional budget-forming capacity of tourism is underdeveloped infrastructure. Border territories, from the point of view of tourism, did not use the opportunities of cooperation to the full extent. This cooperation could open the perspective of the development of border areas, the region and individual products through the attraction of investment, the development of thematic routes, marketing activities in many areas

The cross-border region is only crossed by one of the 19 EuroVelo routes. EuroVelo 11 East Europe is connecting the most northern part of Norway to Greece following a quite straight north – south direction and crossing Prešov and Košice within the cross-border region. The route is a several kilometres away from Nyíregyháza. The route is functional in Slovakia and Hungary but there are still segments to be completed in Poland, Serbia, or Northern Macedonia, as well as Greece.

Slovak and Hungarian regions invested in cycling infrastructure in the last 10 years trying to build up regional cycling networks. Košice and Prešov already have access to a large variety of cycling routes that are administered by NGOs and funded by grants. The main problem here is that these routes are not yet interconnected and fail to form a coherent network. In the case of Hungary, Nyíregyháza has significantly increased the length of its cycle path network in recent years. The city has more than 60 km of cycle paths. In the same way, the cycle path system in Szabolcs-Szatmár-Bereg county is also increasing. Nyíregyháza is already connected to the EuroVelo 11 passing the Tokaj wine area. There are also multiple cycling roads (mostly as cycling lanes, separated from the road) connecting the cities to surrounding villages. The cycle route was opened to cyclists in 2017 and is almost 30 km long. There is even a possible connection between the Nyíregyháza and Satu Mare (Romania). As part of the cross-border cooperation project "HUROVELO" a bicycle road has been built on the Someş dam between Satu Mare – Csenger and Fehérgyarmat.

As part of the MOBI project, the reconstruction of the bicycle path within the settlement of Péterfalva (Ukraine) on the state highway Vylok - checkpoint "Diakovo" with a length of 4.350 meters was carried out. The specified area is a continuation of the already existing bicycle path from the checkpoint "Vylok" to the village of Péterfalva. In order to ensure a circular route in the coming years, it is planned to build a bicycle path with a length of more than 12 km from the village of Péterfalva to the border point "Velyka Palad" (Ukraine) - Kispalady (Hungary), as well as the continuation of the paving of bicycle paths in the direction of the checkpoint "Diakovo", which is

about 10 km, from the village of Vylok in the direction of the city of Vynogradiv with a total length of 20 km of existing and in the future newly built tracks.

Still, cycling routes and cycling tourism in UA oblasts are at an early stage of development while for the case of Romanian cities they are planned to be implemented in the next 3-5 years. Košice and Prešov are the only cities that have a bicycle rental system, while Satu Mare and Baia Mare are preparing such possibilities based on their sustainable urban mobility plans (SUMP).

1.2. MAIN PROJECTS

ROMANIA

- Extension of the Satu Mare – Csenger – Fehérgyarmat cycling routes to a) Mátészalka b) Nyíregyháza.
- Development of a cycling tourism and commuting network in Satu Mare county.
- Someș - Tisza Green Road (cycling routes from Chop to Satu Mare and Baia Mare).
- Development of a network of cycling routes in Maramureș county.

SLOVAKIA

- Interconnection (via Košice) of the Košice region cycling routes.
- Study of the development of the bridge over the Latorica River (cycling path to UA and HU).
- Development of cycling routes along smaller cities in Košice region: Slovenské Nové Mesto / Sátoraljaújhely, Trebišov, Michalovce and Sobrance.
- Local bike sharing and bike rental systems supported by the Košice self-governing region.
- Connecting Košice self-governing region to the Tokaj tourist destination (HU).
- Completion of Eurovelo 11, cycling infrastructure in Košice.
- Development of bike – sharing systems in Satu Mare, Baia Mare and Košice (Antik – private operator).

UKRAINE

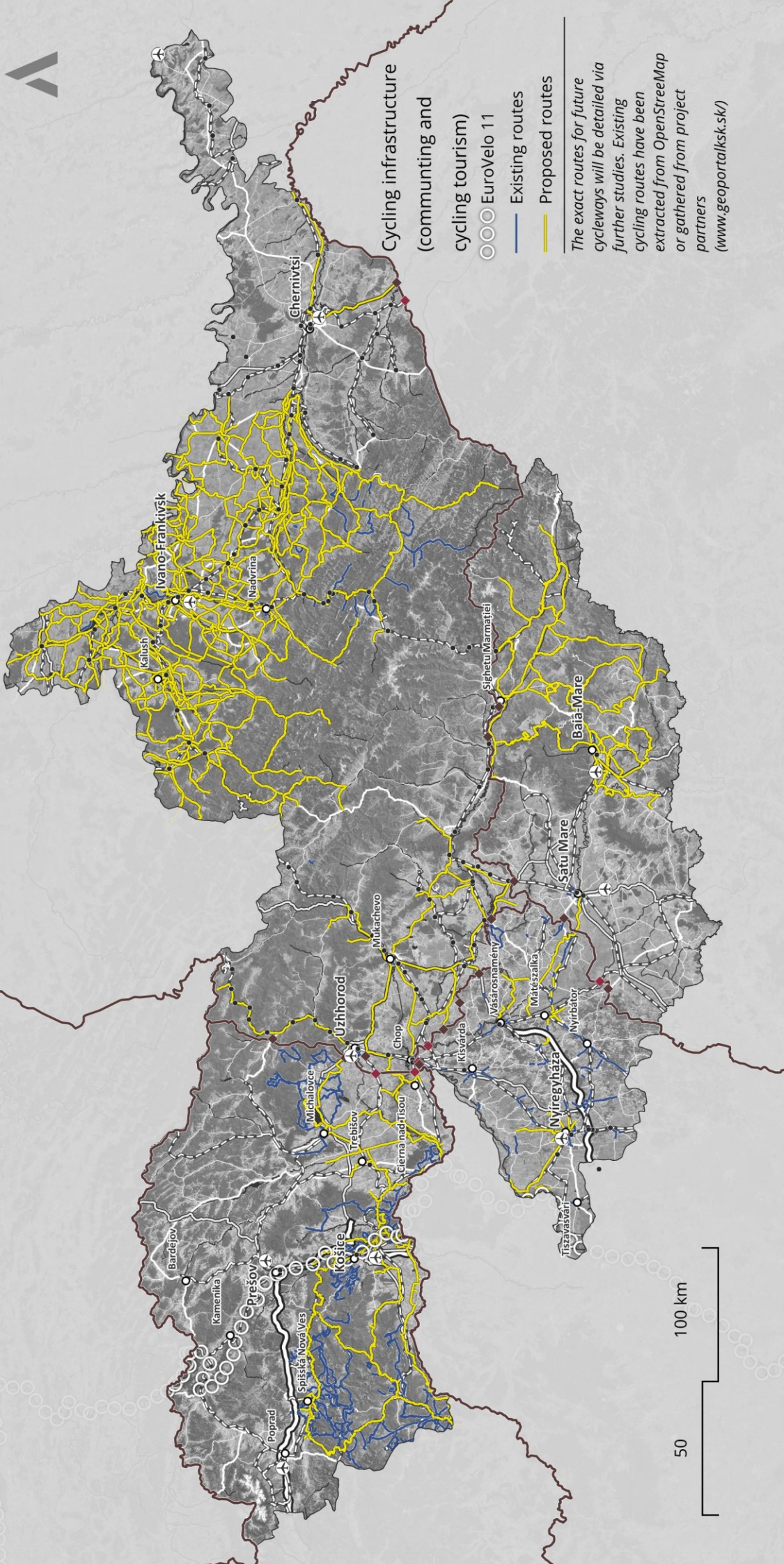
- Reconstruction and arrangement of bicycle paths in Zakarpattia Oblast, namely:
 - along the highway M06 Kyiv - Chop from Mali Selmence checkpoint (Ukraine) - Strumkivka - Uzhhorod - Mukachevo - Svaliava.
 - along the highway M23 Berehove - Vylok - Vynohradiv and M26 Vylok - Diakovo checkpoint with continuation in the direction of the village of Korolevo
 - along highway N13 Uzhhorod - Perechyn – Velykyi Bereznyi with a stop at the Malyi Bereznyi checkpoint
 - along the road T-07-19 Irshava - Vynohradiv
 - along the M25 highway Chop - Velyka Dobron - Mukachevo

- Preparation of the Strategy for the development of bicycle transport and strengthening of bicycle safety (based on a scientific approach and considering progressive foreign experience).
- Development of a cycling network in in Zakarpatska, Ivano-Frankivska and Chernivtsi oblasts.
- Institutional support for the development of cycling, including the development and implementation of regulatory acts regarding the use of bicycles and their participation in traffic.
- Promoting socially and environmentally oriented short-distance mobility based on the "City of Short Distances" concept and implementing the principles of intermodality to ensure optimal interaction between bicycles and other modes of transportation.
- Setting up bicycle routes within the Carpathian Euroregion. Construction and expansion of existing cycling infrastructure (cycling routes) in the adjacent border areas, together with tourism opportunities and promoting a healthy lifestyle.
- Creating bicycle paths on dams and canal embankments of the Berehove Cross-Border Polder System.

HUNGARY

- Development of the Tokaj-Tiszabecs cycle route.
- Placement of signposts of the designated cycle route No 32 between Záhony-Vásárosnamény-Csenger-Mátészalka-Nyírbátor-Debrecen. The route is more than 300 km long. The integration of City of Debrecen into the route represents a significant target market for the Upper Tisza region.
- Development of bicycle tourism centres and rest points in Vásárosnamény, Csaroda, Tákos, Tarpa, Tivadar, Panyola, Kölcse, Nyírbátor, Lónya, Csenger, Cégénydányád, Barabás and Bátorliget. The rest point are equipped with toilets, bicycle storage, in some cases accommodation, service and a visitor centre.
- Providing a uniform fleet of bicycles and a transfer service for cycles in the Upper Tisza region. Providing a significant bicycle fleet in the Upper Tisza region, aimed at to serve cycling programmes and to operate a bicycle rental network. A total of 122 unified KTM bikes are available for touring in the region, of which 18 e-bikes. There are a further 100 Csepel bicycles in Fehérgyarmat, which are part of the Upper Tisza region cycling fleet too.
- Development of local and regional heritage tour routes, tour proposals, recommendations for potential users.
- Promotion of existing cycle routes on flood embankments, the continuous improvement of the network.
- Development of the cycle paths around the bog (Tiborszállás-Nagyecsed-Tyukod-Ura-Csengerújfalú-Csenger-Komlódtótfalu-Nagygéc) and their connection to the existing regional cycle path network along the roads 49 and 471.
- Construction of a cycle path between the settlements of Mátészalka and Ópályi (6 km).
- Construction of a bicycle and pedestrian path linking Tarpa (HU) and Badaló (UKR) on the flood protection embankment of the Tisza River.
- Construction of a cycle path between the settlements of Nyírtass and Ajak.

