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EUROPEAN RESEARCH PROJECT //

Collecting and analysing data for the post-27 INTERREG (Core-IB)

Hungary-Croatia

Border profile

March 2026

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Coordination
Andreea China, Laura Dimitriu, Martin Gauk, Nikos Lampropoulos, Nicolas Rossignol – ESPON EGTC

Lead authors
Tobias Chilla, Dominik Bertram, Elias Günther, Stefan Hippe – Friedrich-Alexander University Erlangen-Nürnberg
Irene McMaster, Heidi Vironen, Neli Georgieva, Stefan Kah, Virginia Arena – Stichting EPRC Strathclyde University
Roland Gaugitsch, Sabrina Mansutti, Helene Gorny, Michelle Wiest, Erich Dallhammer, Cristian Andronic, Manon Badouix, Chien-Hui Hsiung, Robert Badea – ÖIR GmbH
Vít Pászto, Radek Barvíř, Karel Macků, Jaroslav Burian, Zdena Dobešová, Oldřich Bittner – Palacký University Olomouc

Steering Committee
Jean-Pierre Halkin, Gaëlle Doleans, Simona Pohlová, Maria Sioliou, Robert Spisiak – Unit D2 Interreg, Cross-Border Cooperation, Internal Borders, Directorate-General for Regional and Urban Policy, European Commission (EC-DG Regio)
Milada Hronkova – Ministry of Regional Development, Department of European Territorial Cooperation (CZ)
Josiane Meier - Federal Ministry for Housing, Urban Development and Building, Division Spatial Planning, Spatial Planning Law and European Spatial Development Policy BMWSB (DE)
Margarita Golovko – Ministry of Regional Affairs and Agriculture (EE)
Olivier Bichel, Sébastien Keiffer– Ministry of Housing and Spatial Planning, Department of Spatial Planning (LU)

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Contact: info@espon.eu

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Table of contents

List of figures

List of tables

1 Introduction

1.1 Context and objective of the border profile

The ESPON Core-IB project (Collecting and analysing data for the post-27 INTERREG) provides evidence-based, non-binding analytical work to support the next generation of Interreg programmes post-2027. By collecting and analysing harmonised territorial data, the project highlights key socio-economic characteristics, cross-border interactions, and governance structures. Its spatial focus covers 48 cross-border cooperation areas (40 land and 8 maritime), including all EU internal border regions and those bordering Liechtenstein, Switzerland, and Norway. The findings are analytical and informative; they do not create regulatory or policy obligations for Member States, the European Commission, or programme authorities. Each border profile serves as a comparable knowledge base for policymakers at EU, national, and regional levels, supporting dialogue and reflection rather than prescribing policy choices. The profiles aim to provide consistent, data-driven territorial evidence that can inform strategic discussions about future cross-border cooperation and contribute to the preparation of Interreg programmes post-2027.

The Core-IB border profiles are designed to support the upcoming steps in the Interreg programming process with analyses based on data that is available at the European scale, including ESPON, Eurostat, DG REGIO, JRC, and Interreg databases. Their main purpose is to ensure comparability of data analyses and to provide programme areas with access to recent harmonised data at high geographical resolution (NUTS3 level or finer). Member States may hold additional or more detailed data which can further enrich or contextualise the findings beyond the Core-IB project. These national sources are essential for refining and validating territorial evidence in policymaking processes, including additional regional, fine-scale information and insights from political processes related to prioritisation and objective setting. All border profiles follow a systematic and methodologically robust approach. They provide territorial evidence, structured along 6 thematic dimensions, offering insights into the geographic, economic, environmental, socio-economic, border security and governance characteristics of the border region. Quantitative data and qualitative analyses are combined to ensure meaningful insights into all 48 border areas. Due to methodological constraints and limited resources, local studies and national datasets falling outside the European data framework could not be included. Visualisations, such as maps and charts based on descriptive statistics, facilitate understanding and support evidence-based policymaking. The profiles analyse the border region as a whole at NUTS3 (2021) level (corresponding to the current Interreg VI-A programme area)[1] and position it within a broader European context. For comparative purposes, several reference categories are applied:

- European averages (EU27 + Norway, Switzerland and Liechtenstein, depending on data availability)
- National averages
- National border region averages
- Aggregated border region averages

To complement the quantitative evidence, the profiles also draw on strategic and qualitative sources, including:

- Strategic documents from the Interreg Programme 2021-2027
- Border Orientation Papers from the 2021-2027 programming period
- Information from the keep.eu database on cross-border cooperation activities
- Information from the Cohesion Open Data platform
- Information from the b-solutions initiative
- Information from recent ESPON Projects (i.e., CROSSGOV, House4All, PROFECY Update, CPS 2.0)

[1] As defined by Annex 1, Commission Implementing Decision (EU) 2022/74 of 17 January 2022, as amended by Commission Implementing Decision (EU) 2023/1638 of 14 August 2023 (OJ L204, 17.8.2023, p. 9): https://eur-lex.europa.eu/eli/dec_impl/2022/75/oj/eng

Within the ESPON framework, the CROSSGOV project (Governance mechanisms for cross-border functional areas) has been implemented in parallel to Core-IB. The CROSSGOV hub[2] provides a comprehensive platform for interactive data exploration, and selected data have been incorporated into this study.

Additional project-related information can be explored separately in the Core-IB **Final Report**. Further technical information on this border profile can be found in a separate **Technical Annex** providing an overview of data and methods.

1.2 Presentation of the border area

The INTERREG VI-A border region 'Hungary-Croatia' covers the area between parts of south-western Hungary and north-eastern Croatia (see Figure 1.1). In Hungary, the programme area includes the region of Southern Transdanubia in Transdanubia, comprising a total of 3 NUTS 3 regions. In Croatia, it covers parts of the regions Pannonian Croatia and Northern Croatia, encompassing a total of 8 NUTS 3 regions.

Figure 1.1: Overview map

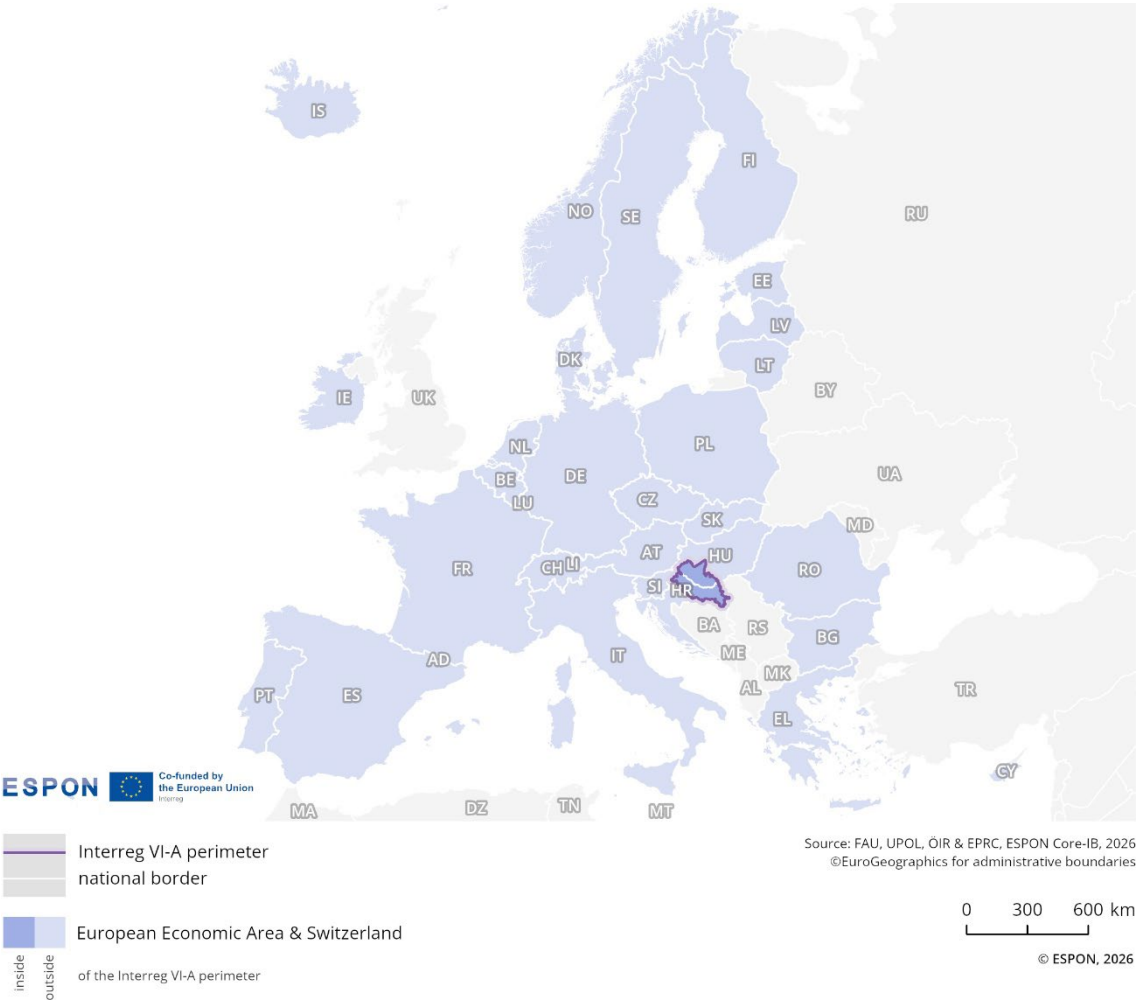
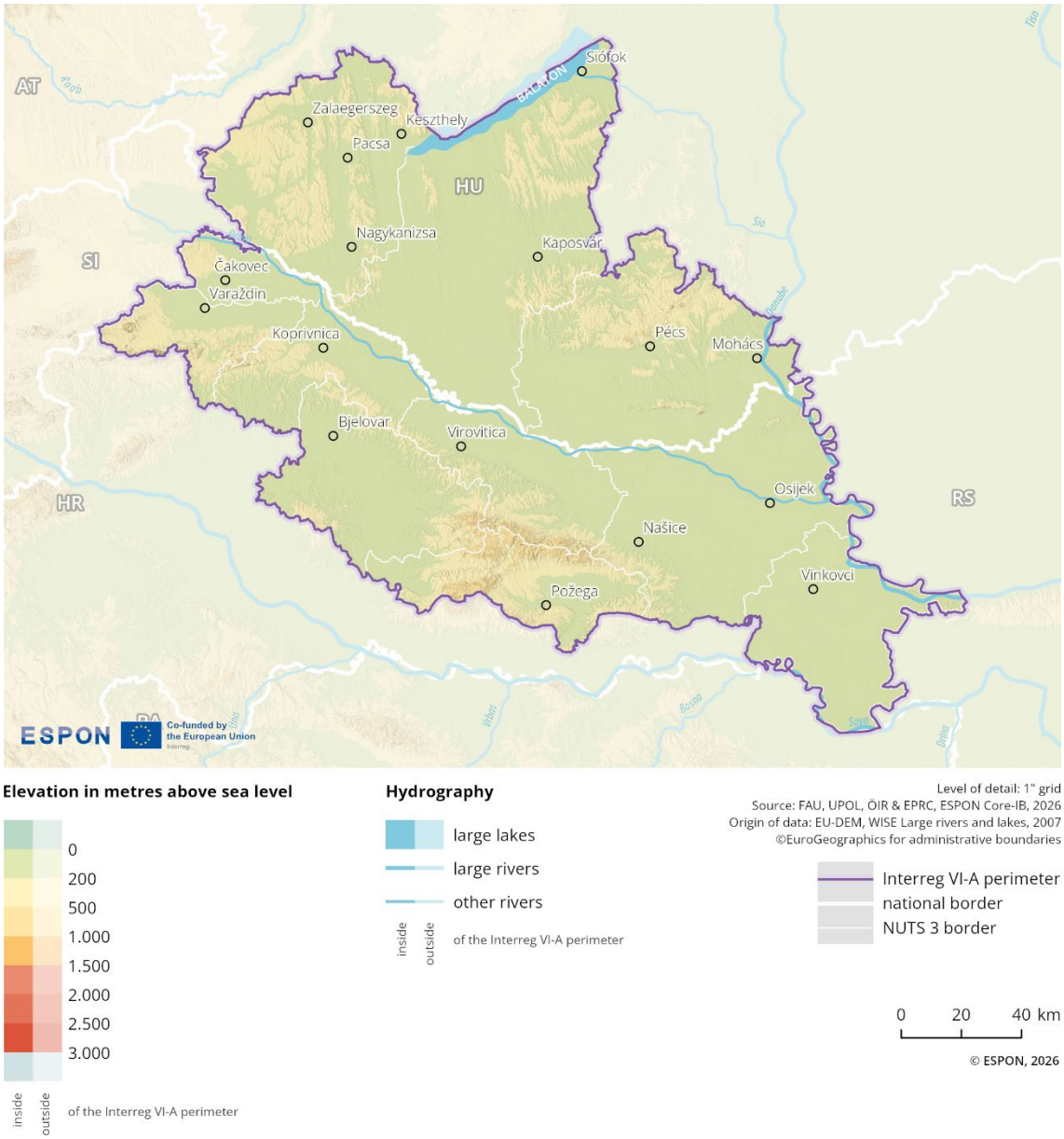


Figure 1.2 illustrates the region's geomorphological features and the perimeter of the current INTERREG VI A programme area. The program area spans approximately 31,085 km². The Drava–Mura

[2] ESPON CROSSGOV Hub: https://gis-portal.espon.eu/arcgis/apps/experiencebuilder/experience/?id=27e3b86ef44441b08793a2239c370607

river forms much of the border and is an important natural feature within the programme area. The programme area extends along the Hungary–Croatia border and includes several urban centres across the region, such as Pécs, Kaposvár, Nagykanizsa, Varaždin, Čakovec, Osiek, Virovitica and Bjelovar, among others.

Figure 1.2: Geographical features and characteristics[3]



The region lies in the Pannonian Basin and is characterised by lowland and gently hilly terrain. Productive soils and a temperate continental climate foster a robust agricultural heritage, characterised by the widespread cultivation of cereals, vegetables, and vineyards, particularly in the Baranya and Slavonia regions. The extensive floodplains of the Danube tributaries, including the Drava and Mura, as well as Lake Balaton contribute to the region's ecological diversity, forming wetlands and protected areas designated under the Natura 2000 and Ramsar conventions.

[3] The selection of displayed settlements is based on factors such as size, administrative or cultural importance, transport links, regional coverage and cartographic clarity. This is part of a standard cartographic generalisation process with no pre-set thresholds, and the main aim is to provide orientation.

The programme area's spatial structure is characterised by a dispersed pattern of small settlements, with only a few medium or large urban areas.

2 Cross-border analysis

2.1 Territorial dimension

The territorial dimension refers to the spatial characteristics and dynamics of a border region. It specifically depicts how factors such as population density, demographic trends, changes in settlement areas and accessibility influence and reflect cross-border integration.

2.1.1 Population and settlements

This sub-dimension illustrates the population characteristics and land use dynamics of the border region, based on analysed indicators. It examines population density, population development by age groups, and changes in settlement areas. The analysis highlights whether the border functions as a catalyst for integration or as a barrier. Comparisons with the respective countries and the EU average provide context for understanding the region's dynamics.

2.1.1.1 Population density

Indicator description

Population density refers to the number of residents per km². This indicator shows the number of inhabitants per square kilometre in a 1x1 km grid. It therefore provides information on the distribution and concentration of population across the region and allows to identify agglomerations of high density. In particular agglomerations at or close to the border area of key interest.

- **Source**: Eurostat
- **Temporal coverage**: 2021
- **Unit**: Inhabitants/km^2

Please refer to the technical annex for more information.

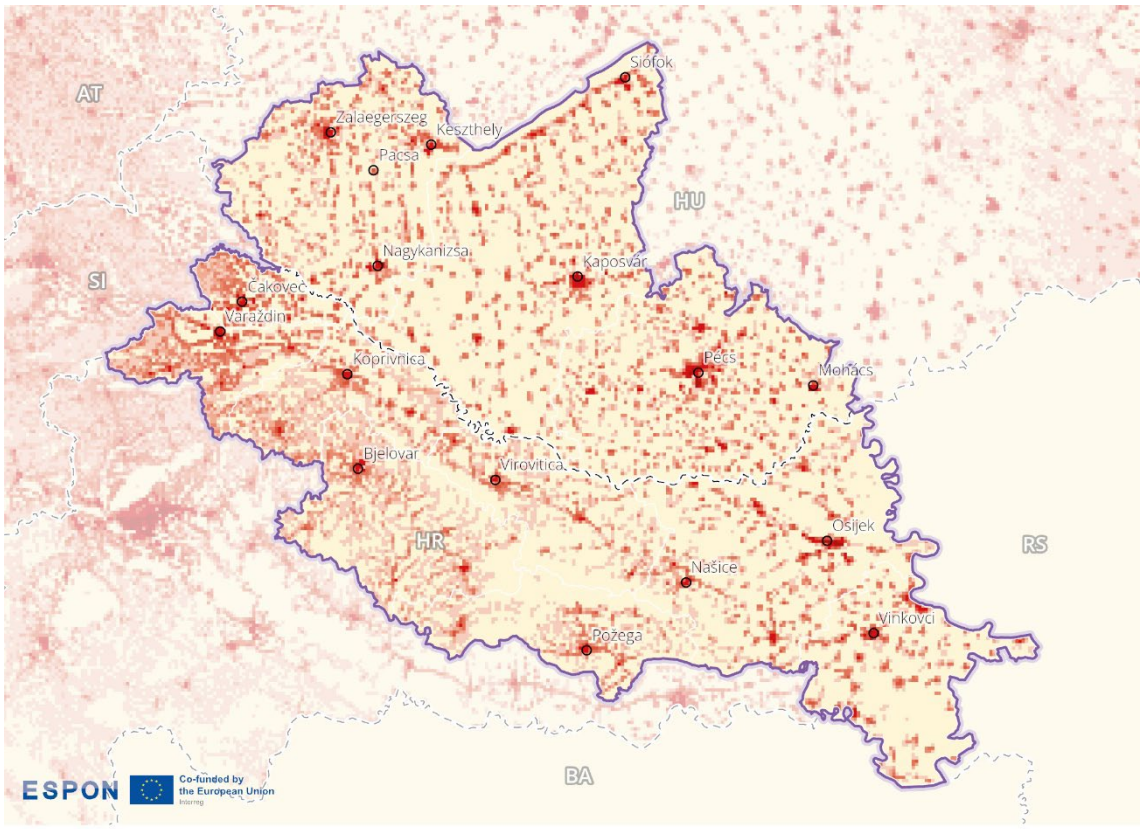
Figure 2.1 indicates that the border divides the territory into 2 distinct parts, differing slightly in settlement character, although the settlement patterns are similar. The largest concentration of population is in the western part of Croatia, where the area around the city of Varazdin (with a population of nearly 40,000 inhabitants) is more densely populated and continuous than other cross-border areas. In Croatia, settlement density decreases eastwards from the cities of Bjelovar and Virovitica, with more areas characterised by sparse or no settlement, except for the cities of Osijek (with over 100,000 inhabitants) and Vukovar. Hungary's landscape consists of numerous isolated, smaller settlements, with the population concentrated in a few cities, such as Zalaegerszeg and Nagykanizsa, as well as Kaposvár and Pécs (with over 140,000 inhabitants) in the east. The border region comprises 6 urban centres with a population exceeding 30,000 inhabitants. Large areas of the Hungarian countryside have very low or no population density.