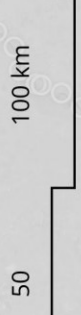
- Construction of a cycle path between the settlements of Kékcse and Kisvárda.
- Reconstruction of cycle paths in the municipality of Máriapócs.
- Construction of an internal cycle path in Kisléta (2,2 km).
- Construction of cycle paths from Tokaj to Tiszadada via Tiszlök.
- Construction of a cycle path between the settlements of Nyíregyháza and Nagykálló.
- Construction of cycle paths from Nyírbátor to Nyírbéltek via Piricse and Encsencs.
- Construction of a cycle path between the settlements of Nyírbéltek – Ömböly - Bátorliget.
- Construction of cross-border cycle path Nyírbátor – Nyírvasvári – Terem – Bátorliget – Vállaj – Urziceni – Carei (HU – RO).
- Construction of cross-border cycle path Tizsakóród (HU) – Vary (Вари) (UA).
- Construction of a cycle path between the settlements of Balkány and Szakoly.
- Construction of cycle paths Hajdúdorog – Ujfehértó – Nagykálló and Nyíregyháza – Újfehértó – Téglás.
- Construction of a cycle path between the settlements of Szakoly – Nyírmihálydi – Nyírlugos.



Cycling infrastructure (commuting and cycling tourism)

- ○ ○ EuroVelo 11
- Existing routes
- Proposed routes

The exact routes for future cycleways will be detailed via further studies. Existing cycling routes have been extracted from OpenStreetMap or gathered from project partners (www.geoportalk.sk/)



- National border
- Populated places
- Main cities in the study area
- Waterways
- Lakes

- Rivers
- Transportation
- ▬ Motorway
- ▬ European road
- ▬ Primary roads

- Secondary roads
- Tertiary roads
- ▬ Railways
- Railway stations
- ✈ Airports

- Cross-border points
- ◆ Rail-crossing
- ◆ Road-crossing

2. RAILWAY NETWORKS

2.1. MAIN CHALLENGES

The initial development of railways through the cross-border region of the MOBI project, bypassing and crossing the Carpathians, took place in the second half of the 19th century through the intersection of historical connections of the "Silk Road" and "from the Varangians to the Greeks", taking into account the results of the Crimean (Eastern) War. According to the initiators of railway construction in the "Habsburg Monarchy" time, its main directions in this area were the Baltic-Mediterranean and "Trieste-Odesa". The basis for their modern use and development is the AGTC Agreement under the auspices of the UN/ECE European Commission, which is responsible for its TEM/TER project and serves as the basis for the development of the TEN-T/RFC network of transport corridors of the EU. The key TEN-T corridor for the project is the modern "Rhine-Danube" and its connections with the corridors "North Sea-Baltic" and Mediterranean-Middle East.

The main rail transport corridors of the TEN-T network in the cross-border region follow an east-west direction connecting Ukrainian regions to central Europe and the North Sea, Eastern Europe and the Baltic Sea / Black Sea and Southern Europe and the Adriatic Sea (freight only). There are two corridors (North Sea - Baltic Corridor and Rhine - Danube Corridor¹) converging towards Lviv and continuing to Kyiv and Odesa (port) or Ivano-Frankivsk – Chernivtsi – Suceava – Constanța (port).

After the changes in the vision for the development of the eastern part of the TEN-T network by the European Commission on February 27th, 2022, the focus is on integrating Ukraine along routes through Lviv, Kyiv, Odesa to the east of the country, as well as Central Europe and the Eastern Baltic to the ports of the Black Sea (Constanța, Varna, Burgas), the Eastern Mediterranean, and the Adriatic. However, the shortest route through the Carpathians is not yet taken into account: through Kolomyia - Rakhiv - Sighetu-Marmației - Teresva with an extension to Central Europe through Chop - Čierna nad Tisou (UA-SK)/Chop - Záhony and Batyovo – Eperjeske (UA-HU) or Diakove - Halmeu (UA-RO)/Dilove-Valea Vișeului (UA-RO). These connections must be considered in the comprehensive TEN-T network and will serve as an important alternative for the reconstruction of the 1520/1435 mm main line through Lviv.

Concerning the cross-border region analysed, the most relevant TEN-T corridors are the Rhine - Danube and the Baltic Sea – Adriatic Sea. Both are entering Ukraine from Hungary (line 100 Debrecen – Záhony) and Slovakia (line 190 Košice - Čierna nad Tisou) via Chop. This makes Chop an essential railway hub in the region and an important gateway to the Ukraine. All these important railway corridors bypass and thus don't reach Romanian counties Satu Mare and Maramureș. The line 400 linking Baia Mare to Satu Mare and continuing to the two border crossing points Carei and Halmeu (line 402) are only part of the TEN-T comprehensive network.

In the cross-border region, main problems are arising from the lack of a coordinated vision among the interested countries (in contrast to agreements reached more than 100 years ago after the dissolution of Austro-Hungarian Monarchy) and relate either with the quality and continuity of the railway infrastructure or with passenger services. In the majority of counties, railway transport is characterized by a self-supporting loop of cargo and passenger rail operations: service is not attractive enough leading to the loss of passengers, either due to frequency, rolling stock (the age

¹ Also, the Baltic Sea – Adriatic Sea Corridor but only for freight.

of rolling stock exceeds 40 years in most of the cases), or total travel times (usually to times slower than the same route by car), which leads to lower frequencies and discontinuation of services due to poor performances, which generates more loss of passengers due to low accessibility / attractiveness.

The most significant challenge for a higher level of integration of rail transport in the partner counties is the differences between rail track gauges used in Ukraine (1520 mm), which differ from the EU standard (1435 mm). Such difference is a huge obstacle to interoperability. According to current approaches (including the joint decision of the European Commission and the European Investment Bank dated 21.10.2022), this problem is being addressed by restoring the TEN-T network through the restoration of the original 1435 mm Euro gauge in western regions of Ukraine and in Moldova, with subsequent extension to the east.

The cross-border counties analysed in the MOBI project have a fairly good coverage of rail infrastructure the main concern remains the continuity of the lines in the border area along with their quality. The line 100 from Debrecen to Nyíregyháza and the line 190 from Košice to Trebišov as well as the 191-line continuing to Humenné are in a better condition² so that travel speeds can get close to 80-100 km/h but this is still far away from the potential of this route.

Even if connections via rail between major cities in the Slovak and Hungarian part are in a better condition this does not necessarily apply to Romanian and Ukrainian regions. In both cases the railway network is fragmented due to geographical reasons as the lines must cross the Carpathian Mountains. For example, Maramureş county is crossed by 2 branches of railway infrastructure, which do not intersect within the county. One branch serves the north-eastern territory and is connected to the railway in Ukraine and the other serves the western settlements of the county and provides a connection between Baia Mare and Satu Mare cities. There is a gap in the network between Baia Mare (the main city) and Sighetu Marmăției. So, everyone traveling from Baia Mare towards Ukraine must take a detour of more than 150km.

In general, the most problematic connectivity issues appear near the border. In Szabolcs-Szatmár-Bereg, a 101 km trip from Nyíregyháza to the border crossings in Zajta takes on average 5 hours with two transfers being needed, while a cross border trip (if it were possible) would imply even longer travel times. In these cases, rail services are significantly less attractive than road transport and only used by carless residents. Investments are needed in improving connectivity between Debrecen / Nyíregyháza and Satu Mare, important lines such as 110³ (Debrecen – Nyírbátor – Mátészalka) or 116 (Nyíregyháza – Vásárosnamény) need to be upgraded while lines 113 (Nyíregyháza – Mátészalka – Zajta) and 114 (Mátészalka – Csenger) (and 400 Satu Mare – Brasov on the Romanian side) need to be extended to form a functional cross-border network.

Similar challenges are noticeable along the border between Ukraine and Romania where the line 417 from Satu Mare to Negrești Oaș (less than 10 km away from the border) is not used anymore. For more than 10 years the line between Câmpulung la Tisa – Sighetu Marmăției – Valea Vișeuului was closed for cross-border trains even if it is an essential link in the Ukrainian railway network (connection between Chop and Ivano-Frankivsk, Chernivtsi and Odesa region through Moldova). Improving cross-border connectivity has to go hand in hand with creating cross-border passenger transport services. At the moment such services are available only on a few links such as Košice – Chop or Nyíregyháza – Mukachevo. There is also a direct link between Nyíregyháza and Košice, but

² These are the only electrified lines in the cross-border region.

³ Second most important railway line in the Szabolcs-Szatmár-Bereg county.

it takes a detour via Miskolc where passengers have to transfer to another train. Meanwhile the train between Dilove – Valea Vişeuului – Sighetu Marmăţiei – Câmpulung Tisa and Teresva is being relaunched (railway repairs still have to be finished). For all other cross border railway links passengers have to change trains and travel with another means of transport between train stations.

To improve quality of railway services investments in rolling stock remain essential while the upgrade of major railway hubs such as Baia Mare, Satu Mare or Košice are important to ensure a good transfer between international / national / regional and local transport networks. Additionally, as most large cities in the cross-border region benefit of extensive railway networks it is important to capitalize on this infrastructure assets and study or even develop metropolitan train services. This approach would help create an attractive option for commuting thus reducing car dependency in the suburbs.

The communication between the regional centres of Ukraine and Romania needs to be further developed, specifically:

- Ivano-Frankivsk (with an extension to Lviv) - Rakhiv - Valea Vişeuului (with a gauge change to 1435 mm) - Salva - Cluj-Napoca - Nyiregyhaza - Debrecen.
- Ivano-Frankivsk (with an extension to Lviv) - Rakhiv - Valea Vişeuului (with a gauge change to 1435 mm) - Salva - Bucharest - Constanta.
- Ivano-Frankivsk (with an extension to Lviv) - Rakhiv - Valea Vişeuului (with a gauge change to 1435 mm) - Salva - Sofia - Istanbul.