The population density in this whole border region is 88 inhabitants/km², which is lower than the EU average of 109 inhabitants/km² (according to EUROSTAT), and it is also lower than the aggregated average of all EU evaluated border regions, which is 125 inhabitants/km².

The part of the border region in Hungary has an average population density of around 62 inhabitants/km². It is therefore lower than the national average population density in Hungary (103 inhabitants/km²).

The part of the border region in Croatia has an average population density of around 58 inhabitants/km². It is comparable to the national average population density in Croatia (64 inhabitants/km²).

Figure 2.1: Spatial patterns of population distribution



Number of inhabitants/km² (2021)

- 1–50
- 51–100
- 101–200
- 201–500
- 501–1,000
- 1,001–5,000
- 5,001–56,158
- no population

inside / outside of the Interreg VI-A perimeter

Twin cities (2025)

cities/towns with 10,000+ inhabitants not further than 5km from another one accross a country border

Border cities (2025)

other cities/towns with 10,000+ inhabitants not further than 10km from another one accross a country border

Level of detail: 1km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: GISCO Population Grid (version 1.3), 2021
OpenStreetMap, 2025
©EuroGeographics for administrative boundaries

- Interreg VI-A perimeter
- national border
- NUTS 3 border

0 20 40 km

2.1.1.2 Population development (by age groups)

Indicator description

Population development refers to the percentage change in population at regional level between 2014 and 2024. The data reflects on the total population, as well as on the age groups 0-14, 15-64 and 65+.

- **Source**: Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2014-2024
- **Unit**: Change in %

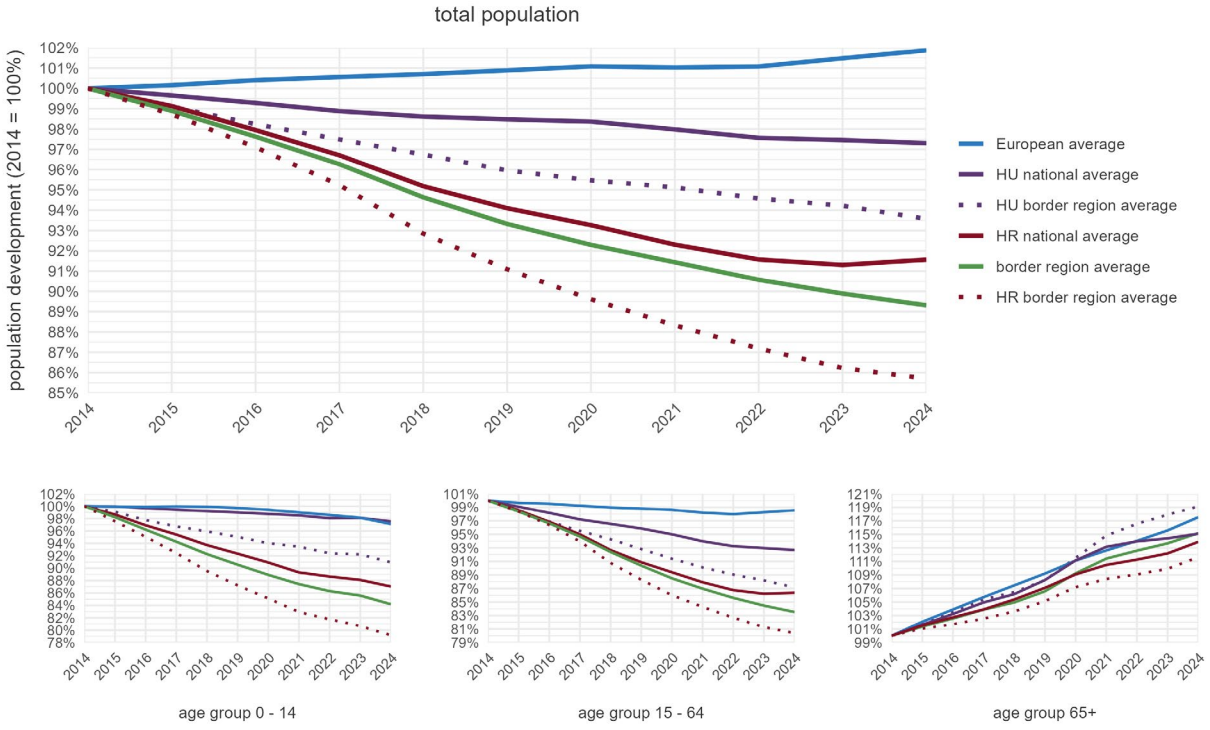
Please refer to the technical annex for more information.

Population in the Hungary–Croatia region in 2024 (Eurostat): 1.89 million inhabitants, of which:

- 52.0% in the Croatian border territory (0.98 million inhabitants)
- 48.0% in the Hungarian border territory (0.91 million inhabitants)
- Region within the border region with the highest population change since 2014: Vukovarsko-srijemska županija (HR026) with a sharp decrease of -20.7%

Figure 2.2 shows the population change in the Hungary–Croatia region between 2014 and 2024. During this period, the region experienced a substantial population decline of -10.7%, with stronger losses on the Croatian side.

Figure 2.2: Population development (2014=100)



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Population growth in the Hungary–Croatia border region is well below the European average (-10.7% vs. 1.9%) and also below the average development in all border regions (-10.7% vs 1.5%). On the

Hungarian side, the border area has a noticeably higher decrease than the national average (-6.4% vs. -2.7%), and similarly, the Croatian border region has a substantially higher decrease than the national average (-14.3% vs. -8.4%).

In terms of the development of individual age groups in the region, the population aged 0–14 experienced a sharp decrease of -15.8%, while the working-age population (15–64) showed a sharp decline of -16.5%. The population aged 65 and over underwent a substantial increase of 15.2%.

2.1.1.3 Change in settlement areas

Indicator description

The indicator shows the relative change in settlement areas per LAU in the border region. It considers changes in land cover, from non-artificial areas (such as agricultural, forest and seminatural areas, wetlands and water bodies) to artificial areas (such as urban, industrial, construction sites) between 2012 and 2018. This indicator has to be viewed alongside population development in particular.

- **Source/method of retrieval**: The indicator is retrieved via processing of raster data from CORINE Land cover. The raster information is crossed with Local Administrative Units (LAU) to calculate a change in %.
- **Temporal coverage**: 2012-2018
- **Unit**: Change in %

Please refer to the technical annex for more information.

Figure 2.3 illustrates the change in settlement areas at municipal level between 2012 and 2018. Overall, the map shows similar patterns of change in settlement areas on both sides of the Hungarian-Croatian border. Changes are evident in particular around the urban centres of Zalaergerszeg, Kaposvár, Pécs, Osijek, Vinkovci, Bjelovar and Varaždin, Nagykanizsa and Virovitica are exceptions, with no significant changes during the observed time period. High growth in settlement areas is particularly evident in Zalaergerszeg, around Varaždin and in Keszthely at Lake Balaton. In close proximity to the national borders, the settlement area increases mainly around Virovitica, Čakovec and around Osijek.

Figure 2.3: Settlement area dynamics

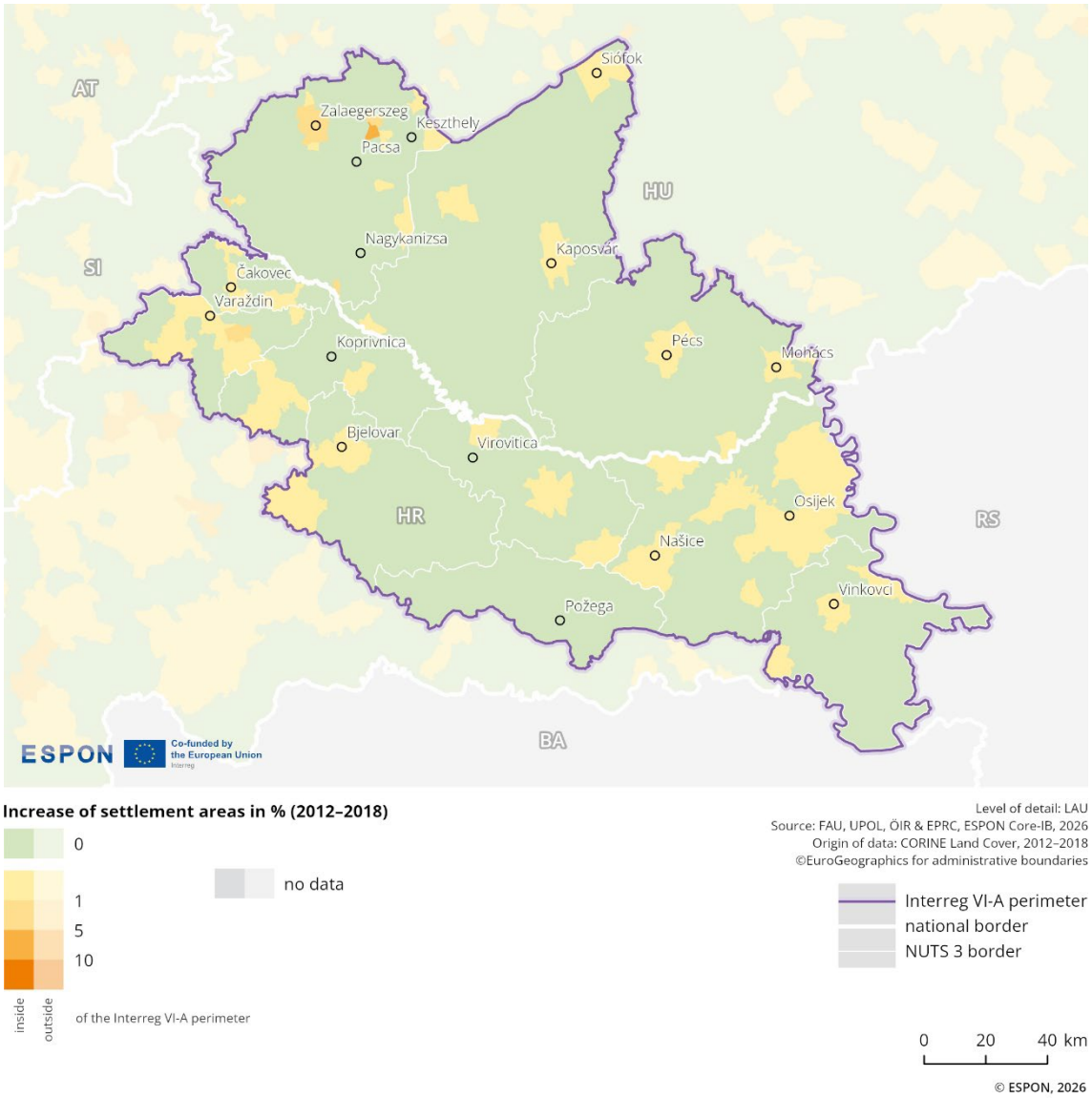
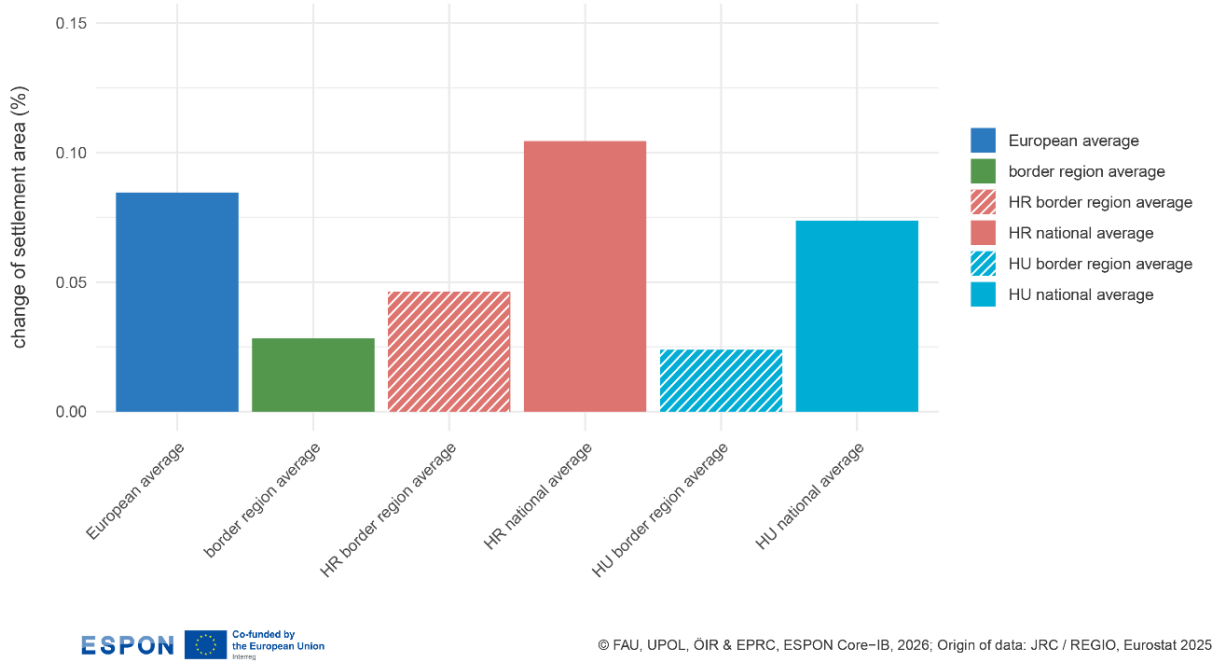


Figure 2.4 presents the change in settlement areas from a comparative perspective. The average for the Hungary-Croatia programme area is lower than the overall European average, which includes both EU member states and the EFTA countries Switzerland, Liechtenstein, and Norway. The Croatian values are higher than the Hungarian ones, which applies for both, the national average as well as the border regions. Both border-regional averages are lower than the national averages.

In general, the programme area shows a relatively dynamic settlement development. The need for an integrated approach to spatial development is obvious. Spatial development has to balance the various demands on land use (e.g., residential, commercial, tourism, transport, agriculture, and nature conservation), and this requires ongoing coordination and exchange, also across the border.

Figure 2.4: Change in settlement areas (2012-2018) (comparison)



2.1.2 Accessibility of the border area

This sub-dimension illustrates the functional travel connections that already exist in the border region. It examines average cross-border travel times for different modes of transport and cross-border catchment areas based on mobility flows. It also considers travel times to and from border crossings. The analysis shows whether mobility flows are integrated between border regions or if the border hampers mobility.

2.1.2.1 Comparative quality of selected cross-border connections

Indicator description

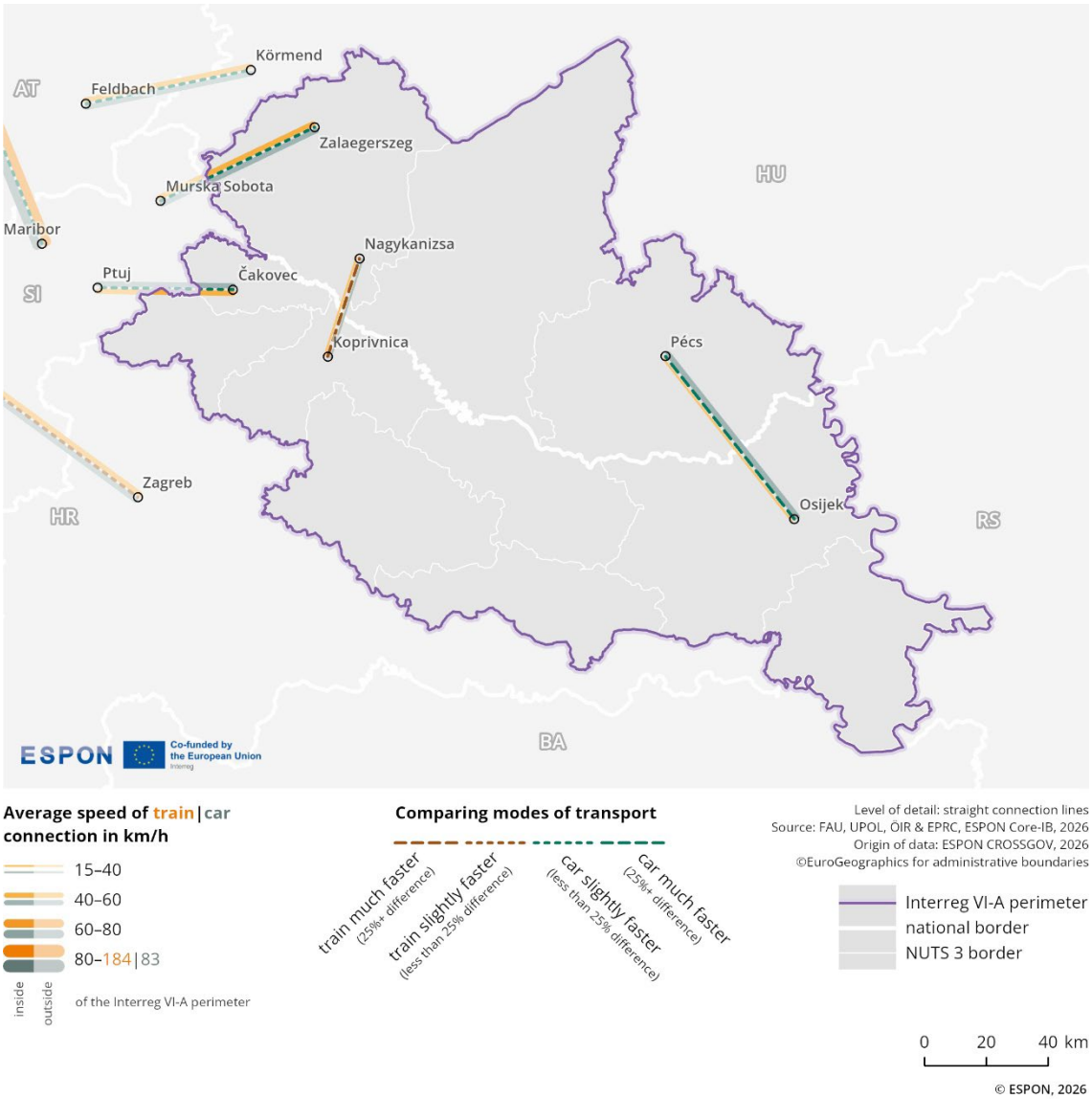
The indicator presents a comparative perspective for different modes of transport (public and private) and their average travel speed (so-called space-time-lines). As such it helps to understand and interpret accessibility patterns along the border and highlights the comparative quality of selected cross-border connections.

- **Source/method of retrieval**: Average number and speed of rail connections/ferries, average speed of car connections between selected cities and towns in border regions using Rail Travel Sites, Google Maps, luftlinie.org, Direct Ferries, local ferry companies
- **Temporal coverage**: 2025 (first quarter)
- **Unit**: km/h

Please refer to the technical annex for more information.

Cross-border accessibility shapes cross-border interactions. Figure 2.5 illustrates this using a "space-time-line" map, which shows parts of a European overview of car and train travel times in the Hungary-Croatia border region. This visualization enables an assessment of transport quality by highlighting differences between public (train) and private (car) transport modes.