2.2. MAIN PROJECTS

HUNGARY

- Improvement of the Debrecen-Nyíregyháza-Záhony section of railway line No. 100 (including electrification).
- Reconstruction of railway lines No. 80 and No. 100c, Rákos-Hatvan-Miskolc-Nyíregyháza section.
- Complete reconstruction of railway line 110 between Debrecen and Mátészalka
- Development of the railway area in Záhony (construction of the RoLa terminal, development of railway infrastructure in Fényeslitke).
- Electrification and renewal of the railway line No 110 Debrecen - Mátészalka and development of the Mátészalka railway station for freight transport.
- Installation of wagon-tipping equipment in Mándok to speed up and facilitate transshipment.
- Renovation of railway stations buildings.
- Extension of lines 113/114 to Romania (including electrification).
- Further development of the East-West Gate terminal.
- The national road passenger transport company and the national rail passenger transport company have merged. The main strategic goal of fusion that the rail and road bus services serve the travelling public in a harmonised and economical way, with a uniform ticketing system and a common tariff.
- Reopening of a narrow-gauge railway for tourism between Nyíregyháza and Sóstógyógyfürdő.
- Construction of the separate level crossing of main road No 38 and railway main line 100 in Nyíregyháza.
- Construction of intermodal hub in Nyíregyháza at railway station.

ROMANIA

- Modernisation of line 300/400: Apahida - Dej - Baia Mare - Satu Mare (minor repairs, electrification in phase 2).
- Modernisation of line 409 Câmpulung la Tisa - Valea Vişeuului.
- Metropolitan train Baia Mare (Baia Mare - Tăuții Măghereuş - Seini / Baia Mare – Ulmeni).
- Metropolitan / touristic train Sighetu Marmăţiei – Borşa.
- Construction of a railway lined between Baia Mare and the Maramureş International Airport.
- Study for the extension of the regional railway network (Baia Mare - Târgu Lăpuş - Dej / Baia Mare - Sighetu Marmăţiei).
- Modernisation of the Halmeu train station and logistic terminal.
- Establishment of cross-border passenger rail routes: Satu Mare – Petea – Csengersima – Csenger / Municipiul Carei – Urziceni – Merk.
- Modernisation of the Baia Mare central railway station (intermodal hub and bus terminal).

- Extension of the 402 line till Hungary (connection to line 113/114).
- Ensuring cross-border connections RO-UA road – railway (RO – LA) at Câmpulung la Tisa /Teresva and/or Valea Vişeuului/Berlibas) - pilot project.

UKRAINE

- Reconstruction of the Rakhiv - Valea Vişeuului railway (already completed by Ukrzaliznytsia to Dilove) - Sighetu Marmăţiei - Câmpulung la Tisa, considering the preparation of a prefeasibility study for the restoration of the European gauge along the Krakow-Lviv-Ivano-Frankivsk-Chernivtsi-Suceava-Iaşi-Chişinău route, in accordance with the aforementioned decision of the European Commission and EIB dated October 21, 2022).
- Relaunch the transportation of both cargo and passengers through Teresva-Câmpulung la Tisa, Sighetu Marmăţiei, Valea Vişeuului/Dilove.
- Electrification of the 1520 mm railway track gauge from Uzhhorod (Kosice) through Teresva – Sighetu-Marmăţiei - Rakhiv - Kolomyia to Chernivtsi and Ivano-Frankivsk after the restoration of freight and passenger traffic on the Teresva/Câmpulung Tisa – Dilove/Valya Vyshneva section.
- Introduction of a "rail bus" for local cross-border connections in the Uzhhorod – Kosice – Mukachevo – Záhony – Satu Mare and Chernivtsi – Suceava zones, with temporary use of adjustable wheelsets (until transition to the standard 1435 mm gauge) and experimental application of electric battery and hydrogen propulsion capabilities.
- Installation of a gauge-changing mechanism from Ukrainian to European gauge at the stations of Valea Vişeuului or Dilove in order to establish the Ivano-Frankivsk - Bucharest route using existing infrastructure.
- Procurement of rolling stock with gauge-changing capability, drawing on the experience of Spain (Talgo company).
- Reconstruction of the narrow-gauge Irshava-Berehove railway line to standard gauge in order to establish regular connections with Irshava (by electric train).
- Reconstruction/launch of railway connection between Solotvyno and Velykyi Bychkiv.
- Building of the 1435 mm gauge Chop – Uzhhorod, Pavlovo – Uzhhorod, Rakhiv - Valea Vişeuului railway.
- Utilizing the best global experience for the development of Ukraine's transportation sector, improving the quality and reliability of transportation and logistics services, taking into account Ukraine's external economic and regional connections.
- Developing multimodal transportation technologies and infrastructure complexes for various modes of transportation, including combinations such as "aviation-railway-road" and "waterway-railway-road."
- Ensuring comprehensive innovative development of transportation, including the implementation of a state strategy (targeted approach) for innovative development and investment projects in the transportation sector.

SLOVAKIA

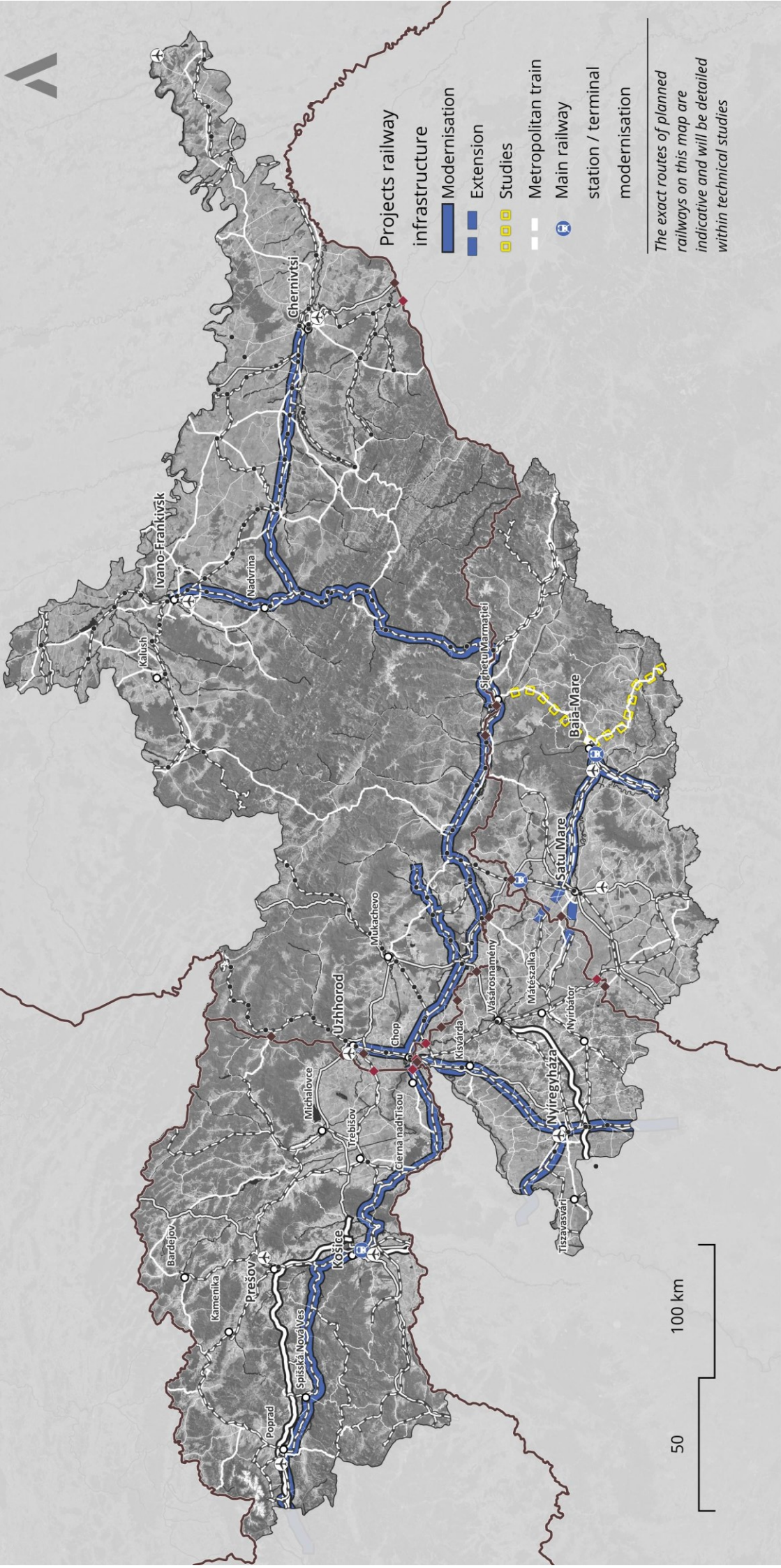
- Modernisation of the Žilina - Košice – Trebišov/Čierna nad Tisou railway line. The use of the existing 1520mm railway track from Uzhhorod to Kosice will allow for the continuation of

some long-distance internal Ukrainian trains traveling to Uzhhorod, as well as regional trains providing connections between this part of Slovakia and the stations of Romanian Maramureş through Ukraine and to Kosice International Airport.

- Modernisation of the Košice railway station (ERTMS and track configuration).
- Modernisation of the Košice – Hidasnémeti - Miskolc railway.
- Electrification and upgrade of the Railway between Slovenske Nove Mesto – Sátoraljaújhely railway.
- Modernization of the broad-gauge line Haniska – Maťovské Vojkovce, including transshipment points near Košice and Dobra.

CROSS-BORDER AREA

- Modernisation of secondary railway lines.
- Upgrade of secondary train stations as local intermodal hubs.



- National border
- Populated places**
- o Main cities in the study area
- Waterways**
- Lakes

- Rivers
- Transportation**
- Motorway
- European road
- Primary roads

- Secondary roads
- Tertiary roads
- Railways
- Railway stations
- Airports

- Cross-border points**
- Rail-crossing
- Road-crossing

The exact routes of planned railways on this map are indicative and will be detailed within technical studies

3. PUBLIC TRANSPORT

3.1. MAIN CHALLENGES

The cross-border regions are in different stages of the development and improvement of passenger transport services and, as such, face different challenges.

Though current European trends focus more on improving user experience for public transport passengers, it is important to note that eastern European countries still face challenges with maintaining a good quality infrastructure, particularly in rural areas, which then affects the possibility to connect certain areas to main urban centres.

In Chernivtsi, Ivano-Frankivsk, and Zakarpattia regions of Ukraine the main challenges are related to ensuring a higher quality of road infrastructure for the provision of safe passenger services and enhancing the regulatory and monitoring capacity of local/regional authorities responsible for passenger transport services. Ukraine has not aligned itself to the EU Regulation 1370/2007 concerning the provision of passenger transport services and the market for the provision of bus services has a commercial nature. In this context it is difficult for local / regional authorities to work with operators and improve the attractiveness and predictability of services, being more equipped to influence the territorial coverage of the services.

As passenger transport on the road network is highly influenced by the quality of roads, in the 3 Ukrainian cross-border regions, the quality of infrastructure is affecting the possibility to provide safe, predictable transport services. This led to residents of rural areas facing a decrease in the standard of living due to the lack of regular provision of transport services.

In contrast, in Maramureş some of the rural settlements are connected through roads with lower quality infrastructure, but here ample rehabilitation of the road network has been possible using European funding and national programs and these investments have been focused on roads with public transport services.

Alignment with the EU regulation, particularly the development of public contract services at local or county level (i.e. between local authorities and one or more transport operators) ensuring free market competition, combined with the prioritization of road rehabilitation on public transport routes would set the basis for a higher level of quality of bus public transport. In parallel, Chernivtsi, Ivano-Frankivsk, and Zakarpattia regions should continue knowledge exchanges within the cross-border region in order to adapt faster to future challenges, which some of their neighbours have already faced.

In Maramureş, the county services are characterized by good coverage and a program well-tailored to user needs, but face challenges concerning amenities for users, particularly comfortable bus stops in rural areas and the provision of easy-to-use information about the routes and circulation schedule. Satu Mare faces similar difficulties as lack of information limits the number of users. Additionally, it faces further challenges related to low frequency of transport services, low speeds of transport, congestion on transport.

Problems in the Eastern Slovak Region are focused more on improving the efficiency of services, because bus transport is organized according to user demand and unprofitable routes are being cancelled, which can affect the coverage of the territory and attracting first

time users. The counties deal with a continuous loss of passengers to individual car transport (ICT), especially those paying a full fare, which is causing significant losses in public passenger transport (PPT) revenues. Also, their legislative / institutional improvement needs are different from those of the Ukrainian regions and focuses more on improving integration and the use of ITS for better services.

The need and potential to improve the level of integration and use the intermodality potential of transport services has also been observed in Maramureş and Satu Mare.

3.2. MAIN PROJECTS

HUNGARY

- Green Bus Program - In urban public transport, only electrically powered buses can be introduced as new vehicles. Nyíregyháza will have 21 electric buses by the end of 2023.
- By merging the national railway company and the national bus company, a coordinated public transport service will be provided at interurban and regional level. In the integrated system, fares for services will be standardised.
- Development of the Nyíregyháza railway station as intermodal hub to integrate a bus terminal, construction of P&R.
- Modernisation of the central building of the Nyíregyháza railway station, located along the main railway line 100, which handles a lot of traffic.
- Relocation of the bus station from the city centre to an intermodal hub in Fehérgyarmat.
- Improving the passenger information system, placing information units at with a significant turnover bus stops.
- Construction of a regional bus station near the railway station in Nyírbátor. Construction of bus shelters (20), renovation of bus turnarounds (25) and bus shelters (50).

ROMANIA

- Park & Ride (P&R) terminals for Baia Mare (Piața Izvoare or str. Vasile Lucaciu and Gara CFR)
- County wide public transport application and platform (continuation of the Overcoming Barriers project) – phase 2 and 3 Mobility as a Service (MaaS)
- Airport bus lines Baia Mare - Maramureş International Airport / Satu Mare – Satu Mare International Airport
- Upgrade of urban central bus stations: Sighetu Marmației, Șomcuta Mare, Târgu Lăpuș, Borșa, Ulmeni and Seini.
- Testing a demand responsive transit system (DRT) for sparsely populated areas.
- Mogoșă bike-bus (equipping metropolitan buses with bicycle racks)
- Development of a touristic (hop-on / hop – off) bus network
- Metropolitan bus network (Borșa - Săliște de Sus – Dragomirești)

- Establishing a metropolitan transport system around Satu Mare.
- Development of the Satu Mare railway station as intermodal hub to integrate a bus terminal.
- Cross border bus routes: Sighetu Marmăției – Ukraine, Satu Mare – Petea – Csengersima – Csenger or Carei – Urziceni – Merk.

UKRAINE

- Combined rail-bus route Uzhhorod - Chop - Khust - Solotvyno with a transfer to the Solotvyno - Rakhiv bus using a single ticket (travel time: 5 hours).
- Electric bus routes for local cross-border connections between border cities in Zakarpattia and neighbouring EU countries (between cities with characteristics of passenger transport hubs). Promising directions include Uzhhorod-Michalovce, Mukachevo-Kosice, Berehove- Vásárosnamény, Mukachevo-Kisvarda- Nyíregyháza, Tiachiv-Baia Mare (subject to the checkpoint in Bila Tserkva), Mukachevo-Vynohradiv-Satu Mare. Implementation methods: 1/ Replacement of the bus fleet with electric buses along existing international routes; 2/ Introduction of new routes along prospective directions.
- Utilizing the best global experience for the development of Ukraine's transportation sector and improving the quality and reliability of transport and logistics services, taking into account Ukraine's external economic and regional connections.
- Developing multimodal transport technologies and infrastructure complexes for various modes of transportation, including combinations such as "aviation-railway-road" and "waterway-railway-road."
- Implementing a new approach to licensing road carriers and ensuring access procedures to the road transport market in accordance with existing European practices.
- Ensuring comprehensive innovative development of transport, including the implementation of a state strategy (targeted approach) for innovative development and investment projects in the transport sector.
- Creating conditions for the implementation of integrated information systems for passengers and cargo owners.
- Ensuring mobility and functioning of modern passenger transport. Developing multimodal passenger transportation and introducing a "single transport ticket."
- Introducing strategic transport planning in cities, suburban areas, and regions as part of their strategic planning, including efficient and convenient suburban connections to transport facilities (airports, railway stations, bus terminals, etc.).
- Using new technologies and intelligent transport systems to improve the quality of transport services, service information systems, and implementing an electronic and integrated automated fare collection system.
- Promoting increased urban mobility and developing a network of parking areas and passenger terminals for transferring from individual transport to public urban transport.

SLOVAKIA

- Terminals for Krásna (Košice), Michalany, Pribeník, Streda nad Bodrogom, Slanec, Čelovce, Kuzmice, Kalša, Čerhov, Čierna nad Tisou (including P&R, train and bus).
- In order to reduce the share of individual car transport, possibilities should be created for introducing an exemption for buses at selected border crossing points with Hungary.
- Introduction of direct trains Miskolc/Szerencs – Sátoraljaújhely – Trebišov, Uzhhorod/Mukachevo – Košice.

CROSS-BORDER AREA

- Public transport fleet renewal and decarbonization program.
- Development and upgrade of intermodal hubs (including P&R facilities).
- Development of dedicated bus / tram lines.
- Development of regional / county / oblast wide integrated public transport applications and platforms (transition to MaaS).
- Modernization / building of bus stations and local mobility hubs in rural areas.

4. ROAD NETWORK

4.1. MAIN CHALLENGES

The main road transport corridors in the cross-border region follow an east-west direction connecting Ukrainian regions to central Europe, the Baltic Sea, the Black Sea and Aegean Seas via Slovakia (Prešov – Košice and Uzhhorod) or Hungary (Miskolc) but bypassing Romania. The Prešov – Košice urban system acts as a major road transport hub in the region, being crossed by 3 TEN-T corridors: Rhine-Danube, Baltic-Black-Aegean Sea and Baltic-Adriatic Sea)⁴. Other major cities in the region are not crossed by the main road TEN-T corridors. Only Nyíregyháza and Chernivtsi are also part of the TEN-T core network while the other main cities of the cross-border region (Satu Mare or Baia Mare) are only connected to the TEN-T comprehensive network. Meanwhile, Ivano-Frankivsk is not linked directly to the TEN-T network. While it is beneficial for the cross-border region to be connected to the main TEN-T corridors, the actual layout does not favour the flow of goods and passengers within the region.

The TEN-T network is transposed at local level by motorways, express roads or in some cases (where traffic is lower) national roads. Three motorway and express road network of the cross-border region is still mostly under construction with only several segments finished, mostly along major transport routes such as: Zilina – Prešov – Košice – Miskolc or Budapest – Nyíregyháza – Nyírmada (Vásárosnamény). This intraregional network relies on four major transport corridors, taking the shape of a parallelogram:

1. North-South: Prešov – Košice – Miskolc,
2. North-South: Ivano-Frankivsk – Baia Mare,
3. East-West: Baia Mare – Satu Mare – Nyíregyháza,
4. East-West: Ivano-Frankivsk - Košice (with a slight detour to Stryi or Dolyna).

At the same time, in the southeast area of the MOBI project area around the junction of Ivano-Frankivsk and Chernivtsi regions of Ukraine and Maramureş and Suceava counties of Romania, there are only two roads in Romania, that connect the counties through Borşa, Iacobenj, and Gura Humorului. Railway lines from the border crossing point Dilove - Valea Vişeuului to Borşa and from the border crossing point Vadul Siret - Vikshany to Putna and Brodina (which before World War II reached Ruska and Selyatyn in Ukraine) have remained parallel to them. In the Ukrainian territory, Chernivtsi and Ivano-Frankivsk regions are connected in the border areas by interregional roads P 62 from Chernivtsi to Kryvorivnya, P 24 from Kryvorivnya to Tatariv and then by national road N-09 through Rakhiv and border crossing points in Dovhe and Solotvyno, and from Mukachevo to Chop and Uzhhorod. Parallel to these roads, there are railways from the border crossing point Vadul Siret through Hlyboka and Storozhynets to Berehomet and from Chernivtsi to Vyzhnytsia (which before World War II reached Tudylovo in Ivano-Frankivsk).