Figure 2.5: Comparative quality of selected cross-border connections



The selection of cities and connections covered is based on a set of criteria applied throughout Europe within the ESPON CROSSGOV project[4]. These criteria include the presence of a railway station, population size, distance to the border, node hub and functionality. The thickness of the lines (orange for trains, grey for cars) indicates the average speed of connections in km/h, with thicker lines representing faster connections. Dotted lines in-between reflect the indexed ratio between train and car speeds. A brown colour scale (values below 100) denotes that trains are faster than cars along the specific route, while a green scale (values above 100) indicates the opposite.

The selected connections within the programme area include Koprivnica–Nagykanizsa and Pécs–Osijek. On the Koprivnica–Nagykanizsa route, train travel outperforms car travel in terms of speed. On the Pécs–Osijek route, car travel is the faster option, particularly since the opening of the Hungarian M6 motorway border section on 7 October 2025, which directly connects to the Croatian A5 motorway and shortens travel time between the 2 cities. While road connections on the Pécs–Osijek route are

[4] ESPON CROSSGOV Atlas, see Storymap on 'Space-time-lines': https://gis-portal.espon.eu/arcgis/apps/storymaps/collections/345c978adf784ad-fac30c16b90219d35?item=4

relatively efficient, overall cross-border travel times in the programme area remain comparatively slow, particularly for rail connections.

2.1.2.2 Cross-border catchment area based on mobility flows

Indicator description

This indicator measures the movement of people across borders. The density of cross-border movements by Twitter/X users is displayed on a grid cell covering an area of 20x20 km. The indicator does not differentiate between reasons for movement.

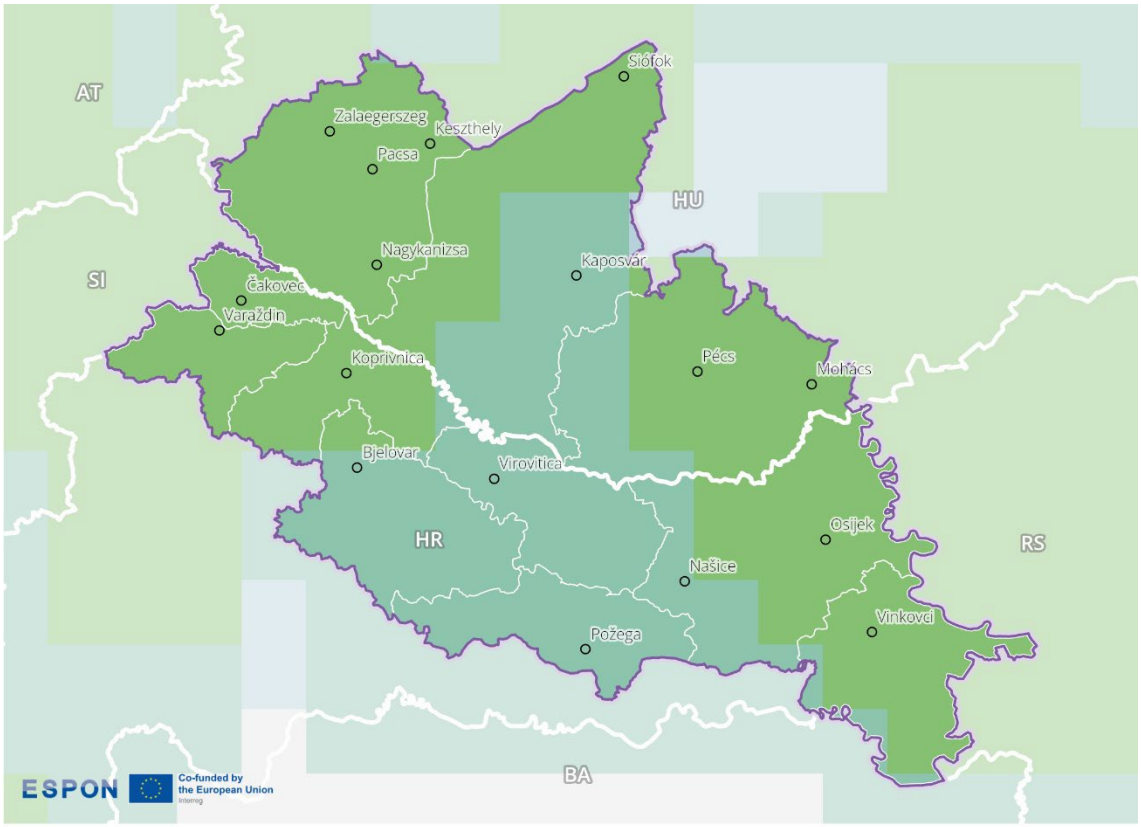
- **Source/method of retrieval**: The indicator is calculated based on Twitter (currently X) data. The digital footprint of individual users provides information about physical mobility flows and is used to calculate cross-border catchment areas of different intensity.
- **Temporal coverage**: 2013-2023
- **Unit**: n/a

Please refer to the technical annex for more information.

Figure 2.6 shows the cross-border catchment area in the border region based on mobility flows from 2013 to 2023, highlighting estimated cross-border mobility intensity across 3 different quartiles. The first quartile represents the 25% highest mobility intensity shown in dark green, the second quartile represents 25-50% coloured in green-blue, and the third quartile represents 50-75% in light blue.

The map illustrates that the intensity of cross-border mobility of people within this cross-border region is relatively homogeneous. The highest mobility intensity is recorded in the western and eastern parts of the region. In the central part of the region, where cities such as Bjelovar, Virovitica, and Kaposvár are located, the intensity is moderate.

Figure 2.6: Cross-border mobility intensity



Estimated cross-border mobility intensity (2013-2023)

high
moderate
low

inside / outside of the Interreg VI-A perimeter

Level of detail: 20km aggregated grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON CROSSGOV, 2026
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

2.1.2.3 Cross-border travel-time accessibility

Indicator description

The indicator shows the time it takes to travel from any location within a region to the next border crossing, using grid data and subsequent categorisations into accessibility groups of 30, 60 and 90 minutes. It reflects the accessibility in cross-border areas, considering road transport. The indicator can describe the quality and speed of road connections and thus spatial reach of the cross-border services.

- **Source/method of retrieval**: Based on the OpenStreetMap road network, the travel time to the border is calculated for a grid of the border are. Based on this, areas are calculated within which border crossings can be reached below thresholds of 30, 60 and 90 minutes. As additional visual element, key services pharmacies, doctors, hospitals and shops (retrieved from the ESPON PROFECY project) are displayed and categorised into the accessibility groups.
- **Temporal coverage**: 2025 (first quarter, for accessibility data), 2021 (for service facility data)
- **Unit**: Minutes

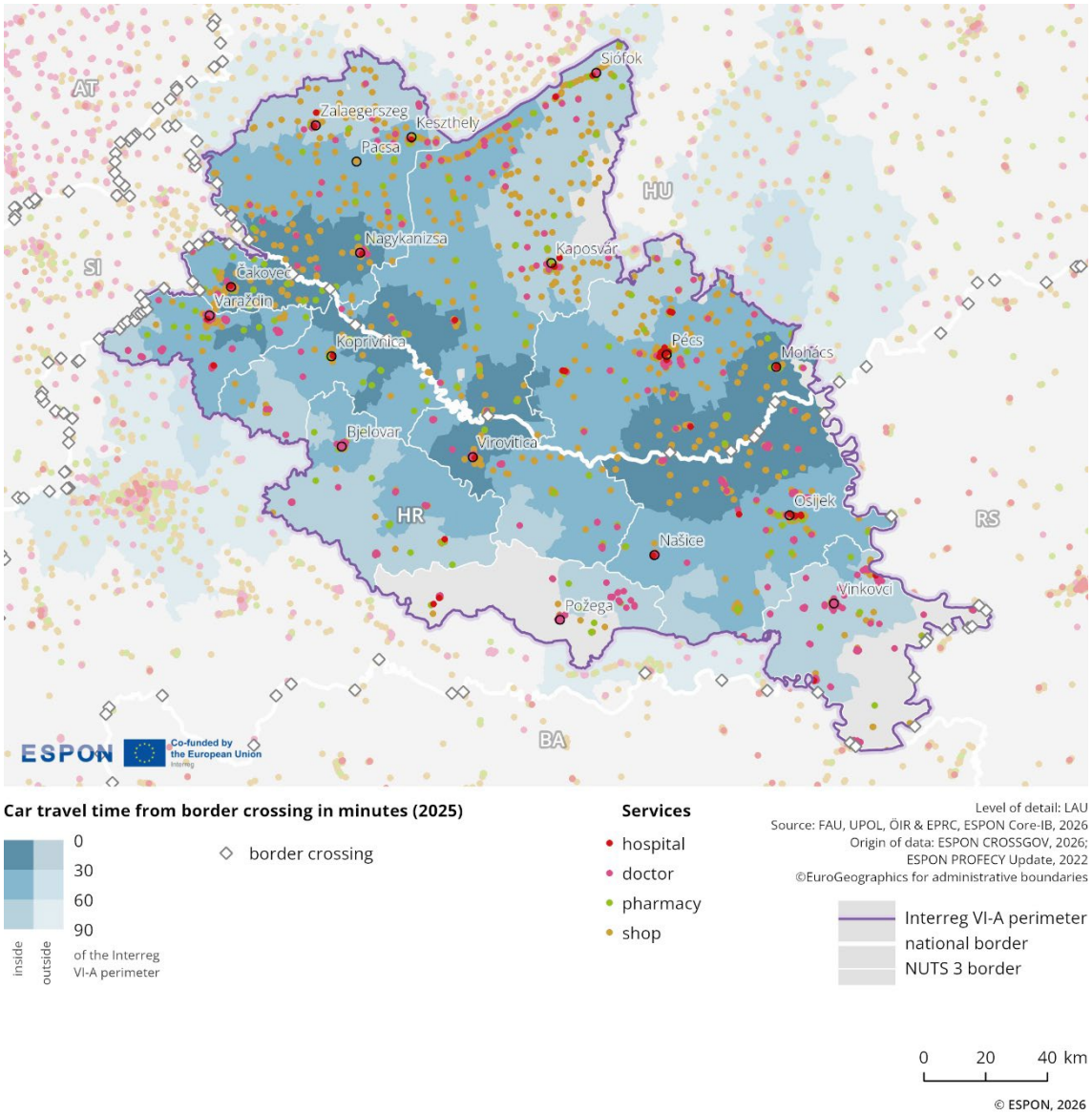
Please refer to the technical annex for more information.

Figure 2.7 illustrates cross-border travel time accessibility in the Interreg area, showing the time distance from the national border in 2025. The legend indicates 3 travel time categories in minutes (30, 60, 90) represented by different shades of blue. In addition, it marks the location of services, including hospitals, doctors (general practitioners), pharmacies, and shops (supermarkets and conventient stores), with distinct coloured symbols.

The map shows that the travel time accessibility of the boundary consists of several isolated areas with accessibility within 30 minutes. These 4 areas are distributed to 3 areas on the west and one in the middle. The biggest area is in the east. The second zone of accessibility within 60 minutes surrounds these isolated 30-minute zones and consists of a continuous, wider belt around the border. The 60-minute zone, together with the up to 90-minute zone, covers nearly the whole area of the region, except for the southern part, which is far distant. The border has a partially good road connection, and in some cases, it is bad.

Services such as shops, hospitals, doctors' offices, and pharmacies are more densely distributed on the Hungarian side of the border than in the Croatian region. There are only several concentrations of services in middle size towns on both side of the border.

Figure 2.7: Travel-time accessibility from border crossings



2.1.3 Key messages on the territorial dimension

The territorial structure of the Hungary–Croatia border region is characterised by relatively low population density and a structure characterised by small and medium-sized towns outside main urban centres. With an overall density of 88 inhabitants/km², the region lies below both the EU average (109) and the aggregated average of all EU border regions (125). The Hungarian part (62 inhabitants/km²) and the Croatian part (58 inhabitants/km²) are comparable in terms of sparsity, though settlement concentration differs: larger towns such as Pécs, Osijek, Varaždin and Kaposvár serve as regional centres, while much of the countryside is characterised by very low or absent population.

Population development between 2014 and 2024 highlights a pronounced demographic decline. The border region lost -10.7% of its population, with sharper reductions in Croatia (-14.3%) than in Hungary (-6.4%). Declines affect both children (-15.8%) and the working-age population (-16.5%), while the elderly population (+15.2%) increased, further underlining ageing trends across the whole border area.

Changes in settlement areas are generally limited, with spatially uneven dynamics concentrated mainly around selected urban centres. Expansion is visible around urban nodes such as Varaždin, Osijek, Pécs

and Zalaegerszeg, yet the overall regional average remains below European values. These developments point to ongoing pressures on spatial planning, requiring integrated approaches that balance residential, economic, and environmental needs.

Accessibility remains a structural challenge. Cross-border transport links show modest quality, with cars faster on some routes, while rail connections may perform better in specific cases but remain limited in service frequency. Travel times are generally slow.. Accessibility zones illustrate fragmented patterns, with only limited areas reachable within 30 minutes from the border. Cross-border mobility flows are relatively homogeneous, with higher intensities in western and eastern parts but moderate values in the centre. Together, these findings stress both the cohesion challenges and opportunities for improved integration through targeted cross-border cooperation.

2.2 Economic dimension

The economic dimension includes analyses of gross domestic product, labour market conditions, competitiveness, and key infrastructure and housing indicators. The aim is to illustrate the impact of the border on economic performance, whether it acts as a barrier or a bridge, and the extent to which integration is supported by labour mobility, remote working, and infrastructure connectivity.

2.2.1 Gross Domestic Product

This sub-dimension illustrates the economic situation of the border region by analysing gross domestic product (GDP). It shows economic development within the border region and how this has changed over time. Comparisons with the respective countries and the EU average provide important context for understanding the region's dynamics.

2.2.1.1 Gross domestic product per capita at current market prices

Indicator description

The indicator shows the regional GDP/capita in current prices and its development over the past years. It highlights structural differences and similarities between the border region and the respective national figures as well as the European average. Furthermore, it highlights patterns within the border region, although has to be interpreted with care in the case of a strong presence of commuters.

- **Source**: Eurostat, Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2010-2023
- **Unit**: Euro per capita

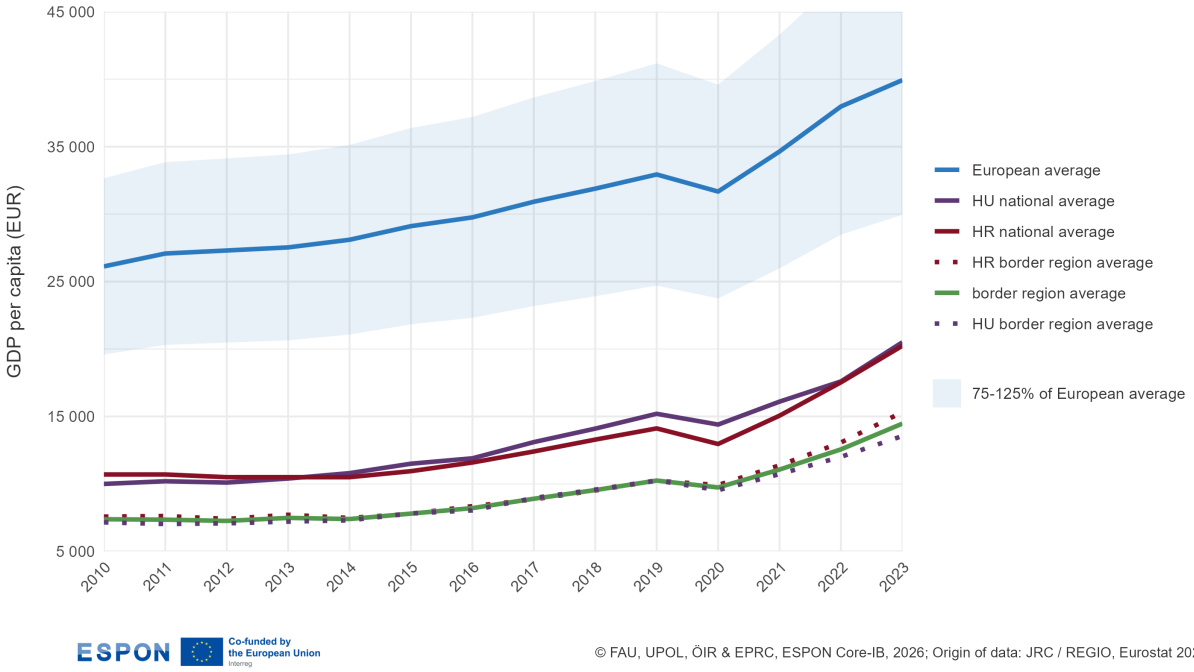
Please refer to the technical annex for more information.

As seen on the Figure 2.8, the region shows a GDP/capita value of 34.6% the EU average in 2022 and 35.1% of the average in European border regions in general. The region marks a 69.8% increase of GDP per capita in the border region between 2014 and 2022[5]. This corresponds to a 34.1 percentage points higher increase of GDP per capita in the border region compared to the EU average. Furthermore, this corresponds to 34.6 percentage points higher increase of GDP per capita in the border region compared to the average of European border regions. Both the national GDP per capita as well as the

[5] Percentage changes are calculated using Eurostat data to ensure harmonised statistics from official sources. The latest year for which full coverage of all European regions is available on Eurostat is 2022. For visualisation purposes, ARDECO data has been used to enable longer time series to be visualised by filling the official dataset's existing gaps with model-based estimates. Therefore, slight deviations between the calculation and visualisation are possible.

respective border regions display very similar development. In both cases the border regions have a lower GDP per capita than the national average. The border regions GDP per capita is only a third of the EU average, thus among the lowest within the EU. However, the growth rate is in both cases around double of the EU average.

Figure 2.8: Gross domestic product at current market prices (per capita)



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2.2.2 Labour market and commuting

This sub-dimension highlights the existing and potential functional links within the labour market of the border region. It examines the employment situation and commuting patterns, as well as the role of telework agreements, and considers developments over time based on analysed indicators. The analysis identifies factors that facilitate or hamper cross-border labour market integration.[6]

2.2.2.1 Share of employment

Indicator description

This indicator shows the share of employees in the population aged 15 to 64. Although it does not fully capture entrepreneurs, marginal employees, or civil servants, this is an important statistic for understanding general labour market patterns. It covers 2 aspects: first, high values can result from a high proportion of the resident population being employed. Second, high values can result from a high number of incoming commuters (from other NUTS3 regions within the country or from neighbouring countries). The same arguments apply to low values: they may indicate low levels of employment, or they may result from high shares of outgoing commuters. Values of more than 100% are possible, since the number of incoming commuters can exceed the number of inhabitants aged 15 to 64 (including both domestic and cross-border commuters).

- **Source**: Eurostat, Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2014-2023
- **Unit**: Share in %

Please refer to the technical annex for more information.

Figure 2.9 illustrates the share of employment per capita in the population aged 15 to 64 in 2023. The data are categorised into ranges from below 50% (twice as many residents aged 15 to 64 as employees) to above 200% (twice as many employees as residents aged 15 to 64), with 100% representing a balanced ratio. Blue or green-coloured regions indicate more residents aged 15 to 64 than employees, while yellow regions indicate more employees than residents aged 15 to 64.