The main connectivity issues in the road network of the cross-border region are between Hungary / Slovakia and Romania/Ukraine where the capacity of the road network is reduced, and congestions is higher. Border issues between Romania and Ukraine are caused by the

⁴ EC. Proposal for the revision of the TEN-T network COM2021/812 – COM2022/384

difficult relief of the Carpathian Mountains which are hard (especially cost intensive) to cross with high-capacity roads. This is than doubled by the need to also cross the Tisza River which is separating the two countries.

Main traffic jams in the cross-border road network are:

- On N-S Ivano- Frankivsk – Baia Mare there is no motorway, only a national road with 1 lane per direction and multiple chicanes due to the relief,
- On E-W Baia Mare – Satu Mare – Nyíregyháza the motorway stops after Nyírmada, before Vásárosnamény (HU). There is not high-capacity road linking Satu Mare and Maramureş counties to Szabolcs-Szatmár-Bereg,
- On E-W Ivano- Frankivsk – Košice there are no motorways in place, only national roads with 1 lane per direction and multiple chicanes due to the relief.

With large flows of goods towards Uzhhorod it is important to have alternative routes. One of these is Chop which now benefits of a direct connection only to Hungary while only a 4-5km missing link could also connect the M06 road (UA) directly to Slovakia following the state road 79. Similar missing links are also visible in the Romania-Ukraine border, between Teceu Mic and Tiachiv, Valea Vişeuului and Dilove while the only bridge passing the Tisza does not support freight. These dysfunctional or inexistent crossings greatly affect the performance of the north-south corridor from Baia Mare to Ivano- Frankivsk and Chernivtsi.

While the main road transport network is still being built, county /district / oblast roads still need upgrades and maintenance. This is especially valid in remote mountain areas such as the Carpathian Mountains between Romania and Ukraine where the roads have to pass difficult terrain and serve a low amount of people and businesses (ex a missing link between Lopuhovo and Chorna Tysa - the “Upper Zakarpattia road”). A reduced connectivity seems to be an issue not just in remote areas but also along the border where multiple roads are not interconnected, especially between Ukraine and Romania and Romania and Hungary (ex. Csengerújfalú – Boghiş or Nagyhódos and Velyka Palad).

There also multiple cities in the cross-border region that don't have beltways and are crossed by intense flows of freight traffic, especially near the border. This greatly reduces road safety, generates congestion and increases pollution (especially GHG emissions) and thus significantly deteriorates the quality of living. This is particularly a problem in larger cities such as Baia Mare, Košice or Chernivtsi but also smaller cities like Carei, Sighetu Marmăţiei, Şomcuta Mare, Berehove or Nadvirna.

Most county / district / oblast roads lack adequate sidewalks or cycling infrastructure while road safety remains an important concern, especially in and around major cities and in relation to vulnerable traffic participants such as pedestrians and cyclists. This calls for a new approach to road design developed around the Vision Zero concept and with a focus on traffic calming (especially in vulnerable areas such as schools) and more attention dedicated towards pedestrian and cycling infrastructure.

4.2. MAIN PROJECTS

HUNGARY

- Construction of the M34 expressway, which will connect Vásárosnamény with Záhony as a continuation of the M3 to Ukraine.
- Construction of the M49 motorway as a connection between M3 (Budapest – Nyíregyháza) and the Romanian border (Csenger – Vetiş).
- Upgrading of the main road No 4 between Debrecen – Újfehértó – Nyíregyháza section and construction of a bypass road around Újfehértó.
- Development of road link between settlements Nagyhódos and Velyka Palad (including a bridge and border crossing).
- Construction of the southern bypass for Kisvárda.
- Construction of the northern and southern section of the bypass road for Nyírbátor.
- Construction of a link road between Geszteréd and Újfehértó (4.5 km).
- Construction of a link road between Nyírbátor – Nyírderzs – Hodász settlements.
- Preparation of a new Tisza road bridge between Záhony (HU) and Chop (UA).
- Preparation and construction of a new Tisza road bridge between Záhony (HU) and Male Trakany (SK).
- New bridge across Tisa river at Vasárosnamény on M3 motorway.
- Construction of a new Tisza road bridge at Tivadar.
- Preparation and construction of the new bridge over the Szamos between Olcsava and Olcsvaapáti.
- Renovation of the Kraszna bridge and the road near Vállaj.
- Reconstruction and upgrading of the Nyíregyháza - Beregsurány primary main road (No 41).
- Reconstruction and upgrading of the Rohod – Mátészalka – Csengersima secondary main road (No 49).

ROMANIA

- Construction of the Northern Motorway (Satu Mare – Baia Mare express road) with a possible extension to Petea (border crossing).
- Construction of the Satu Mare – Veliş - Csenger express road (including border crossing)
- Extension of DJ 183 road from Poienile de Sub Munte till the Ukraine border (including border crossing)
- Sighetu Marmaşiei bypass and new bridge over the Tisza River towards Bila Tserkva in Ukraine (including border crossing)
- Construction of the Baia Mare – Jibou express road

- Modernization of county road DJ 193 satu mare-borlești-maramureș county border, km 1+300-41+300"

UKRAINE

- Construction of a highway on the section from the state border with Slovakia (D1 Košice – Uzhhorod) to highway M-06 Kyiv – Chop.
- Construction of a highway on the section from the state border with Hungary (M3 Beregdaróc – Dyida) to highway M-24 Mukachevo-Berehovo-Luzhanka.
- Construction of a highway on the section from the state border with Romania to highway H-09 Mukachevo-Rakhiv-Rohatyn-Lviv (Bila Tserkva village).
- Construction of a road section between Solomonovo (UA) and Čierna (SK) (including border crossing).
- Development of road link between settlements Péterfalva and Velyka Palad with bridge construction.
- Construction of roads to develop tourism and recreation between neighbouring territories of Zakarpattia, Lviv and Ivano-Frankivsk regions:

SLOVAKIA

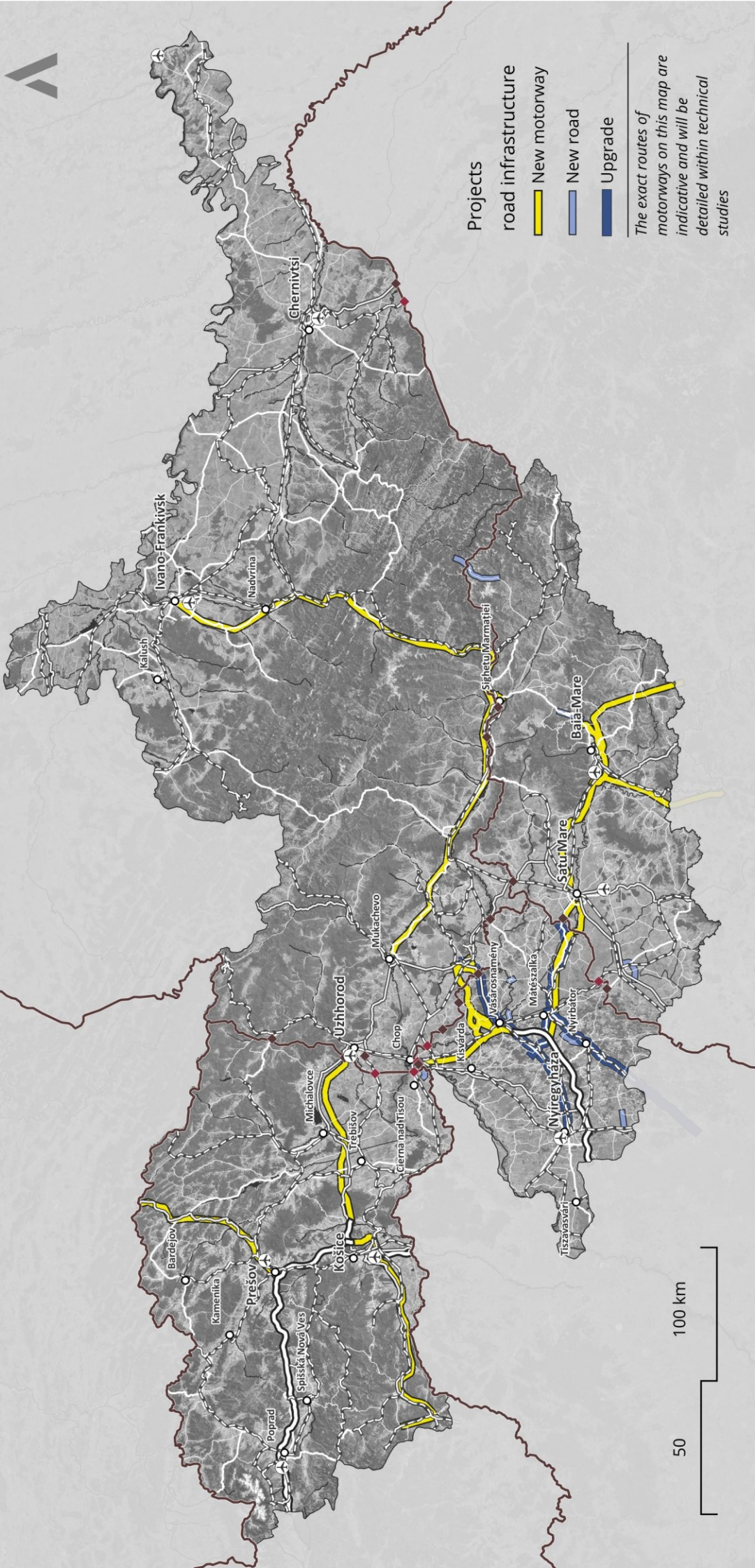
- Construction of the D1 motorway between Košice and Uzhhorod.
- Construction of the R4 motorway between Prešov and Vyšný Komárnik.
- Construction of the R4 motorway – Košice bypass.
- Construction of the R2 motorway between Košice and Lučenec.
- Rest area with parking lot on road I/19 Vyšné Nemecké.

CROSS-BORDER AREA

- Design guidelines for “complete”⁵ roads.
- Regional programme for upgrading of county / district / oblast roads.
- Regional programme for building beltways along cities crossed by heavy traffic (Carei, Negrești-Oaș, Ardud, Livada, Nadvirna, Ulmeni, Berehove, Kisvárd, Baia Mare, Copalnic Mănăștur, Căvnic, Borșa, Vișeu de Sus, Sighetu Marmăției, Șomcuta Mare).
- Regional programme for improving roads safety (focus on main roads and “black points”⁶).

⁵ County roads based on design features that pay more attention to pedestrians and cyclists

⁶ The „black dot” represents the segment of public road that has a higher rate of road accidents than the average rate of registered accidents on which, in a period of 5 consecutive years, there have been at least 10 serious traffic accidents, resulting in at least 10 dead or seriously injured people.



Projects
road infrastructure
 New motorway
 New road
 Upgrade

The exact routes of motorways on this map are indicative and will be detailed within technical studies

- National border
- Populated places**
 - Main cities in the study area
 - Urban areas
 - Study area
- Waterways**
 - Lakes
 - Rivers
- Transportation**
 - Motorway
 - European road
 - Primary roads
 - Secondary roads
 - Tertiary roads
 - Railways
 - Airports
- Cross-border points**
 - Rail-crossing
 - Road-crossing

5. WATERWAYS

5.1. MAIN CHALLENGES

The inland waterways are one of the less developed transport networks in the cross-border region and therefore now rivers are part of the TEN-T (core or comprehensive) network. The Tisza and the Someş are the main rivers in the region but none of them are used for freight nowadays. Nevertheless, both have a tradition as being important arteries in waterborne transport: the Someş was used for transporting salt from the Dej mines towards Hungary while the Tisza, along the Romanian – Ukrainian border, has been used to transport wood harvested in the area. Due to climate change and longer periods of draught using the inland waterways for the transport of goods becomes more and more difficult. However, within the Danube strategy there are studies being prepared to analyse the opportunity to transform the Tisza River into a class IV waterway, this could activate several ports along the river (ex. the Záhony – Chop port).

Leisure seems to be the main transport related role of inland waterways in the region. For example, in Szabolcs-Szatmár-Bereg the Tisza river is used for canoe between "Vylok - Tiszabecs" while in the Prešov Region the Dunajec river includes two touristic ports: Červený Kláštor and Lesnica. The Someş river, in the Satu Mare area is also used quite often for kayak trips or trainings.

While the Tisza River is an important barrier in the continuity of communication channels, there are no ferries border crossing points along it. Several options are being analysed for such services such as: Solovka – Tiszaszentmárton, Badalovo - Szatmárcseke or Vary - Tizsakóród.

5.2. MAIN PROJECTS

HUNGARY

- New ferry crossings, namely: Vary – Tizsakóród, Badalovo - Szatmárcseke and Tiszaszentmárton – Solovka.

UKRAINE

- Creation of a national segment of the information exchange system for vessel traffic and activities of economic entities in the maritime shipping sector. Integration into the European information system.
- Acquisition of maritime/river search and rescue units and establishment of infrastructure for their base.
- Progressive liberalization of freight transport on inland waterways, opening of inland waterways for foreign vessels. Review of policies on the formation of river tariffs and fees to stimulate the development of inland water transport.
- Improvement of transportation (river) connection in the Upper Tisza River Basin, specifically in Ukraine, Hungary, and Slovakia.

- Carrying out a technical and economic study to determine the potential of navigation on Tisza river in the Chop-Záhony area and research on the possibilities of building a river port.

ROMANIA

- Feasibility study to identify the navigation potential of the Someş river.

CROSS-BORDER ASPECT

- Development of touristic ports and leisure activities along the rivers in the cross-border region.
- Further development of ferry services to improve connectivity along rivers.

6. AIR TRANSPORT

6.1. MAIN CHALLENGES

The main airports in the cross-border area are Maramureş International Airport (Baia Mare), Satu Mare International Airport (Satu Mare), Debrecen International Airport (Debrecen), Uzhhorod International Airport (Uzhhorod), Ivano-Frankivsk International Airport (Ivano-Frankivsk), Košice Airport (Košice) and Poprad-Tatry International Airport (Poprad). Unfortunately, there are no flights between cities in the cross-border region, as they only have connections to other major cities/transport hubs in Europe. The need for air transport is generally supported by the long journey times caused by the still incomplete motorway network in the region and the congestion caused by border crossings.

The two airports located in Satu Mare and Maramureş counties, although slowly recovering from the restrictions associated with the Covid 19 pandemic but remain the smallest airports in terms of passengers transported (under 75.000 passengers / year per airport) in Romania. They both serve the north-western part of Romania while being only 65 km apart from each other. While the Satu Mare International Airport manages to also serve localities from Hungary, the Maramureş International Airport (near Baia Mare) is mostly targeting tourists visiting the Maramureş touristic area. Both airports are in direct competition with larger airports in the region such as: Avram Iancu International Airport (Cluj-Napoca) and Debrecen International Airport in Hungary. These two airports are 2-3 hours away from most cities and offer a larger variety of international flights, including links to main European gateway airports. Currently, none of the two Romanian airports is connected to the main city via a public transport line.

Uzhhorod Airport has the opportunity to carry out the maintenance of aircraft. The location of Uzhhorod airport is very attractive for small aircraft as many such aircrafts are planning the flights to the Balkans via this airport. The main obstacle for the development of Uzhhorod airport is its proximity to the border of Slovakia. This fact makes it possible to operate the landing and departure of aircraft only using the airspace of Slovakia. By 2016, a specific agreement was in force between Ukraine and the Slovak Republic, which made it possible to operate the necessary part of the airspace of the Slovak Republic for landing of aircraft. By 2016, Uzhhorod Airport could operate to 15,000 passengers annually. Now a new agreement is being formed between Ukraine and the Slovak Republic, which will allow the restoration of regular air traffic.

International Ivano-Frankivsk Airport operates in the regional centre with a capacity of 120 people/hour, which can receive all types of aircraft. The airport receives and dispatches aircraft (serves regular, charter, domestic, international passenger, and letter flights and performs the functions of a spare for Lviv airport), carry out their commercial, ground, and technical maintenance, services for passengers, baggage, mail, and cargo. The potential of the Chernivtsi International Airport is also similar. The first plane landed on its territory in 1910. It was built in 1930-1936, and in 1939, the Polish military aviation was interned to Romania through it. Its international status was restored in 2002, and in 2021, at the

Investment Forum "Ukraine - Invest 2030," the development of the Uzhhorod and Chernivtsi airports as international regional airports was announced.

The International Poprad–Tatry Airport provides air connections to the Prešov region. After a complete reconstruction carried out in 1992, regular and irregular passenger and cargo transport, as well as sightseeing flights are carried out from it. Together with Košice Airport, the Poprad-Tatry Airport belongs to the aggregate network of airports of the Trans-European Transport Network TEN-T Core. There are several airports of regional importance in the Prešov Region, which are mainly used for support purposes. These are the airports in Svidník, Mlynica, Kamenica nad Cirochou and Ražňany.

6.2. MAIN PROJECTS

HUNGARY

- Upgrade of the Nyíregyháza airport – construction of a new 1500 m runway.

ROMANIA

- Upgrade of the Maramureş International Airport.
- Bus line to the Maramureş international airport.
- Rail link (1 km) to the Maramureş international airport (long term).
- Rehabilitation and modernisation of airport infrastructure for the Satu Mare International Airport - construction of a new passenger and a cargo terminal and an airplane hangar for the Satu Mare International Airport.

UKRAINE

- Development of a Ukraine – Slovakia agreement for restoration of regular air traffic on the Uzhhorod.
- Design and construction of an airport in the Zakarpattia region with a passenger capacity of 500,000 passengers per year (State Targeted Program for Airport Development).
- Modernisation works at airports (Uzhhorod, Ivano-Frankivsk and Chernivtsi).
- Construction of a network of airfields and runways in regional communities and important mountain tourist-recreational centres, ensuring sustainable connectivity with regional and international airports.
- Increase in the capacity of Ukraine's airspace through the introduction of Free Route Airspace (FRA) and navigation technologies based on GNSS.
- Development of terminal passenger and cargo complexes with multimodal technologies through the involvement of their owners and/or public-private partnerships, ensuring international quality service standards for passengers.
- Reconstruction of runways and comprehensive upgrading of equipment in regional airports to enable the operation of medium-haul aircraft and, if necessary, wide-body aircraft, in accordance with European legislation.
- Development of domestic aviation transportation, including the modernization of Ukraine's regional airports and aerodromes, with the involvement of international

credit programs and grants to reduce costs and increase the accessibility of airport services.

- Creation of favourable conditions to attract more airlines for international and domestic air transportation, including low-cost carriers.
- Acquisition of aviation search and rescue units and establishment of infrastructure for their base.
- Deregulation of economic activities of regional airports with passenger traffic up to 5 million passengers, in accordance with relevant EU legislation.

SLOVAKIA

- Completion, modernization, lengthening and widening of the existing runway of the Košice International Airport.
- Prešov airport Poprad Tatry – runway modernization.
- Construction of a freight transport centre with CARGO operation at the airport in Košice with special road and siding connections.
- Completion and equipment of the airport in Spišská Nová Ves as an airport of local importance.

7. BORDER CROSSING

7.1. MAIN CHALLENGES

A good distribution of cross-border check points is essential to ensure a decent flow of persons and goods within the cross-border region. Chop – Záhony, Csengerisma - Petea (close to 3 mil persons / year or 1 mil cars) and Uzhhorod - Vyšne Nemecke are the busiest checkpoints. At the moment, most border crossing points are concentrated between Hungary – Ukraine and Slovakia – Ukraine while between Romania and Ukraine there are more than 160 km of border without checkpoints, between Valea Vișeuului and Valea Siretului. Indeed, this area is crossed by the Carpathian Mountain range and is less inhabited. This low amount of border crossings creates a strong pressure on the Sighetu Marmăției border checkpoint, a bridge that needs urgent repairs and does not permit freight to pass at the moment. To improve cross-border mobility a bypass and a new bridge over the Tisza River is being built between Sighetu Marmăției and Bila Tserkva. The construction of the international border crossing point between Bila Tserkva (Ukraine) and Sighetu-Marmăției (Romania) is included in the Action Plan for the reconstruction and modernization of border crossing points, and the draft Agreement at the intergovernmental level between Ukraine and Romania in the form (exchange of notes) has already been approved.

Problems with cross-border connectivity occur also along the border between Hungary and Romania, which is only served by 4 border crossing points (3 for cars and 1 for trains)⁷ while there are multiple missing rail and road missing links that could reduce the queues at main border checkpoints. This also applies to Prešov and Zakarpattia where line 196 stops a few kilometres away from the border.