[6] See also: European Commission 2024: Cross-Border Regional Labour Market Analysis, https://op.europa.eu/s/AazM

Figure 2.9: Employment share[7]

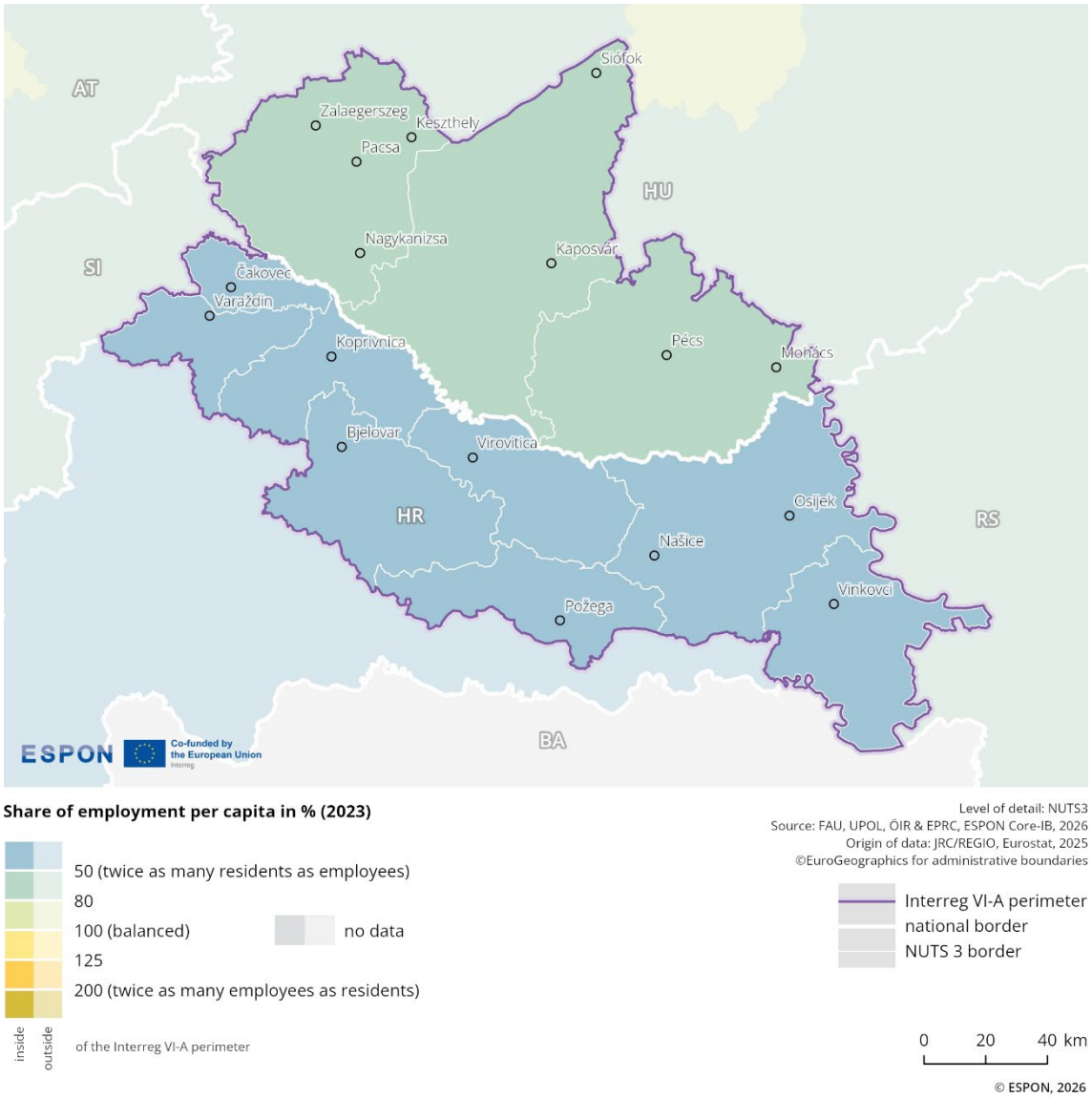


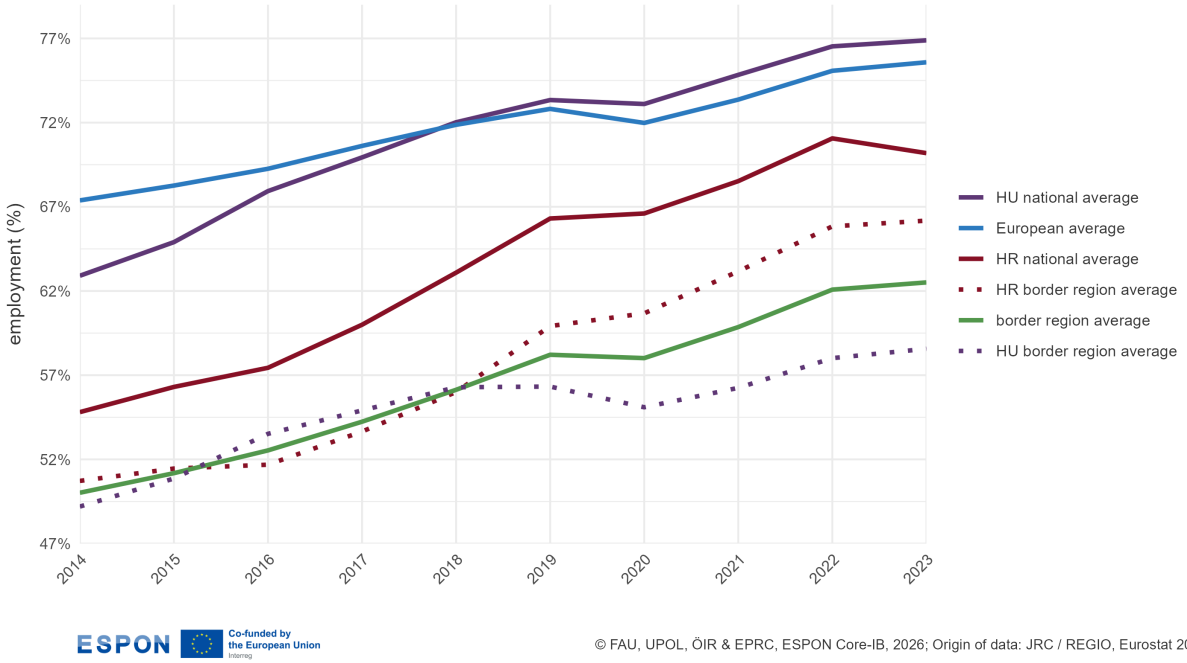
Figure 2.9 and Figure 2.10 show that the share of employment in this border region has remained relatively stable, with the regional average reaching 62.5% in 2023, representing an increase of 12.5 percentage points since 2014. Due to differing values between the countries within the region, national disparities are clearly evident. In the entire Croatian part of the region, values fall below 50%, while in the Hungarian part, values range between 50% and 80%. A comparison of the share of employment values of this border region reveals the following situation:

- Compared to the European average, the values in the cross-border region are lower by 13 percentage points; in 2014, the difference was 17.4 percentage points.
- In comparison to the national average of Hungary, the cross-border region is 14.38 percentage points lower, whereas in 2014, the difference was 12.9 percentage points.
- Compared to the national average of Croatia, the values are more than 7 percentage points lower; in 2014, the difference was 4.8 percentage points.

[7] Note: In this map, 'residents' refers to the population aged 15 to 64.

- The Hungarian part of the border region records values 18.3 percentage points below the Hungarian national average, while the Croatian part remains around 4 percentage points below the Croatian national average when comparing regional averages..
- Compared to the average of all cross-border regions, this region's share of employment is lower by approximately 12 percentage points; in 2014, the difference was 16.3 percentage points.

Figure 2.10: Employment share over time (comparison)



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2.2.2.2 Share of working-age population

Indicator description

This indicator shows the share of people aged 15 to 64 in the total population, reflecting the potential working-age population. The population counted includes all residents who live in the country permanently, excluding foreign students and military personnel. Using the 15–64 age range is a standard European statistical proxy, since differences in retirement age or labour participation across countries cannot be captured systematically. It allows for regional differentiation of potential workforce throughout the border region.

- **Source**: Eurostat, Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2014-2023
- **Unit**: Share in %

Please refer to the technical annex for more information.

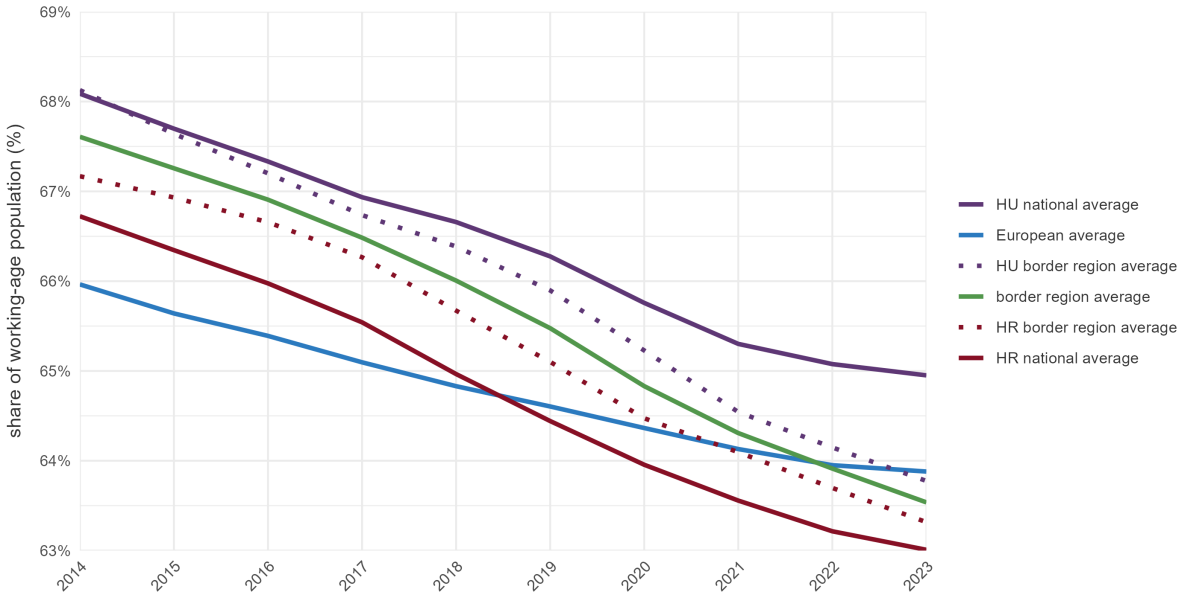
Figure 2.11 illustrates the evolution of the share of the working-age population in the Hungary–Croatia cross-border region between 2014 and 2023. In 2023, the region shows an average working-age population share of 63.5%, compared to the European average of 63.9% and 63.7% for the average of all cross-border regions.

The share of the working-age population in the whole cross-border region is almost equal to the Hungarian border average (63.8%) as well as the Croatian border average (63.3%). Compared to national averages, the regional value is moderately lower than the Hungarian national average (65.0%) and slightly higher than the Croatian national average (63.0%).

The region experienced a noticeable 4.1 percentage point decrease in the share of working-age population between 2014 (67.6%) and 2023 (63.5%). This decline is clearly stronger than the European average, which dropped by 2.1 percentage points in the same period. Both sides of the region recorded a declining trend of comparable intensity, with the decrease reaching -4.3 percentage points at the Hungarian border (-3.1 nationally) and -3.9 percentage points at the Croatian border (-3.7 nationally).

The Hungary–Croatia cross-border region experienced a clear decline in the share of the working-age population between 2014 and 2023, though the decrease was relatively balanced across both countries. The 2023 value remained close to the EU and cross-border averages.

Figure 2.11: Share of working-age population over time (comparison)



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2.2.2.3 Employment by sector

Indicator description

The indicator differentiates the number of jobs in a region by sector. This indicator focuses on workplace-based employment, providing insight into the employment landscape of a region. The dataset can be disaggregated according to "10-sector" NACE (Nomenclature statistique des activités économiques dans la Communauté européenne) classifications, allowing for detailed analysis of employment distribution across various industries.

- **Source**: Eurostat, Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2014-2023
- **Unit**: Share in %

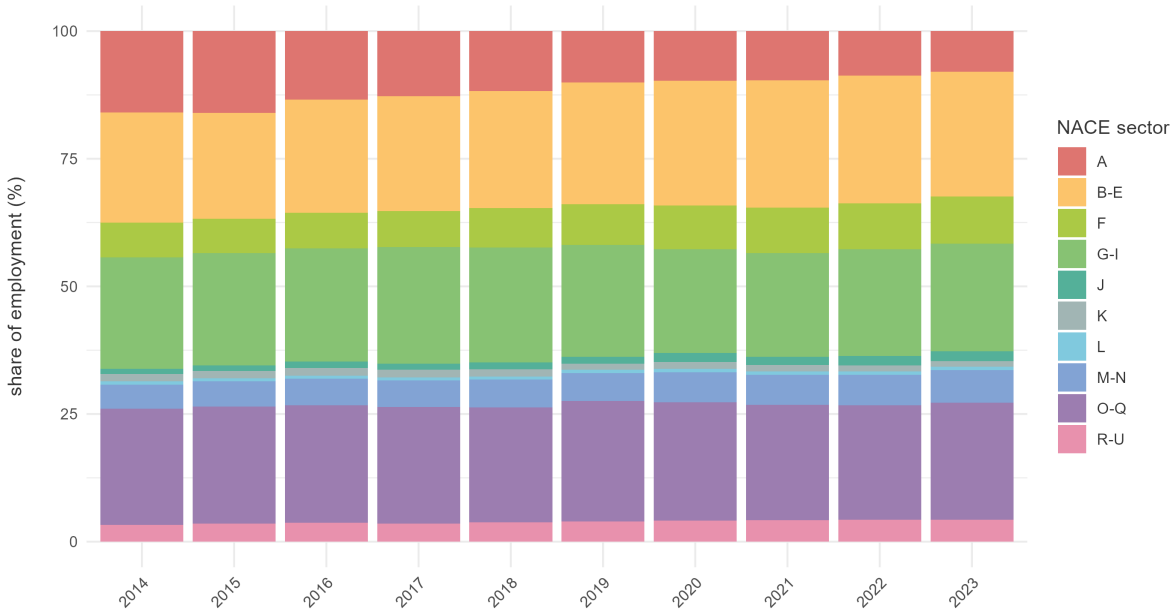
Please refer to the technical annex for more information.

Figure 2.12 illustrates the relative number of jobs in the border area differentiated by sectors. It shows where jobs are located (not where employed persons live). This workplace-based indicator offers insight into the employment structure of a region.

The dataset uses a '10-sector' classification based on NACE categories. The sectoral breakdown is as follows:

- A: Agriculture, forestry and fishing
- B-E: Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply; sewerage, waste management and remediation activities (E)
- F: Construction
- G-I: Wholesale and retail trade; repair of motor vehicles and motorcycles (G), Transportation and storage (H), Accommodation and food service activities (I)
- J: Information and communication
- K: Financial and insurance activities
- L: Real estate activities
- M-N: Professional, scientific and technical activities (M), Administrative and support service activities (N)
- O-Q: Education (O), Human health and social work activities (Q)
- R-U: Arts, entertainment and recreation R), Other service activities (S), Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use (T), Activities of extraterritorial organisations and bodies (U)

Figure 2.12: Employment by sector (comparison)



A: Agriculture, forestry and fishing
B-E: Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply; sewerage, waste management and remediation activities (E)
F: Construction
G-I: Wholesale and retail trade; repair of motor vehicles and motorcycles (G), Transportation and storage (H), Accommodation and food service activities (I)
J: Information and communication
K: Financial and insurance activities
L: Real estate activities
M-N: Professional, scientific and technical activities (M), Administrative and support service activities (N)
O-Q: Education (O), Human health and social work activities (Q)
R-U: Arts, entertainment and recreation (R), Other service activities (S), Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use (T), Activities of extraterritorial organisations and bodies (U)

Between 2014 and 2023, the relative number of jobs in the different sectors remains fairly stable. There is a slight decline in the share of employment in agriculture, forestry and fishing (A). Conversely, there is a modest increase in the number of jobs in Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply; sewerage, waste management and remediation activities (E), Construction (F), Information and communication (J), Professional, scientific and technical activities (M), Administrative and support service activities (N), Education (O) and Human health and social work activities (Q).

Over the entire period, the sectors with the highest share of jobs are 'B-E' (mining, quarrying, manufacturing, electricity, gas, steam and air conditioning supply, water supply; sewerage, waste management and remediation activities, 'G-I' (wholesale and retail trade; repair of motor vehicles and motorcycles, transportation and storage, accommodation and food service activities) and 'O-Q' (education, human health and social work activities).

2.2.2.4 Outgoing cross-border commuters

Indicator description

The indicator shows outgoing cross-border commuting dynamics at NUTS3 level. Even though no origin-destination information can be provided, it is assumed that commuters primarily travel across the nearest border. Spatial, economic and population arguments are combined to calculate the number of outgoing cross-border commuters.

- **Source/method of retrieval**: Eurostat/LFS data on outgoing commuters currently available on NUTS2 level has been regionalised for NUTS3 by means of weighting by border length, NUTS3 population-weighted centroid distance to border, population per NUTS3 region (15–64 years old) and real compensation per employee
- **Temporal coverage**: 2015-2023
- **Unit**: Share in %

Please refer to the technical annex for more information.

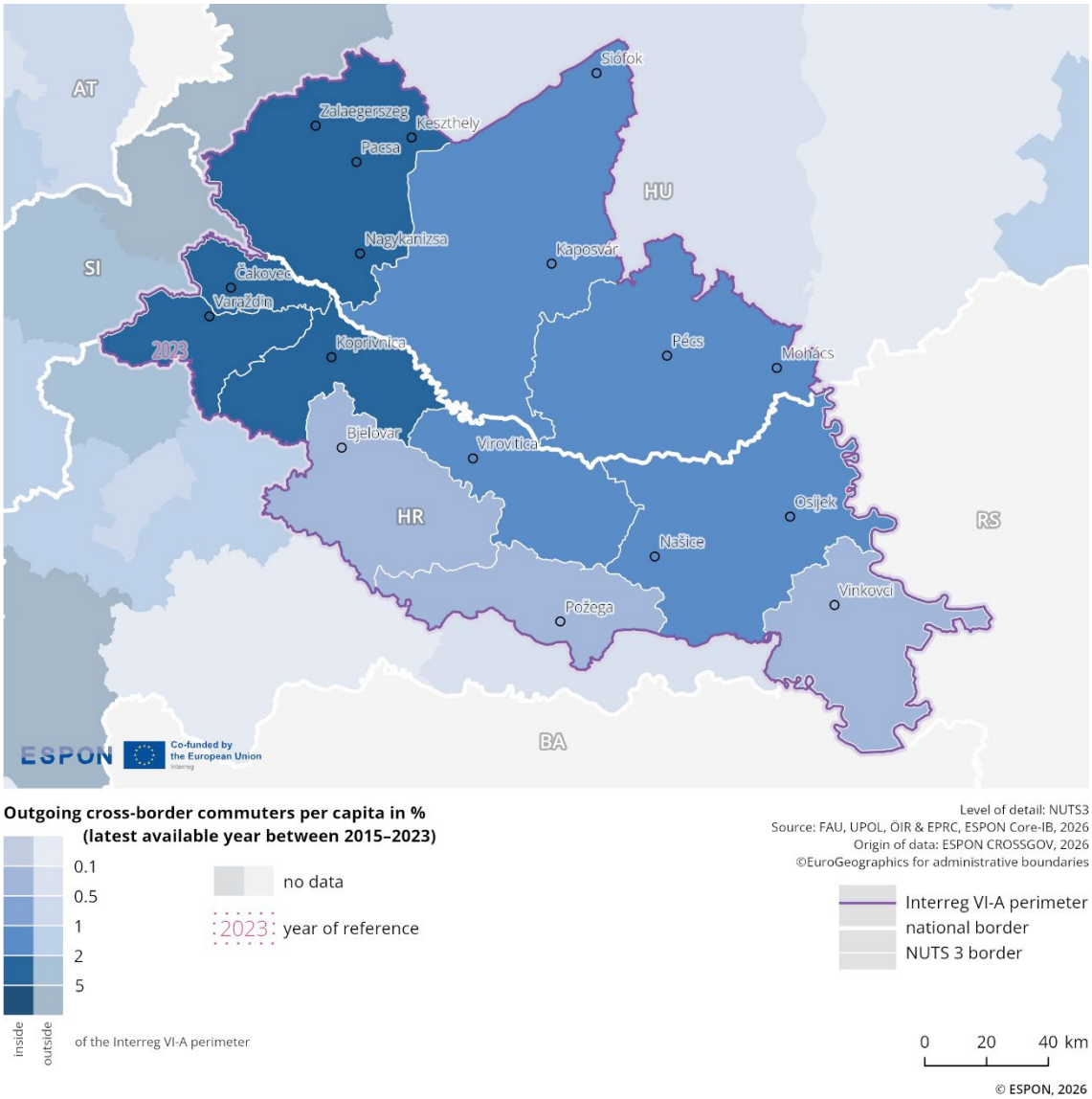
Commuting is one of the most relevant cross-border flows to identify functional linkages. Figure 2.13 illustrates the share of outgoing commuters per capita for each NUTS3 region (more concretely speaking the share of outgoing commuters among the residential population of the age group 15-64 years old, resembling the potential labour force). Origin-destination information cannot be provided, but the share of outgoing commuters in regions close to the border indicates the relevance of commuting. It highlights functional relations in the labour market within the cross-border region.

The map illustrates the share of cross-border commuters, based on the most recent available year of data. It shows relatively strong cross-border commuting activity in areas directly adjacent to the border on both the Croatian and Hungarian sides.

The Croatian regions of Međimurska županija, Koprivničko-križevačka županija, and Varaždinska županija stand out in particular, with high levels of outgoing commuters, suggesting daily flows primarily toward Slovenia or Hungary[8]. Another 'hotspot' is the Hungarian region of Zala, which also shows elevated shares of outgoing cross-border commuters per capita.

[8] See Eurostat Statistical Atlas for NUTS3 (2021) regions: https://ec.europa.eu/statistical-atlas/viewer/?config=typologies.json&ch=NUTS&mids=BKGCNT,NUTS2021L3,CNTOVL&o=1,1,0.7&center=49.69576,14.3332,4&lcis=NUTS2021L3&

Figure 2.13: Outgoing cross-border commuting patterns



2.2.2.5 Cross-border telework agreements

Indicator description

The indicator shows what kind of legal framework for cross-border telework is enacted.

- **Source/method of retrieval**: The indicator is based on information about the legal framework for social security regarding cross-border teleworking, categorised by border pair.
- **Temporal coverage**: Status as of March 2025
- **Unit**: n/a

Please refer to the technical annex for more information.

While Croatia is a signatory state of the 2023 Framework Agreement on Cross-Border Telework, Hungary is not. Therefore, the 2 countries apply the standard rules under Article 13 of Regulation (EC) No. 883/2004. This means that cross-border telework is generally limited to 25% of the total working time, beyond which social security affiliation may shift to the country of residence.

2.2.3 Competitiveness

This sub-dimension illustrates the competitiveness of the border region by analysing the main industry sectors that contribute to its economic development. It assesses gross value added (GVA) at basic prices by sector, as well as nominal compensation per hour worked, in order to understand productivity levels and sectoral strengths.

2.2.3.1 Gross value added at basic prices by sector

Indicator description

The indicator shows the gross value added (GVA), which is a measure of the contribution of a country or region to the economy. Regional GVA represents the value generated by all units involved in the production of goods and services within a specific area. This indicator can be disaggregated by industry and service sector, allowing for a detailed analysis of economic contributions across different fields. Additionally, the sum of GVA across all industries or sectors, combined with taxes on products and minus subsidies on products, yields the gross domestic product (GDP) of the region. The dataset is available in "10-sector" NACE classifications, facilitating comprehensive evaluations of the regional economy.

- **Source**: Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2014-2023
- **Unit**: Million purchasing power standards (PPS)

Please refer to the technical annex for more information.

Figure 2.14 visualises gross value added (GVA), which is an important indicator of economic activity. GVA measures the value created by all economic activities involved in producing goods and services in a specific area. It is differentiated by sectors to provide detailed insights into the economic contributions of different fields.

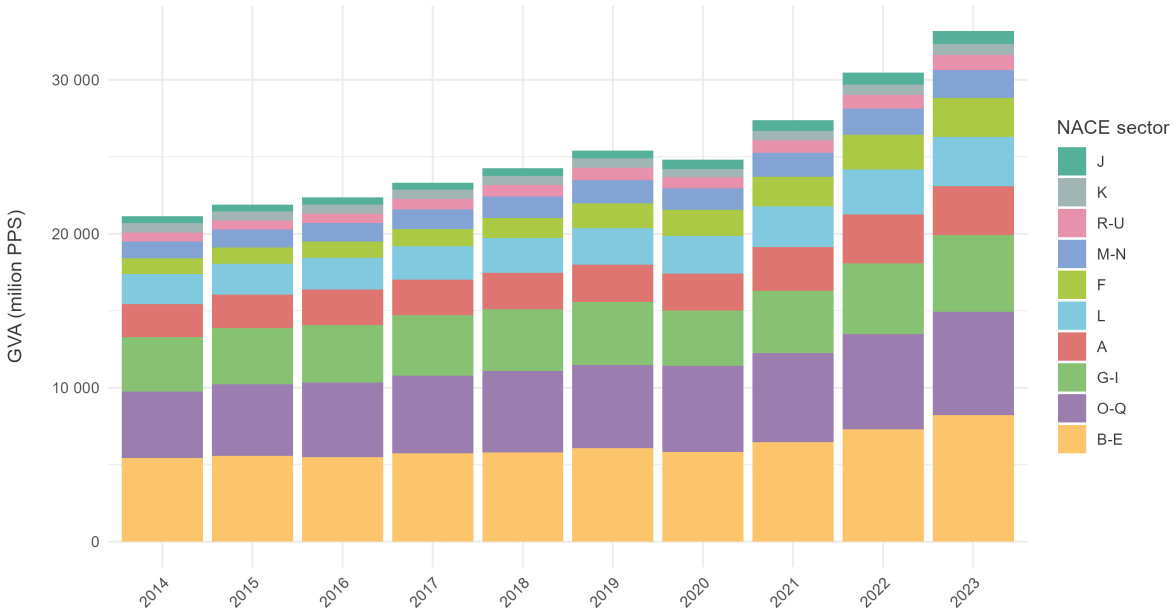
The dataset uses a '10-sector' classification based on NACE categories. The sectoral breakdown is as follows:

- A: Agriculture, forestry and fishing
- B-E: Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply; sewerage, waste management and remediation activities (E)
- F: Construction
- G-I: Wholesale and retail trade; repair of motor vehicles and motorcycles (G), Transportation and storage (H), Accommodation and food service activities (I)
- J: Information and communication
- K: Financial and insurance activities
- L: Real estate activities
- M-N: Professional, scientific and technical activities (M), Administrative and support service activities (N)
- O-Q: Education (O), Human health and social work activities (Q)

› R-U: Arts, entertainment and recreation R), Other service activities (S), Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use (T), Activities of extraterritorial organisations and bodies (U)

Between 2014 and 2023, the GVA in the border area of Hungary-Croatia increased from 21,127 million purchasing power standards (PPS) to 33,164 million PPS — a growth of 57%. Sector groups B–E, G–I, and O–Q together make up over half of the total GVA, highlighting their significant contribution to the regional economy within the border area. The sector groups B–E contributed the largest share, with a total of 8,232 million PPS in 2023. This underlines the significance of sectors such as Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply; sewerage, waste management and remediation activities (E) in the Hungary-Croatia border region.

Figure 2.14: Gross value added at basic prices by sector (comparison)



A: Agriculture, forestry and fishing
B-E: Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply; sewerage, waste management and remediation activities (E)
F: Construction
G-I: Wholesale and retail trade; repair of motor vehicles and motorcycles (G), Transportation and storage (H), Accommodation and food service activities (I)
J: Information and communication
K: Financial and insurance activities
L: Real estate activities
M-N: Professional, scientific and technical activities (M), Administrative and support service activities (N)
O-Q: Education (O), Human health and social work activities (Q)
R-U: Arts, entertainment and recreation (R), Other service activities (S), Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use (T), Activities of extraterritorial organisations and bodies (U)

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2.2.3.2 Nominal compensation per hour worked

Indicator description

The indicator shows the average income paid for each hour worked, known as compensation per hour worked. This measure is calculated by dividing the "compensation of employees at current prices" by the total number of "hours worked (employees)." Employees, in this context, are defined as individuals engaged by contract in productive activities for a resident unit, receiving remuneration irrespective of their place of residence. The total hours worked is considered the most appropriate measure of labour input, representing the aggregate number of hours actually worked by employees. This indicator provides valuable insights into labour productivity and wage dynamics within the economy.

- **Source**: Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage**: 2023 (missing data from 2023 in Switzerland were supplemented by values from 2022)
- **Unit**: Euro

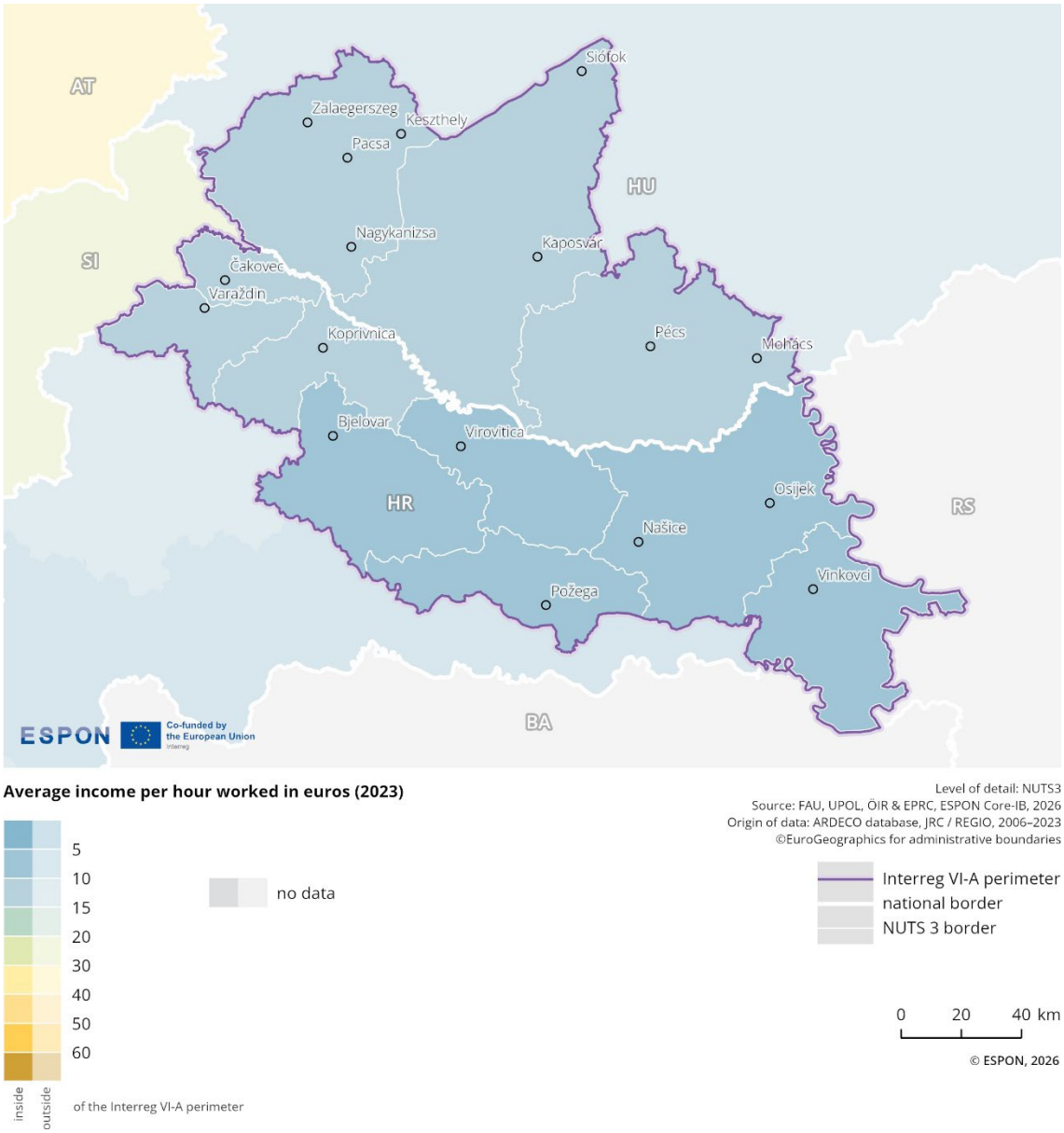
Please refer to the technical annex for more information.

Figure 2.15 shows the average values for the 'compensation per hour worked'. This indicator is calculated by dividing the total compensation of employees (at current prices) by the total number of hours worked by those employees. In this context, 'employees' are defined as individuals engaged by contract in productive activities. The data is available for the place of work, regardless of the place of residence. Total hours worked represent the actual number of hours worked by employees and are considered the most accurate measure of labour input.

In 2023, nominal compensation per hour worked in the Hungary–Croatia border region appears to be distributed somewhat evenly. In the Croatian areas within this cross-border region, the average hourly income ranges between €9.80 and €11.20 (national average: €11.30)[9]. In Hungarian areas, the average hourly income ranges between €10.50 and €11 (national average: €11.3).

[9] See Eurostat Statistical Atlas for NUTS3 (2021) regions: https://ec.europa.eu/statistical-atlas/viewer/?config=typologies.json&ch=NUTS&mids=BKGCNT,NUTS2021L3,CNTOVL&o=1,1,0.7&center=49.69576,14.3332,4&lcis=NUTS2021L3&

Figure 2.15: Average income per hour



2.2.4 Infrastructure and housing

This sub-dimension shows the impact of the border on infrastructure and housing in the region. It assesses housing prices and average internet speed in order to identify cross-border effects, including potential price spillovers and disparities. The analysis reveals whether infrastructure and housing markets facilitate integration or expose structural challenges that are specific to the border area.

2.2.4.1 Advertised sales prices

Indicator description

The indicator shows the advertised sales price per square meter for houses/appartements as retrieved from commercial real estate websites at national level. In the cross-border region, local differences between average sales prices are highlighted and the "cutting" effect of the border and its influence on price levels is visualised.

- **Source/method of retrieval**: Processed ESPON House4all data. The original data is collected via web-scraping of national listing websites over a one-year period.
- **Temporal coverage**: 2024/2025
- **Unit**: Average price per square meter (€/m^2)

Please refer to the technical annex for more information.

Figure 2.16 illustrates the advertised sales price of housing in 2025 across the border region. The data are categorised into ranges of average housing price per square metre, from below 250 €/m^2 up to more than 8,000 €/m^2, shown in colours ranging from purple and blue to green, yellow and orange.

The map shows that prices in the Hungarian part are mostly in the lower categories, ranging from 500 to 2000 €/m^2. The exception is the belt around the recreational area around Lake Balaton, where prices range from 2,000 to 4,000€/m^2 at the northern part of the cross-border area. The area around the town of Balatonboglár has prices above 4,000 €/m^2. In the Croatian part, there is only partial data about average sales prices, especially for towns. Prices have been determined in the cities of Osijek and Slavonski Brod (2,000 to 4,000 €/m^2). The other 2 cities, Varaždin and Bjelovar, have lower average prices, ranging from 1,000 to 2,000 €/m^2. The prices in the Croatian countryside are not determined, and this influences the calculated average price for this part of the border.