There are no ferry border crossing points even if the Tisza forms a more than 50 km long border between Romania and Ukraine and several 10-15 km border segments between Hungary and Ukraine or the main border between the Košice region and Szabolcs-Szatmár-Bereg county.

The analysis of existing interstate agreements that regulate the opening and functioning of border crossing points has shown that these documents need updating, as decisions at the national level are based on them, and there is currently the lack of consistency between visions of development at the regional level, targeted programs for the development of checkpoint infrastructure at the national level, and interstate agreements.

The reconstruction and modernization of border crossing points are key, but not the only factors for mobility development. The Program documents for the implementation of an integrated border management system include the following provisions:

- Introduction of advanced technologies and information support for transportation, including the creation of a unified information system for technological interaction

⁷ During the Covid 19 Pandemic 3 additional border crossing points (Bercu- Garbolc, Peleş – Zajta and Horea – Ömböly) have been temporarily opened to reduce the pressure on the Petea border crossing point. These are now active only 1 day / week.

between different modes of transport, cargo owners, freight forwarders, customs, and state control authorities in transportation and at border crossing points.

- Improvement of border management between Ukraine and EU member states, enhancing the functioning of border crossing procedures at border checkpoints, reducing passenger waiting times, and creating better conditions for movement.

7.2. MAIN PROJECTS

This section includes both proposals provided at the regional level and planned measures included in national-level program documents. It is important to note that the projects for the development of border crossing points mentioned in this section should be present in the texts of interstate agreements, as well as in the relevant target programs and action plans.

HUNGARY / ROMANIA

- Vetiș - Csenger road border crossing (related to the new motorway).
- Construction of a railway border crossing between Zajta and Peles or Csenger and Oar (including railway extension).
- Construction of a road border crossing between Garbolc and Bercu.
- Streamlining the surveillance and verification activity at the border control points "Schengen Bus".

UKRAINE / ROMANIA

- Upgrade of Halmeu railway station and terminal and border checkpoint (2 entrances and exits).
- Installing weight in motion (WIM) systems in Romanian border crossing points: Halmeu, Petea and Urziceni.
- Ensuring RO-UA cross-border links by road - railway (Ruma - Luiziana) at Câmpulung la Tisa / Teresva and / or Valea Vișeuului / Berlibas.
- Diakove checkpoint: construction of the checkpoint, including a video control and weighing system; installation of a stationary type scanning system for the inspection of passenger vehicles; installation of a stationary type scanning system for the inspection of cargo vehicles and containers.
- Bila Tserkva checkpoint: construction of the checkpoint, including a video control and weighing system; installation of a stationary type scanning system for the inspection of passenger vehicles; installation of a stationary type scanning system for the inspection of cargo vehicles and containers.
- Ruska checkpoint: construction of the checkpoint, including a video control and weighing system; installation of a stationary type scanning system for the inspection of passenger vehicles.
- Krasnoilsk checkpoint: reconstruction of the checkpoint, including a video control and weighing system; installation of a stationary type scanning system for the inspection of passenger vehicles.

- Porubne checkpoint (passenger section, modernization and technical re-equipment of the checkpoint): construction of canopies over customs control zones; reconstruction of in-depth inspection boxes; installation of a stationary type scanning system for the inspection of passenger vehicles; installation of an intelligent video control system; arrangement of weighing complexes for weighing passenger vehicles in motion (up to 5 tons) at the entrance and exit.
- Diakivtsi checkpoint: reconstruction of the checkpoint, including a video surveillance system and weighing, installation of a stationary type scanning system for the inspection of passenger vehicles.
- Checkpoint Tiachiv - Malyi Tiachiv or Checkpoint Yablunivka-Remety (requires consideration and inclusion in the action plan).
- Khyzha-Tarna Mare checkpoint (requires consideration and inclusion in the action plan).

HUNGARY / UKRAINE

- Ferry border crossings: Vary-Tizsakóród or Badalovo – Szatmárcseke.
- Construction of the Dyjda - Beregdaróc checkpoint (linked to the M3 motorway).
- Preparation of new bridge across Tisza River at Lónya and between Záhony and Chop.
- Solovka - Eperjeske checkpoint (ferry / road).
- Construction of a road (bridge) crossing point Chop - Cherna-nad-Tisou.
- Chop - Záhony crossing point (cycling and pedestrians).
- Chop checkpoint: (modernization and technical re-equipment of the international vehicle checkpoint, capital repair of infrastructure facilities; construction of a warehouse for confiscated goods; installation of a stationary type scanning system for motor vehicles inspection; installation of an intelligent video control system).
- Dzvinkove checkpoint: (construction of the checkpoint, including a video control and weighing system; installation of a stationary scanning system for the inspection of passenger vehicles).
- Kosyno checkpoint: (construction of the checkpoint, including a video control and weighing system; installation of a stationary scanning system for the inspection of passenger vehicles).
- Dyjda checkpoint: (construction of the checkpoint, including a video control and weighing system; installation of a stationary type scanning system for the inspection of passenger vehicles; installation of a stationary type scanning system for the inspection of cargo vehicles and containers).
- Luzhanka checkpoint: (reconstruction of the checkpoint, including a video control and weighing system; installation of a stationary type scanning system for the inspection

of passenger vehicles; installation of a stationary type scanning system for the inspection of cargo vehicles and containers).

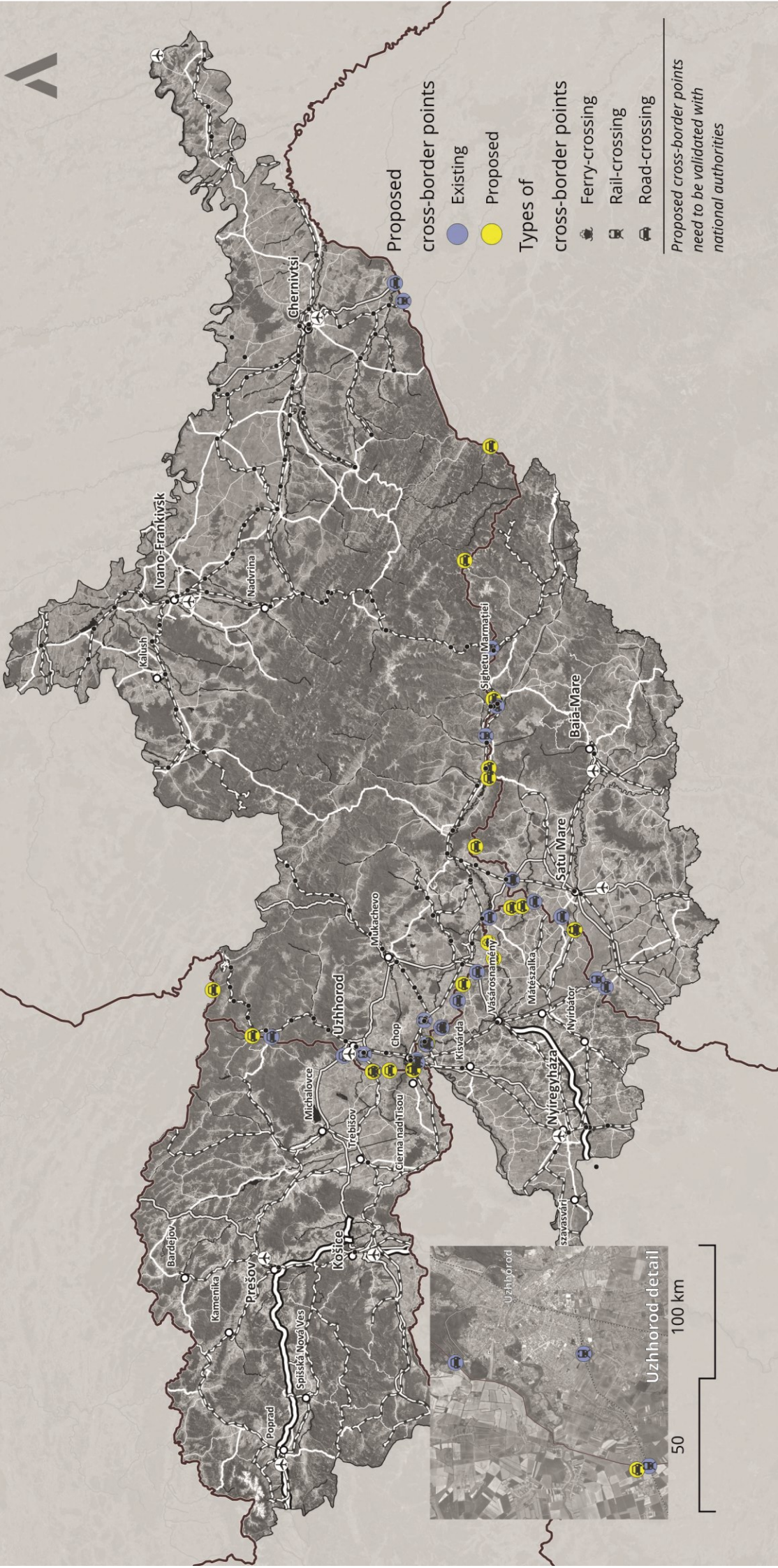
- Vylok checkpoint: (reconstruction of the checkpoint, including the video control and weighing system; installation of a stationary scanning system for the inspection of passenger vehicles).

SLOVAKIA / HUNGARY

- Upgrade of SK/HU border crossing points to ensure the crossing of busses (3.5t).
- Hostóvce-Tornanádaska (HU - also for freight transport up to 12 t with connection to R2).

SLOVAKIA / UKRAINE / POLAND

- Lubnia-Volosate checkpoint (and the road leading to it). The construction of a new border crossing point called "Lubnia-Volosate" and the development of the associated road and transport infrastructure are planned. The goal is to create better opportunities for cross-border mobility, particularly along the path of tourism development.
- Vyšné Nemecké – Uzhhorod (pedestrians and cyclists). To achieve this goal, it is necessary to make amendments to the intergovernmental agreement.
- Čierna - Solomonovo (UA).
- Lekárovce - Botfalva (UA).
- Uzhhorod checkpoint: modernization and technical re-equipment of the international vehicle checkpoint, reconstruction of the passenger section of the checkpoint, including the video control and weighing system; installation of a stationary scanning system for the inspection of passenger vehicles, installation of an intelligent video control system (freight direction), restoration of canopies on the cargo area construction of a warehouse for confiscated goods).