Figure 2.16: Advertised housing prices

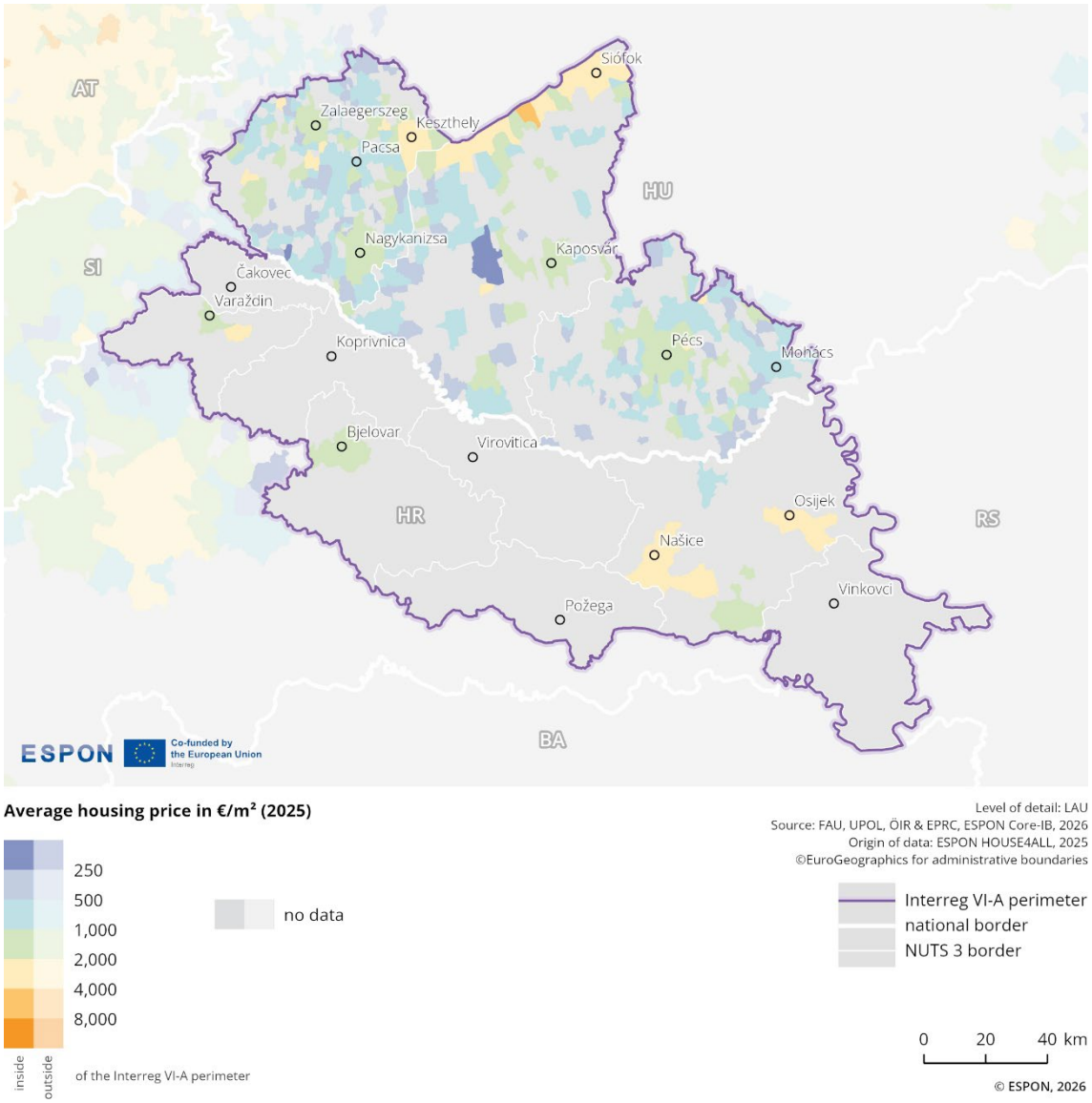
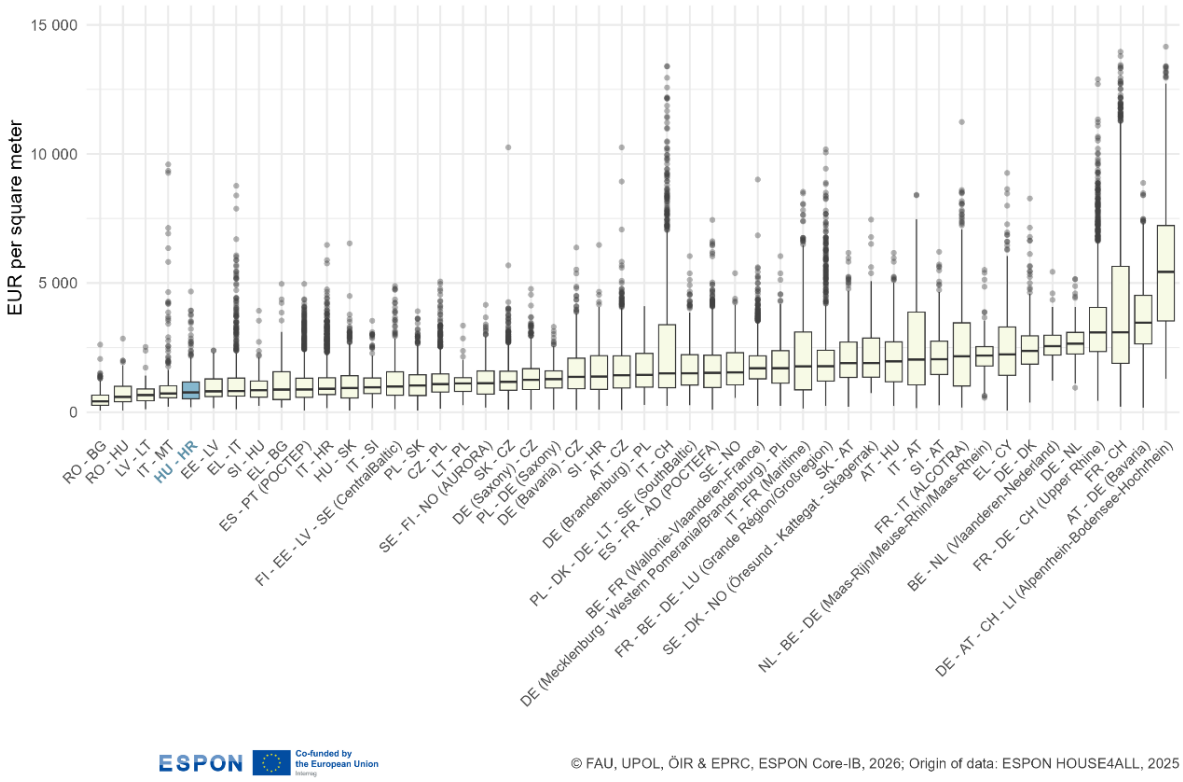


Figure 2.17 shows that the part of the border region in Hungary has an average advertised sales price of around 967 €/m².

The part of the border region in Croatia has an average advertised sales price of around 2,310 €/m² for areas with known prices. The prices in the Croatian countryside are not determined, so the calculated average price is not valid for these parts of countryside.

The average advertised sales price in this entire border region is 1,002 €/m², which is below the average of all EU evaluated border regions at 1,900 €/m². The prices are below European average of 5,600 €/m².

Figure 2.17: Advertised housing prices (comparison)



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2.2.4.2 Average internet speed

Indicator description

The indicator shows the population weighted average internet speed available at municipal level. It highlights differences in the "digital preparedness". In border regions, this indicator is particularly relevant for identifying digital infrastructure gaps that may hamper balanced development and cross-border integration.

- **Source/method of retrieval**: Processing of data provided by Speedtest by Ookla Global Fixed and Mobile Network Performance Maps, based on Ookla's analysis of Speedtest Intelligence data.
- **Temporal coverage**: 2022
- **Unit**: Download speed in Mbps

Please refer to the technical annex for more information.

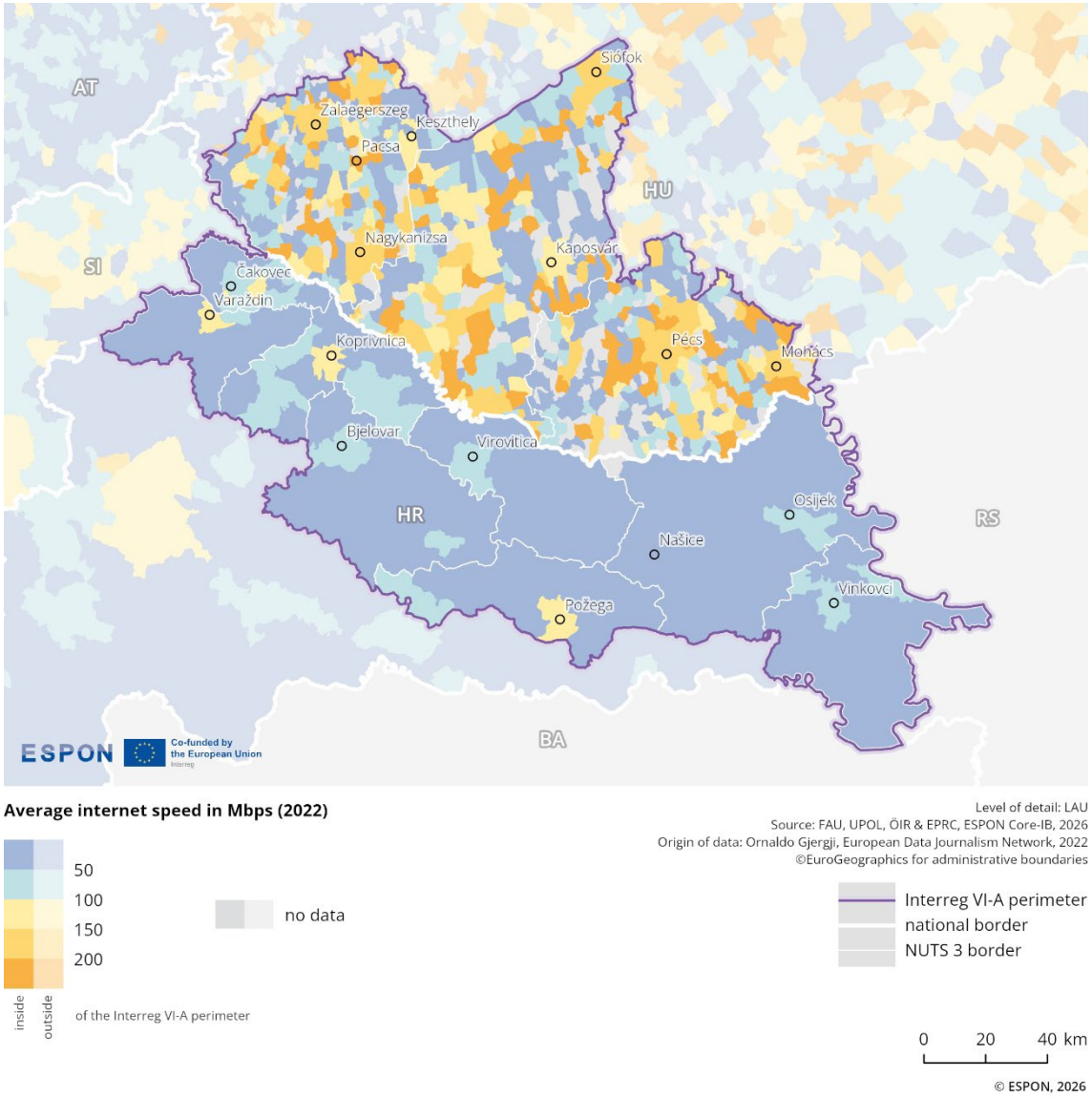
Digitalisation is a highly relevant issue in European border regions, with the overarching objective of ensuring appropriate digital access. It is widely recognised as a key precondition for successful regional and economic development. A major challenge in this process is preventing 'digital divides'— i.e., avoiding significant disparities in economic, social, and spatial terms.

Average internet speed is a telling indicator of such disparities, highlighting differences in 'digital preparedness' at the local level. Figure 2.18 shows the average download speed at the municipality level. The colour scheme ranges from dark blue (very slow speeds) to orange (very fast speeds). The

data, prepared by OBC Transeuropa for EDJNet, is based on Speedtest Intelligence data from Speedtest/Ookla's Global Fixed and Mobile Network Performance Maps for the first quarter of 2022. The average download speeds are expressed in megabits per second (Mbps), not to be confused with megabytes per second (MBps).

The map reveals significant differences between urban and rural areas. Values range from under 50 Mbps to over 200 Mbps. Cities such as Zalaegerszeg, Nagykanizsa, Kaposvár, Pécs, and Varaždin report relatively high average speeds, while surrounding areas tend to have significantly lower values. This may be due to the greater return on investment typically associated with digital infrastructure projects in urban areas compared to rural ones. However, not all urban areas in this border region have high download speeds—for example, Bjelovar, Virovitica, Osijek, and Vinkovci do not stand out in this regard. Croatia's slightly mountainous terrain clearly poses a challenge to providing high-speed internet, potentially resulting in lower speeds compared to Hungary.

Figure 2.18: Average internet download speed



2.2.5 Key messages on the economic dimension

The Hungary–Croatia border region belongs to the economically weaker areas of the EU. GDP per capita reached only one third of the EU average in 2022, ranking among the lowest in Europe. Nevertheless, the region has shown remarkable dynamics: between 2014 and 2022, GDP per capita increased by nearly 70%, more than double the EU growth rate and significantly above the average of European border regions. This strong convergence trend, however, has not yet closed the absolute gap with national or European levels.

Employment indicators highlight persistent disparities. In 2023, the employment rate in the region stood at 62.5%, still 13 percentage points below the EU average. Substantial national differences exist: employment rates in Croatian border counties remain below 50%, while Hungarian areas range between 50% and 80%. Over time, the gap to European averages has narrowed somewhat, but regional values continue to lag behind both national and cross-border benchmarks.

The share of working-age population has declined markedly, from 67.6% in 2014 to 63.5% in 2023, with losses more pronounced than in the EU overall. Sectoral employment and gross value added (GVA) remain concentrated in manufacturing, trade, and public services, with only moderate structural shifts.

Labour market integration is visible in elevated cross-border commuting, especially from Croatian counties primarily towards and Slovenia. At the same time, wage disparities remain moderate, with hourly compensation ranges between €9.80 and €11.20 in most Croatian areas and €10.50 and €11 in Hungary.

Additional economic dimensions reveal spatial imbalances. Housing prices are lower than the EU border-region average, though Lake Balaton and urban centres constitute high-price pockets. Finally, significant differences in digital infrastructure persist, with urban municipalities better equipped than rural areas. This unevenness underscores the need for targeted policies to support balanced socio-economic development and digital inclusion.

2.3 Green dimension

The green dimension highlights the environmental characteristics, vulnerabilities and sustainability-related interactions within the border region. The analysis provides insight into the environmental interdependence of border regions. Additionally, the spatial distribution of renewable and conventional energy infrastructure, alongside indicators of resources and the circular economy, reveals whether the border facilitates collaborative transitions towards sustainability.

2.3.1 Nature protection and pollution

This sub-dimension investigates cross-border functional links in protected areas and areas affected by air and water pollution. It analyses the presence of protected areas in order to identify cross-border ecological links and conservation efforts. It also highlights the extent to which air and water pollution affects people living in border regions.

2.3.1.1 Protected areas

Indicator description

The indicator shows the presence and territorial coverage of protected areas based on the combination of 3 data sources, i.e., Nationally designated areas, Natura 2000 Network and Emerald Network.

- **Source/method of retrieval**: The indicator represents a combination of nationally designated areas, Natura 2000 and Emerald network provided by EEA (European Environment Agency) Geospatial data catalogue.
- **Temporal coverage**: 2024
- **Unit**: n/a

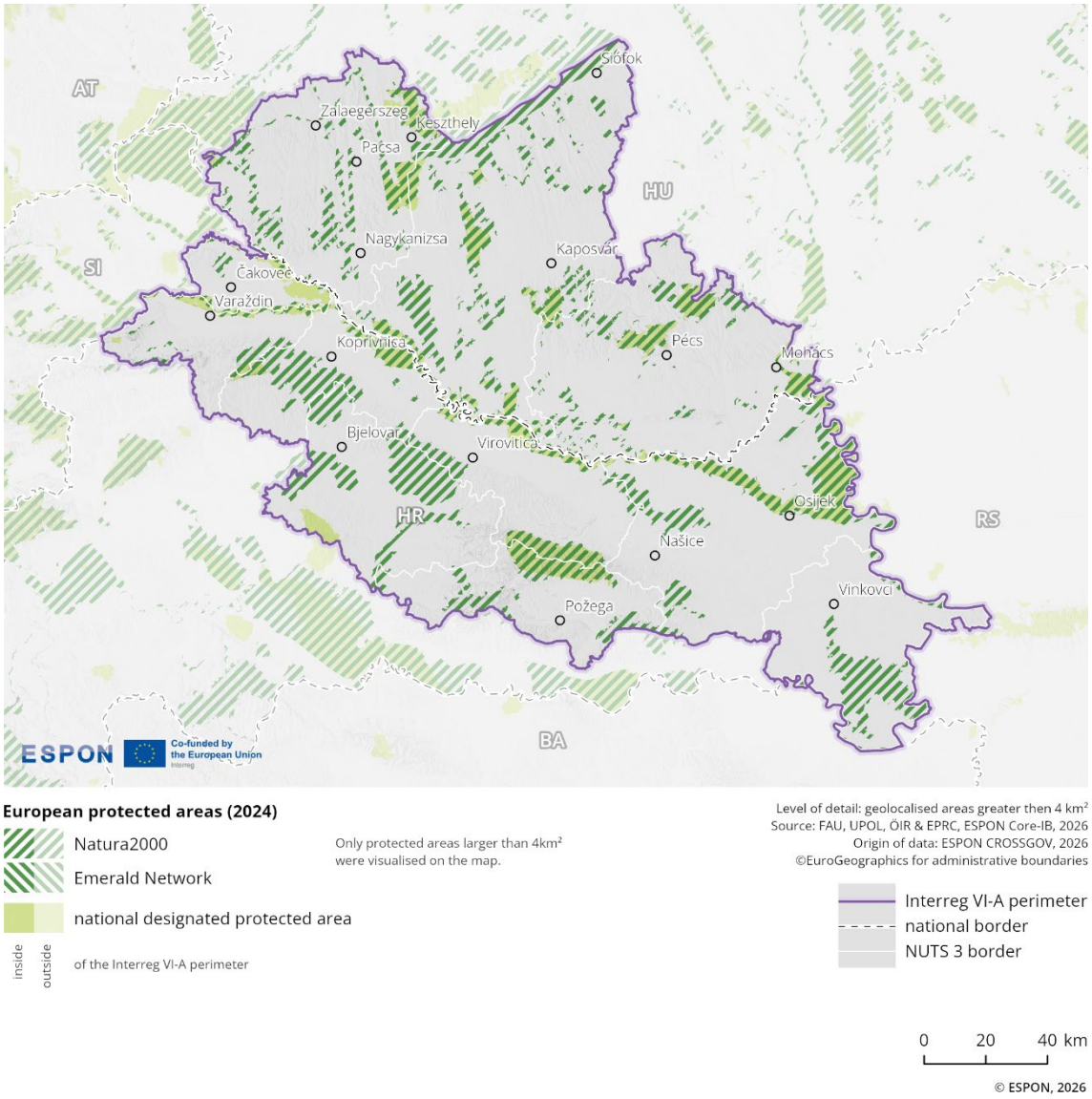
Please refer to the technical annex for more information.

Figure 2.19 illustrates the distribution of protected areas in 2024 across the border region. The data differentiate between Natura 2000 sites, the Emerald Network, and nationally designated protected areas, with only protected areas larger than 4 km² displayed.

The map shows that protected areas within the Interreg region are mostly concentrated along the various rivers forming the border, i.e. the Danube corridor and the Drava and Mura rivers. Additional larger inland clusters are visible in the central Hungarian areas and spread east to west in the Croatian areas. A considerably higher share of Natura 2000 than of nationally designated areas is evident for the programme area.

Due to the nature of riverine borders, a majority of protected areas form continuous cross-border corridors, which however do not extend significantly inland. As almost all protected areas located at the border exhibit this characteristics, connectivity is generally well developed.

Figure 2.19: Nature protected areas



2.3.1.2 Air pollution

Indicator description

The indicator shows the air pollution from fine particulates (PM2.5) at NUTS3 level. The data shows the population-weighted average air pollution level (µg/m³), providing an indication of the extent to which the regional population is affected by air pollution.

- **Source/method of retrieval**: Processing and analysis of European Environment Agency data
- **Temporal coverage**: 2022
- **Unit**: Population weighted average of µg/m³

Please refer to the technical annex for more information.

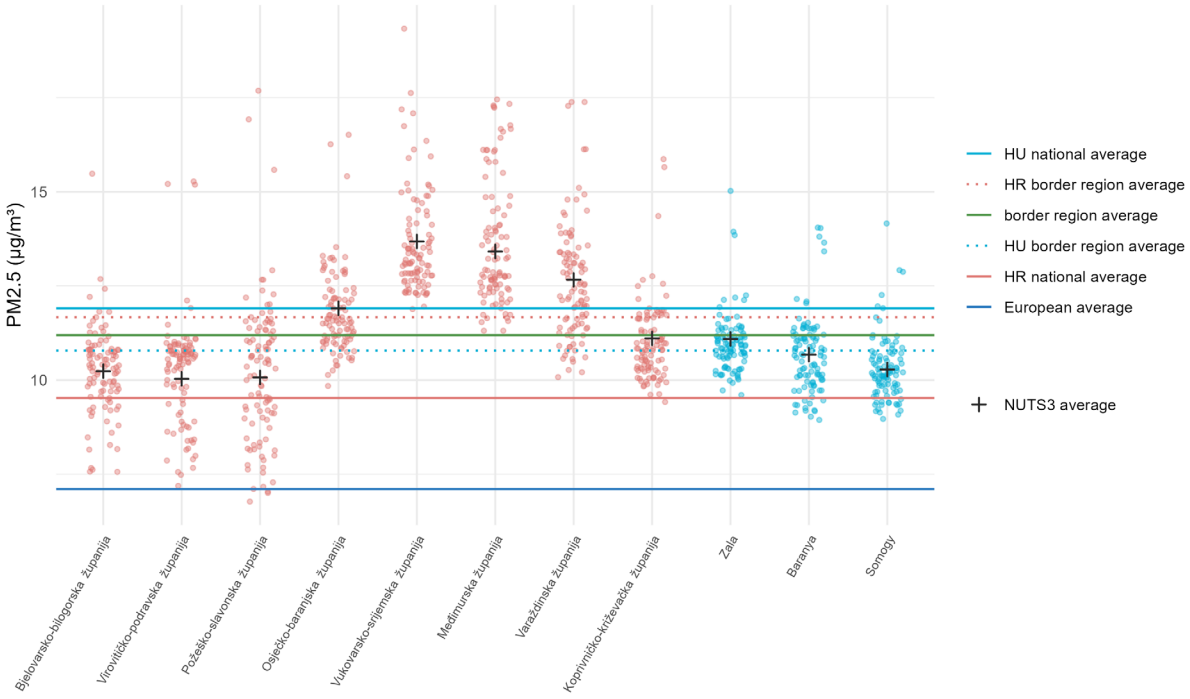
Figure 2.20 illustrates PM2.5 concentrations (in µg/m³) across NUTS3 regions in Croatia and Hungary. Each small dot represents an individual measurement, while the black crosses indicate the average PM2.5 concentration for each NUTS3 region[10]. The regions are aligned along the x-axis, with Croatian regions on the left (in red) and Hungarian regions on the right (in blue).

PM2.5 values in both countries span a wide range. Overall, Croatian regions show higher individual peaks in PM2.5 concentrations than Hungarian regions. Hungarian NUTS3 averages cluster below 12 µg/m³. Croatian NUTS3 averages display more variability and several exceed 12 µg/m³.

Hungary's national average is approximately 12 µg/m³, with the border region average being lower. In contrast, Croatia's national average is slightly below 10 µg/m³, which is significantly lower than its border region average.

The European average is around 7 µg/m³, which is lower than both the Croatian and Hungarian values. The cross-border average is slightly around 11 µg/m³, making it higher than the European average and Croatian national average. This cross-border average reflects the higher PM2.5 values in the Croatia border region and the lower values in the Hungarian border region.

Figure 2.20: Air pollution



[10] See Eurostat Statistical Atlas for NUTS3 (2021) regions: https://ec.europa.eu/statistical-atlas/viewer/?config=typologies.json&ch=NUTS&mids=BKGCNT,NUTS2021L3,CNTOVL&o=1,1,0.7&center=49.69576,14.3332,4&lcis=NUTS2021L3&

2.3.1.3 Water pollution

Indicator description

The indicator shows the ecological status or potential for coastal and river water bodies. It is based on an assessment of biological, hydro-morphological, chemical and physico-chemical quality elements.

- **Source/method of retrieval**: Processing and analysis of European Environment Agency data
- **Temporal coverage**: 2022 (supplemented by 2016 data)
- **Unit**: n/a

Please refer to the technical annex for more information.

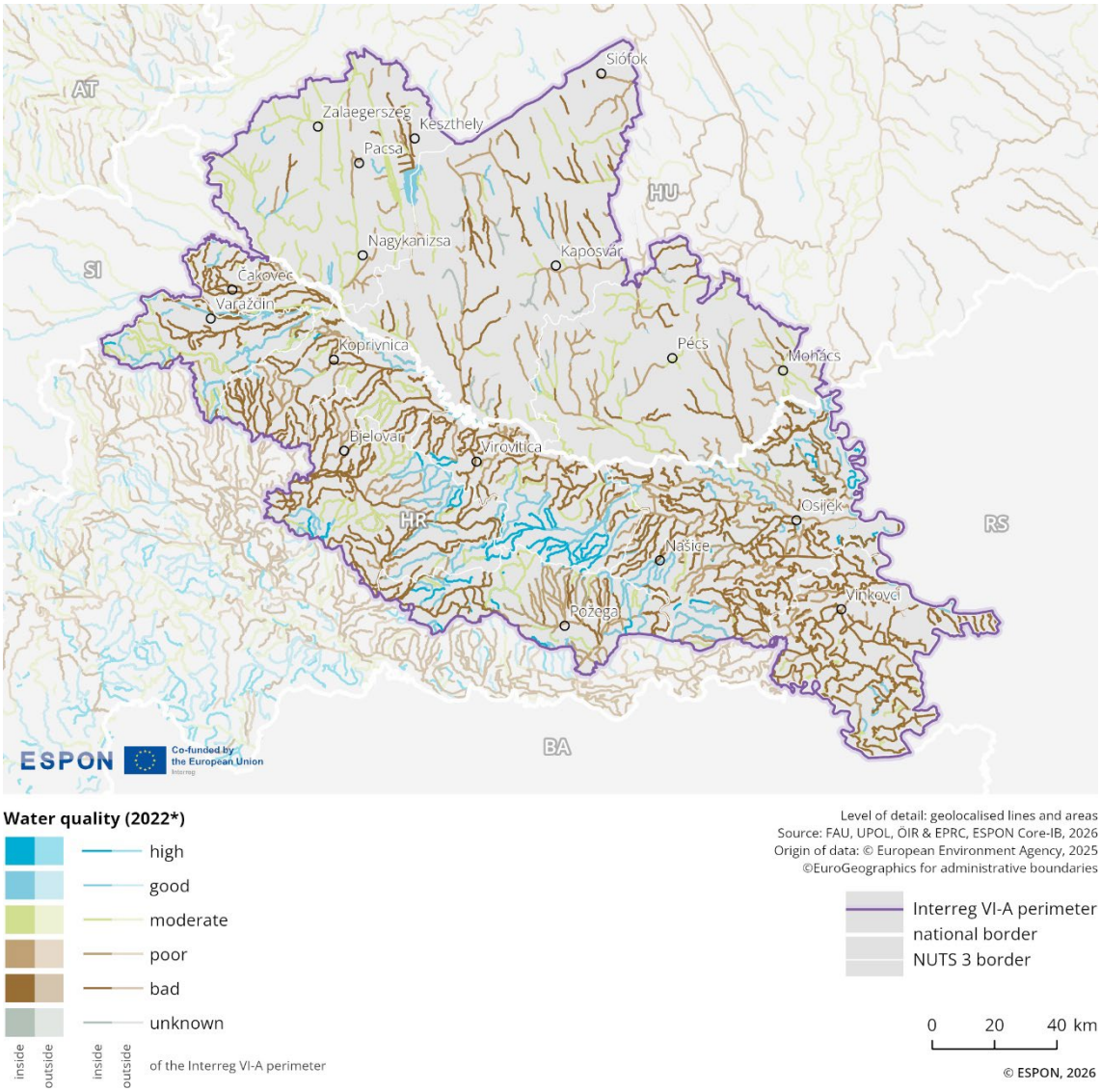
Figure 2.21 illustrates water pollution levels in Hungary and Croatia within their Interreg region in 2022. Water quality is represented using 6 colour-coded categories, ranging from "bad" to "high", including an "unknown" category[11].

In the Hungarian part, water bodies are predominantly rated as “poor” and “bad”, some stretches are classified as “moderate” and a small number as “good”. Only a few smaller rivers achieve “moderate” or “good” quality.

In the Croatian part, however, conditions vary strongly. Water bodies, particularly in the east are predominantly rated as “bad”. A few rivers are classified as “poor” and “moderate”. However, in the Centre of the region some rivers are rated as “good” and “high”.

[11] For more information see the Water Framework Directive Reporting Guidance (2022): https://cdr.eionet.europa.eu/help/WFD/WFD_715_2022

Figure 2.21: Water quality patterns



2.3.2 Climate risks and resilience

This sub-dimension examines cross-border functional links relating to climate risks and resilience. It analyses exposure to natural hazards such as landslides, earthquakes, droughts and floods in order to identify vulnerabilities and risks.[12]

2.3.2.1 Natural hazard risks

Indicator description

The indicator shows the risk the border region is facing in relation to natural hazards (floods, droughts, landslides and earthquakes). The map highlights potential cross-border affectedness and allows to judge the relative relevance of each risk for the cross-border region.

- **Source/method of retrieval**: The indicator is based on geodata from the Disaster Management Risk Knowledge Centre/JRC. It provides the likelihood of specific natural hazard events at grid level.
- **Temporal coverage**: 2024
- **Unit**: n/a

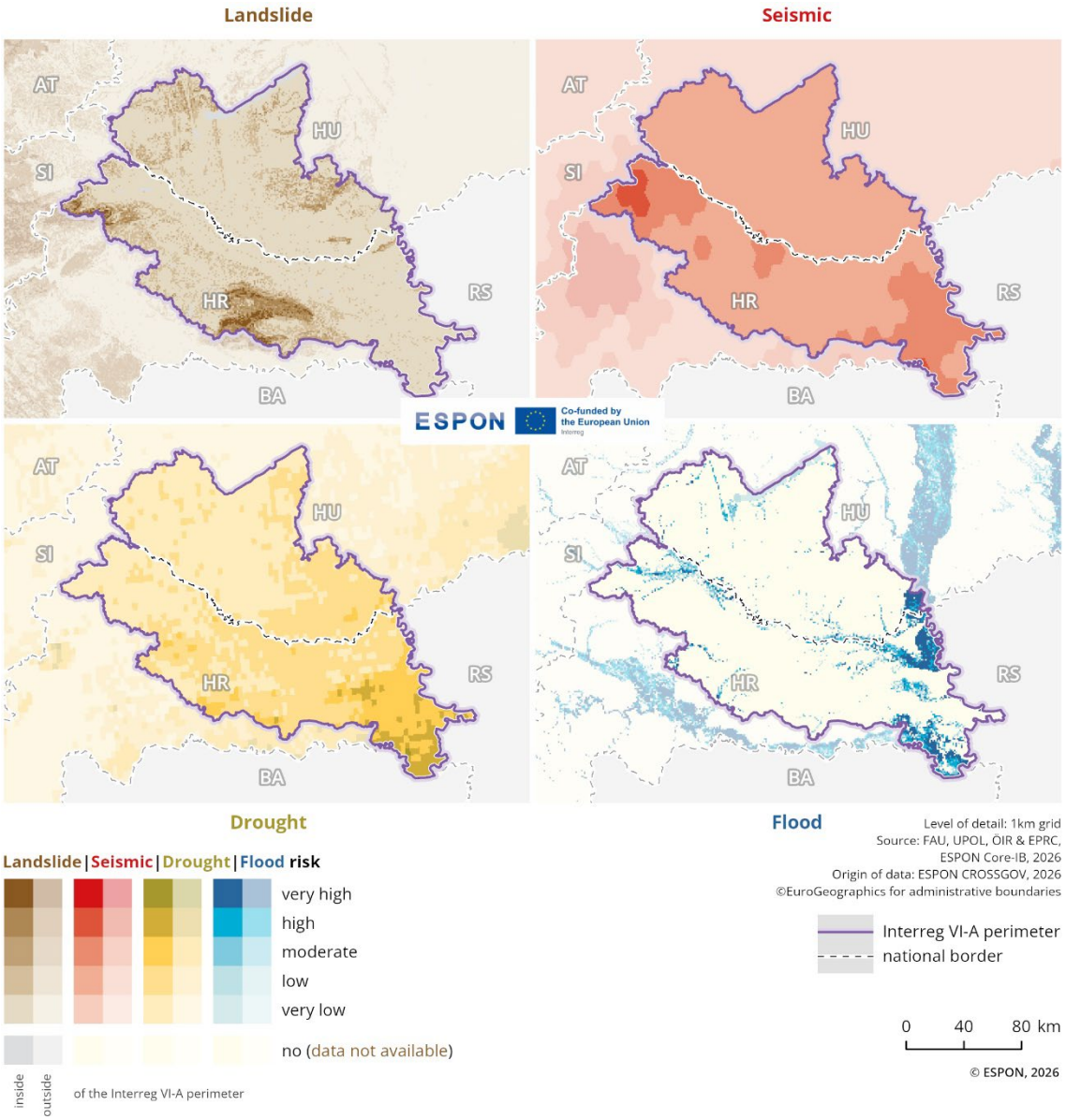
Please refer to the technical annex for more information.

Figure 2.22 illustrates the spatial distribution of natural hazards in the Hungary-Croatia region, highlighting areas where risks are shared across national boundaries and where risks are not necessarily cross-border relevant.

Seismic activities are mostly very low, except for a small region around the city of Varaždin on the Croatian side of the border. Similarly, the risk of landslides is concentrated very locally in some more mountainous areas in Croatia. Moderate drought risks are present in the Croatian region of Slavonia, located in the south of the cross-border area. In Hungary, the Danube poses a very high risk of flooding, while the border river Drava is of concern for both sides of the border. In the south the Sava poses a flooding issue for the Croatian side.

[12] See also: European Commission 2024: Strengthening the Resilience of EU Border Regions, https://ec.europa.eu/regional_policy/sources/studies/KN-02-24-586-2A-N.pdf

Figure 2.22: Natural hazard risks



2.3.3 (Renewable) Energy and energy infrastructure

This sub-dimension assesses cross-border functional links in energy supply and infrastructure, focusing on existing connections and missing links. The distribution of power lines, energy infrastructure and power stations is analysed to identify supply patterns and potential integration gaps. The analysis reveals whether the border facilitates energy cooperation and connectivity, or if infrastructural differences create barriers.[13]

2.3.3.1 Power lines and energy infrastructure

Indicator description

The indicator shows the distribution of power lines and energy infrastructures in the cross-border region. The geodata highlights the existing links and gaps in the cross-border interconnections of the energy transmission network.

- **Source/method of retrieval**: Geodata on high-voltage energy infrastructure (100 kV and above) has been collected and processed from OpenStreetMap.
- **Temporal coverage**: 2025
- **Unit**: kV

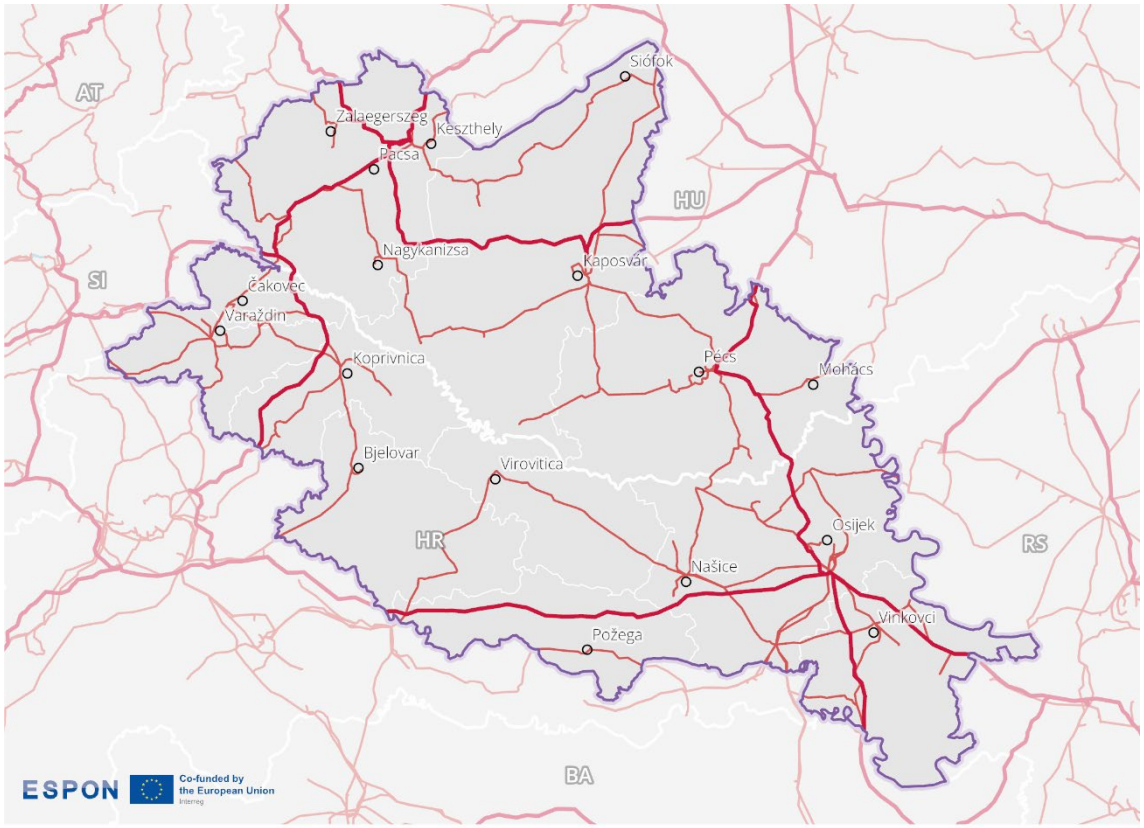
Please refer to the technical annex for more information.

Figure 2.23 illustrates the distribution of power lines and cables in 2025 across the border region. The data distinguish between overhead and underground power lines, further classified into high-voltage (100-230 kV), extra high-voltage (230-1,000 kV), and ultra-high voltage (above 1,000 kV).

The map shows that the cross-border region of Hungary-Croatia features relatively extensive high- and extra high-voltage energy infrastructure. A considerably branched network of extra high-voltage lines (in the northwestern and southeastern parts of the cross-border region) are complemented with a network of high-voltage lines throughout the region. This is spatially matched by the direct connection between the 2 countries at 3 points along their shared border (twice via extra high-voltage lines and once via a lower high-voltage line). In the central part of the cross-border region, the energy infrastructure is rather sparse.

[13] See also: European Commission 2025: Handbook on Cross-border Energy Communities, https://ec.europa.eu/regional_policy/sources/studies/2025/Handbook_on_Cross-border_Energy_Communities.pdf

Figure 2.23: High-voltage transmission infrastructure



Overhead power lines (2025)

- High Voltage (100–230 kV)
- Extra High Voltage (230–1.000 kV)
- Ultra High Voltage (1.000 kV+)

Underground power cables (2025)

- High Voltage (100–230 kV)
- Extra High Voltage (230–1.000 kV)
- Ultra High Voltage (1.000 kV+)

inside / outside of the Interreg VI-A perimeter

ANSI Standard C84.1 was used for classification of power lines.

Level of detail: geolocated lines
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON CROSSGOV, 2026
©EuroGeographics for administrative boundaries

- Interreg VI-A perimeter
- national border
- NUTS 3 border

0 20 40 km

2.3.3.2 Power stations

Indicator description

The indicator shows the location of power stations by type and energy production levels (coal, gas and oil, nuclear, hydro). It can indicate differences and complementarities in the national energy supply systems as well as highlight potential supply-demand links when viewed in conjunction with power lines infrastructure.