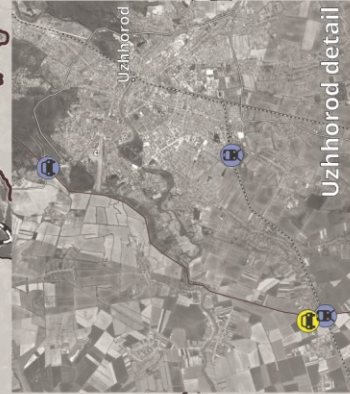
Proposed cross-border points

- Existing
- Proposed

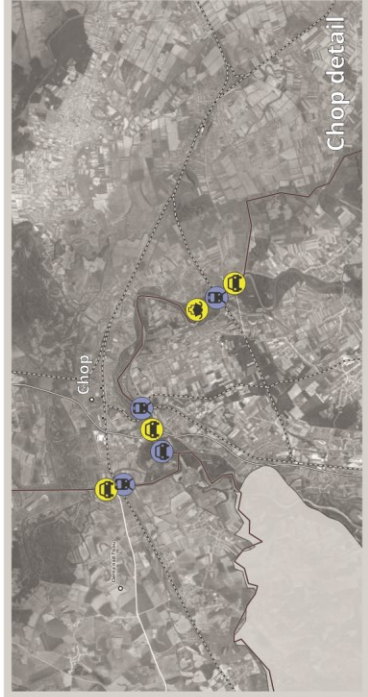
Types of cross-border points

- 🚢 Ferry-crossing
- 🚆 Rail-crossing
- 🚗 Road-crossing

Proposed cross-border points need to be validated with national authorities



50 100 km



Chop detail

- National border
- Populated places
- Main cities in the study area
- Waterways
- Lakes
- Rivers
- Transportation
- Motorway
- European road
- Primary roads
- Secondary roads
- Tertiary roads
- Railways
- Railway stations
- ✈ Airports

8. TRANSITION TO ALTERNATIVE FUELS

8.1. MAIN CHALLENGES

The transition to alternative non-polluting fuels is essential for the next 10 years to meet Paris Agreement and Green Deal targets and to counter climate change while combating the rapid degradation of air quality in major cities and the limited availability of petrol. In 2019 most of the cross-border region was beyond the EU average regarding the uptake of electric vehicles⁸ (no data on Ukraine). In 2020 Szabolcs-Szatmár-Bereg county (HU), Košice and Prešov regions (SK) already managed to provide 5-10 charging stations / 1000 inhabitants while Satu Mare and Maramureş had less than 1 charging station / 1000 inhabitants.

In the last years investments in the transition to alternative fuels consisted mostly of acquisition of electric busses (or CNG Hungary), installing of electric vehicle charging stations and subsidies, usually from the government, for the acquisition of a new electric vehicle. At the moment each larger city in the cross-border region has at least 20-30 electric vehicle charging stations and a national network of charging stations positioned along main roads. The existing network of charging stations may be enough for the existing number of electric vehicles but is undersized for future expected demand. Investments are needed especially in Romanian and Ukrainian counties / oblasts where the main road network is not well covered with electric vehicle charging stations thus making it difficult for drivers to drive a longer distance with their electric vehicle. There are also various projects being planned for the uptake of hydrogen-based transport, especially in the Košice Region (Slovakia).

⁸ ICCT, 2021. Beyond major cities: Analysis of electric passenger car uptake in European rural regions

8.2. MAIN PROJECTS

HUNGARY

- Development of public charging infrastructure in main cities and along important roads and motorways.

ROMANIA

- Multiannual program for installing electric vehicle charging stations in Maramureş county (150 stations).
- Development of the public infrastructure for charging electric vehicles in the cities and communes of Satu Mare County.

Development of public transport system in Satu Mare county by transitioning to vehicles that use alternative fuels.

UKRAINE

- Implementation of economic incentives for the use of environmentally cleaner modes of transport, including electric vehicles, public electric transport such as metro, trams, trolleybuses, electric buses, as well as muscle-powered transport modes like bicycles (public bicycle rental systems), scooters, and their public rental systems.
- Increase the number of high-capacity fast charging stations along intercity highways in border areas (within a zone of 100 km from the border). The most optimal and expedient approach would be installing stations at existing petrol stations, which are characterized by high density of locations and access to power supply. Justification: all target countries tend to develop their infrastructure based on a "center-out" principle, considering border areas as peripheral. Therefore, infrastructure development lags behind compared to central and more densely populated regions of the countries.

Apart from building EV charging stations along main transport corridors, in touristic areas and urban / metropolitan the State Agency of Automobile Roads of Ukraine (Ukravtodor) Motor Roads and local self-government bodies should also take into consideration following principles when planning and implementing new road construction / modernisation projects:

- Include provisions in urban planning documentation to allocate space for the installation of high-power electric vehicle charging stations (50 kW and above) and charging hubs, and incorporate relevant requirements and provisions into urban planning documentation. Such locations should be planned in close proximity to international and national highways, on adjacent plots of land.
- When repairing or reconstructing a road or street that coincides with the highway corridor, include in the technical specifications and design requirements the laying of power cables of the corresponding capacity (or ducts for them) to the planned locations of EV charging stations or charging hubs.
- When constructing new commercial facilities of mass gravity (shopping malls, supermarkets, gas stations, water parks, etc.), especially along highways and at city entrances, include in the technical specifications and design requirements provisions for the construction of EV charging stations and the laying of power cables of the corresponding capacity.

SLOVAKIA

- Hydrogen Valley in Košice Region (part of the 23 EU hydrogen valleys).
- Research initiatives for the further integration of hydrogen in the transport system, especially aviation (memorandum with Innovation Centre of the Košice Region) and shipment (memorandum with Moravian-Silesian Region) or metropolitan public transport (memorandum with Kosit a.s.).

CROSS-BORDER ASPECT

- Development of local charging stations (especially in urban areas and touristic destinations).
- Development of a network of highspeed charging stations along main transport routes.
- Development of subsidy scheme for the acquisition of non-polluting vehicles (including e-bikes, e-scooters, cargo bikes, small electric vehicles for elders etc.).
- Development of non-polluting car sharing and rental systems in larger cities.

9. CONCLUSIONS AND NEXT STEPS

Modern infrastructure, fair and open market competition, and the development and coordination of various modes of transport, along with the implementation of an effective regulatory and management system, provide the foundation for mobility development. Global trends in transportation systems indicate the need for rapid integration of transport technologies and regional mobility projects.

The growth in speed, cost-efficiency, and environmental friendliness of transportation vehicles is a key trend across all modes of transport, aligning with development strategies that emphasize energy efficiency, sustainability, safety, and consumer and environmental friendliness.

The countries of the Carpathian region have untapped potential in terms of shared historical, economic, social, and cultural connections, infrastructure, rapid digitization, and advantageous geographical location, which create conditions for progressive development.

Alongside this potential, there is a need for prompt response and rapid transformation in the face of global challenges. Climate change, wars, pandemics, population migration, and other challenges compel countries to act swiftly and collaboratively. That is why it is crucial to have a coordinated vision regarding the strategic direction of partner countries, taking into account challenges, global trends, and internal possibilities of border territories.

The development of the CBC Mobility Plan began with a comprehensive analysis of the border regions of the four countries in the Carpathian region. The results helped identify the completeness of inclusion of strategic directions affecting mobility development in planning and normative documents. The analysis also examined the current level of infrastructure in border territories and explored opportunities for future mobility development.

An analysis of existing interstate agreements regulating the opening and functioning of border crossing points revealed the need for updates. Currently, decisions are made at the national level based on these agreements, leading to inconsistencies between regional development visions, target infrastructure development programs at the national level, and interstate agreements.

Therefore, the next step will be to take into account the provisions of the Mobility Plan, which includes and takes into account the regional plans of each border region in the field of transport and border infrastructure, in the strategic planning of the development of international connections.

The Hungary, Slovakia, Romania and Ukraine cross-border region, represented in this project (MOBI) by territorial administrative units: Szabolcs-Szatmár-Bereg county (HU), Košice and Prešov regions (SK), Maramureş and Satu Mare counties (RO) and Zakarpattia, Ivano-Frankivsk and Chernivtsi (UA) is in the midst of developing its transport infrastructure, while its cities have already begun the transition to sustainable and inclusive urban mobility. However, in the coming years, cross-border connections between the different territories of the region must be significantly improved. This aspect needs to be dealt with very carefully on three different levels:

- a. European Union level and a better connection to the TEN-T network – currently the region is almost bypassed by the main European transport corridors,
- b. national level and better harmonization with national transport policies – currently the main investments in transport infrastructure at the national level are significant partly outside the region (modernized or new railways, highways or border crossing points),
- c. local level and better correlation with sustainable urban mobility policies at the level of cities and metropolitan areas.

In this context, the territorial administrative units that form the cross-border region of Hungary, Slovakia, Romania and Ukraine must continue, even accelerate their approach to a sustainable, inclusive and intelligent transport system, relying on:

- the modernization and interconnection of the railway network, especially in the border area,
- increasing the attractiveness and optimization of county public transport,
- development of the network of cycle tourism and bicycle commuting routes,
- development and modernization of border crossing points,
- continuation of projects to modernize and expand county roads following the principles of "complete streets",
- expanding the network of highways and express roads with an emphasis on their interconnection in the border area,
- setting up detours and routes for heavy traffic,
- expanding the network of electric vehicle charging stations and alternative fuel supply stations,
- optimizing and modernizing the network of airports in the region and connecting them as nearby urban centres through public transport services,
- capitalizing on the hydrographic network for ecological transport and leisure.

All these steps will be part of future cross-border cooperation projects.

A positive impact in the development of transport networks and systems will be caused by the strategic documents that cover or include the territories of the Carpathians: EU strategies for the Danube region; Strategies of the Carpathian macroregion; Strategies "Carpathian Euroregion - 2020 and beyond".

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The ENI Hungary-Slovakia-Romania-Ukraine 2014-2020 cross-border cooperation program provides EU funding for sustainable development along Ukraine's border with Hungary, Slovakia and Romania, helps to reduce the difference in living standards and solve common problems across these borders.

The member states of the European Union decided to combine their know-how, resources and destinies. Together, they built a zone of stability, democracy and sustainable development while preserving cultural diversity, tolerance and personal freedoms. The European Union seeks to share its achievements and values with countries and peoples beyond its borders.

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