- **Source**: OpenStreetMap, Global Energy Monitor, JRC Hydro-power plants database
- **Temporal coverage**: 2025
- **Unit**: MW

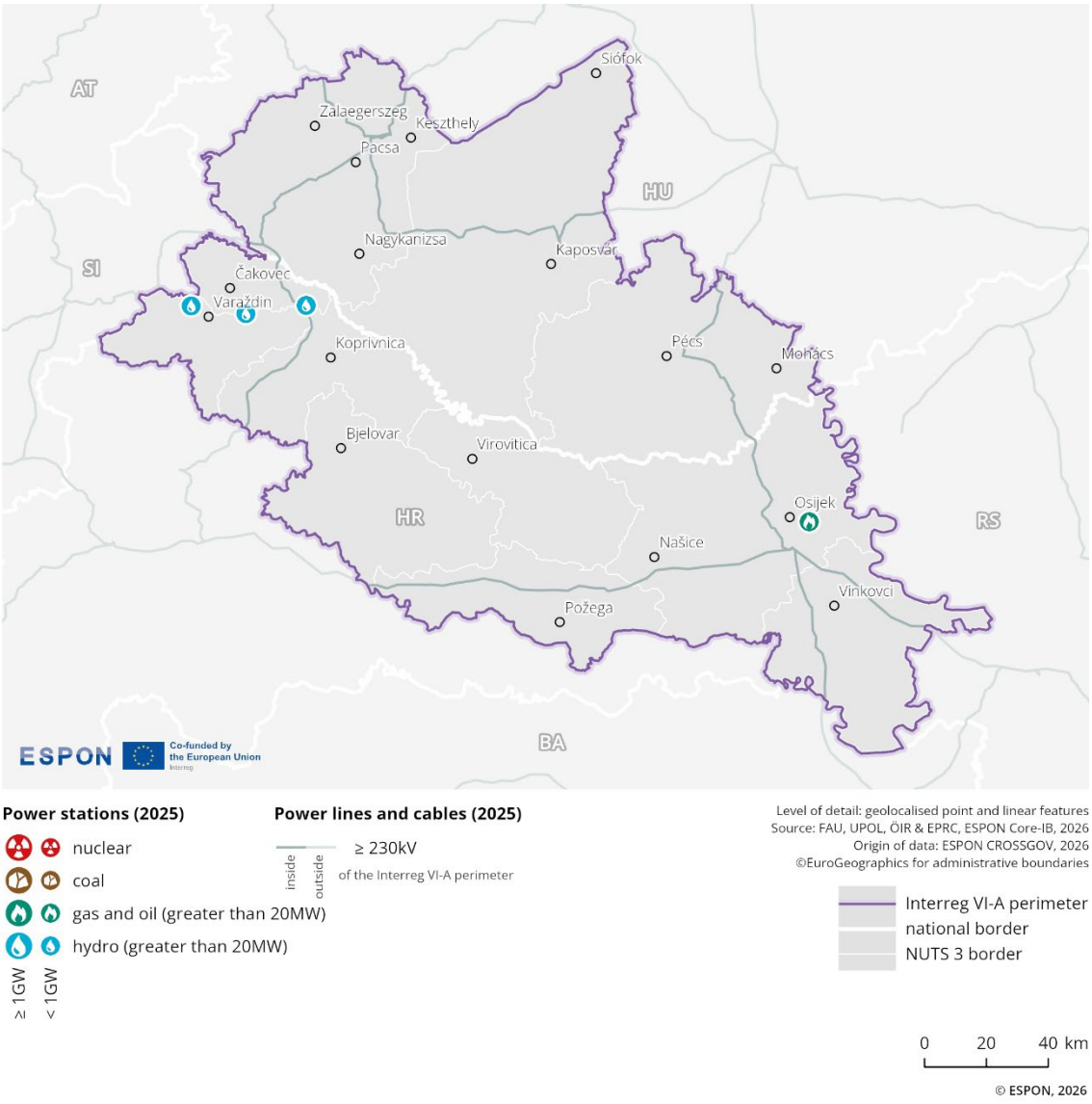
Please refer to the technical annex for more information.

Table 1 and Figure 2.24 show that in the Hungary-Croatia cross-border region, in total, there are 4 power station locations – 3 of them are represented by hydroelectric power stations, all of them located in Croatia (in the western part of the cross-border region). The only gas and oil station is also placed in Croatia, but in its eastern part near Osijek. No other type of power station/plant is present in the region.

Table 1: Number and type of power stations

Power stations/plants	Less than 1GW	1GW and up
Nuclear	/	/
Coal	/	/
Gas and oil	1	/
Hydro	3	/

Figure 2.24: Power stations infrastructure



2.3.4 Resources and circular economy

This sub-dimension focuses on resource use patterns in the border region and their implications for circular economy practices. It analyses resource productivity and waste generation in order to evaluate the efficiency and sustainability of resource utilisation across the border.

2.3.4.1 Resource productivity

Indicator description

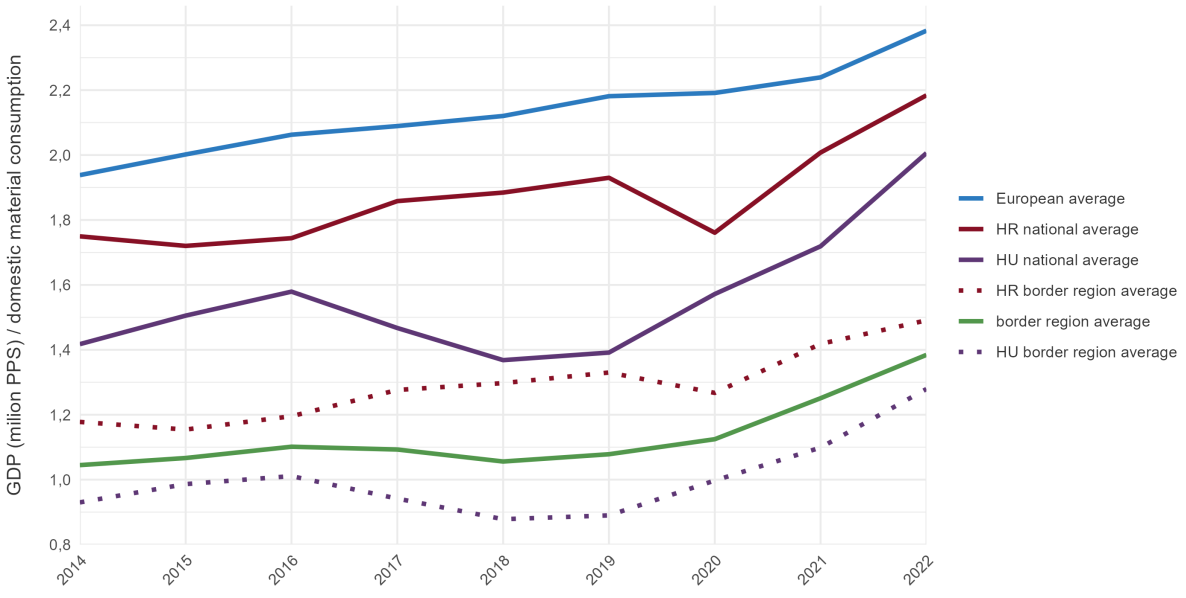
The indicator shows the economic value generated per unit of material consumed for each region within the cross-border area. Developments over time provide insights if the decoupling of productivity from resource use is progressing on regional level.

- **Source/method of retrieval**: Processing of Eurostat and ESPON CIRCTER (Circular Economy and Territorial Consequences) Update data
- **Temporal coverage**: 2014-2022
- **Unit**: PPS/tons

Please refer to the technical annex for more information.

Figure 2.25 illustrates the development of GDP per unit of domestic material consumption in million PPS/DMC (purchasing power standards per domestic material consumption) between 2014 and 2022. The data compare the national averages, the averages of their respective border regions, and the overall border regional average with the European average.

Figure 2.25: Resource productivity



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The chart shows that the Croatian and Hungarian national averages both show an upward trend over the observed period, although with several fluctuations. The Hungarian national average shows a slight decrease between 2016 and 2019, followed by a sharp increase, reaching around 2.0 million PPS/DMC in 2022. The Hungarian border region average follows a similar trend but at a lower level, reaching

around 1.3 million PPS/DMC in 2022. The Croatian national average shows an overall steady increase, expect for a downward peak in 2020, but rises again afterward, reaching around 2.2 million PPS EUR GDP per unit of domestic material consumption in 2022. The Croatian border region average follows a similar trend at a slightly lower level.

The European average lies significantly above both the Hungarian and Croatian values. The border region average represents a combination of the lower Croatian border region values and the higher Hungarian border region values, reaching approximately 1.3 million PPS/DMC in 2022.

2.3.4.2 Generation of waste per GDP

Indicator description

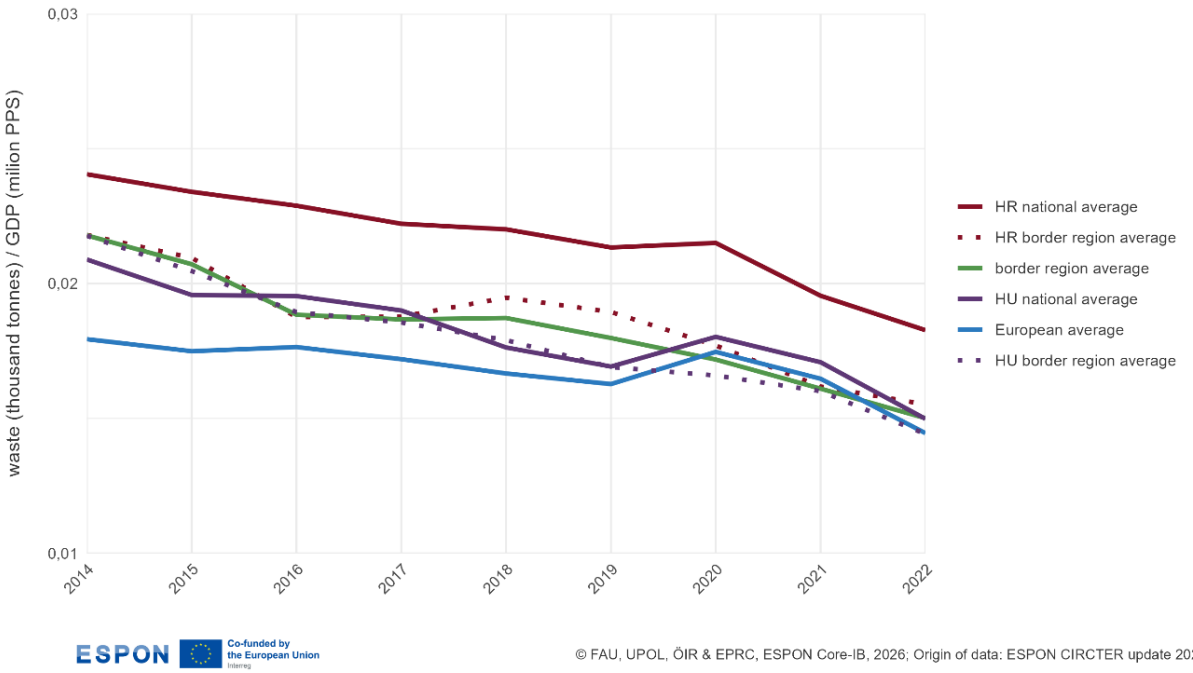
The indicator shows the regional distribution of waste creation in relation to the GDP development. Comparing waste generated to GDP reflects the waste intensity of the economy and provides a measure of "eco-efficiency". Observation of its change from year to year permits to assess whether the economy is able to produce more wealth while at same time generating less waste.

- **Source/method of retrieval**: Processing of Eurostat and ESPON CIRCTER Update data
- **Temporal coverage**: 2014-2022
- **Unit**: Tons/PPS

Please refer to the technical annex for more information.

Figure 2.26 illustrates the trend in waste generation relative to economic output, measured in tonnes of waste per million PPS (Purchasing Power Standard) of GDP from 2014 to 2022 in Hungary, Croatia and their Interreg border region.

Figure 2.26: Waste generation per GDP



Hungarian and Croatian values show a steady downward trend over the observed period. In Hungarya the average for border region is slightly lower than the national average. In 2022, the Hungarian national average reached approximately 0.015 tonnes of waste per million PPS. Croatian national average is considerably higher than the Hungarian one. The Croatian border region records values that are lower than the national average and closely aligned with the Hungarian border regional average.

The European average gradually decreases from around 0.018 in 2014 to approximately 0.015 tonnes of waste per million PPS in 2022. The cross-border regional average remains above the European average until 2020 and lies between the higher values of the Croatian border region and the lower values of the Hungarian border region. In 2022, it reaches approximately 0.015 tonnes of waste per million PPS.

2.3.5 Key messages on the green dimension

Environmental features of the Hungary–Croatia border region are strongly shaped by its river systems. Protected areas are concentrated along the Danube, Drava and Mura corridors, forming continuous cross-border ecological zones. While these provide well-developed connectivity, protected areas seldom extend inland, limiting broader spatial integration of conservation. Natura 2000 sites account for a comparatively higher share than nationally designated areas, underlining the European framework's significance in safeguarding biodiversity.

Air quality indicators reveal contrasting patterns. Average PM2.5 concentrations (in µg/m³) are lower in the Hungarian part of the region, generally clustering below 12 µg/m³, while Croatian border regions display more variability and frequent exceedances of this threshold. The cross-border average of around 11 µg/m³ remains above the European benchmark (7 µg/m³), pointing to persistent challenges, particularly on the Croatian side.

Natural hazards are spatially diverse: flood risks are pronounced along the Danube and Drava, affecting both sides, while the Sava represents an additional concern in southern Croatia. Other risks, such as seismic activity and landslides, are locally confined, mainly in Croatian mountainous areas, whereas drought risk is more notable in Slavonia.

Energy infrastructure is relatively well developed, with 3 cross-border high-voltage connections. Yet the generation capacity is limited, dominated by 3 Croatian hydroelectric stations and a single gas and oil plant near Osijek, while Hungary has no major power plants in the border zone.

In terms of resource use, the border region lags behind European standards. Resource productivity remains substantially below the EU average, despite gradual improvements, while waste generation per GDP has converged to EU levels only recently. These trends indicate ongoing efficiency challenges.

Taken together, the region demonstrates ecological continuity along riverine borders but persistent disparities in pollution levels, hazard exposure, energy production, and resource efficiency, requiring stronger cross-border coordination.

2.4 Socio-economic dimension

The socio-economic dimension examines patterns of social integration, tourism, and access to public services in the border region. It identifies how socio-cultural links, visitor flows and essential services influence development in the cross-border area. By examining interpersonal interactions via social media, language differencies, tourism intensity, and the accessibility of facilities such as secondary schools, grocery shops, hospitals, doctors, pharmacies and cinemas this dimension highlights both functional integration and potential socio-spatial differences.

2.4.1 Social integration

This sub-dimension evaluates the level of social integration in the border region by identifying areas with low or high cross-border interactions. It analyses cross-border connectivity in social media and language similarities across and along national borders to evaluate the potential for cultural and social integration.

2.4.1.1 Cross-border connectivity in social media

Indicator description

The indicator refers to the existing connections between users of META social media (in particular Facebook) across the border. It aims at giving an overview of the degree of personal connectivity between inhabitants of the border area. Even though not all these internet connections will relate to real communication exchanges but sometimes just "following" content from other users, they give an overview of interpersonal and cultural knowledge of the social media landscape from across the border.

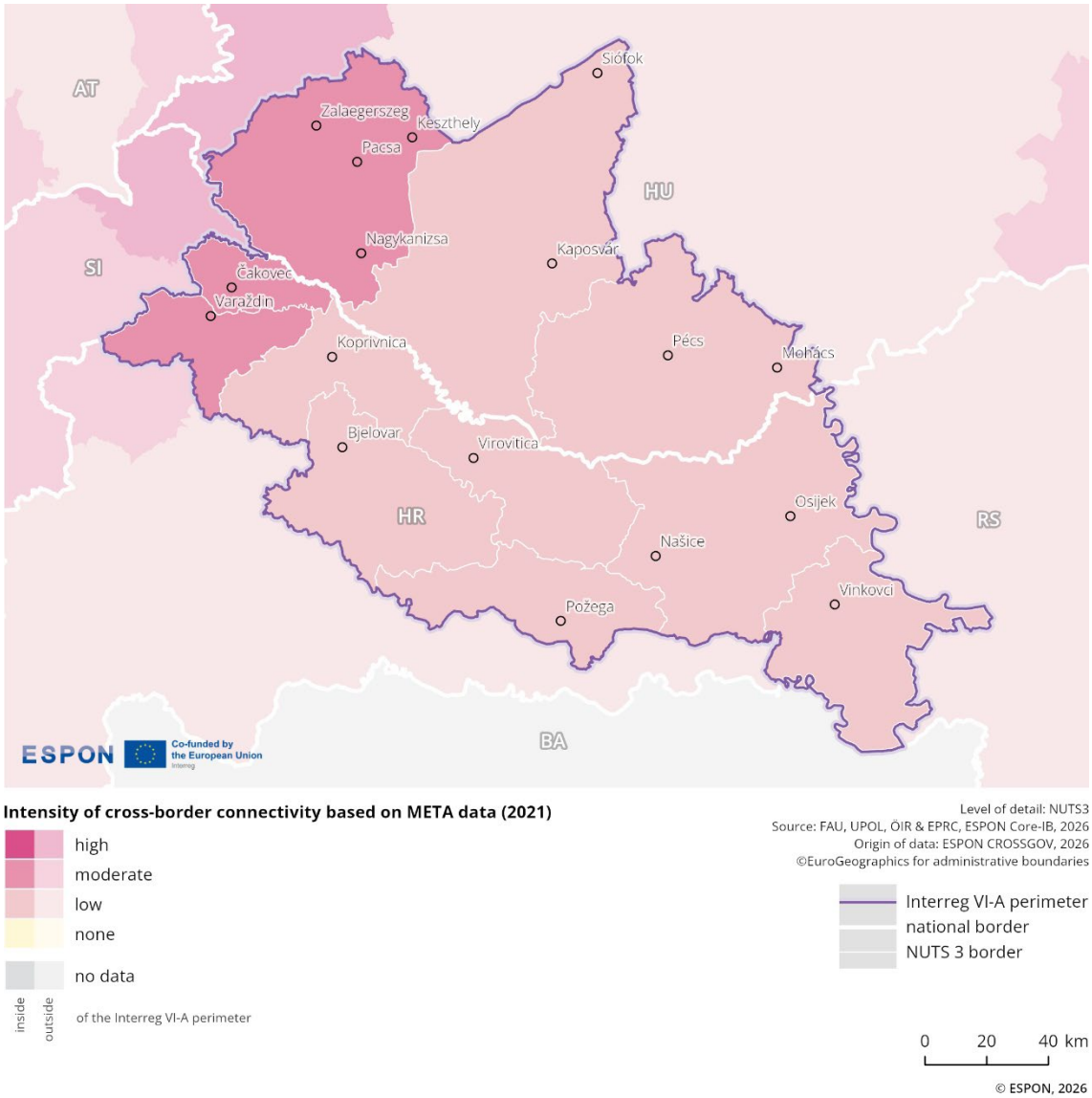
- **Source/method of retrieval**: Processing Facebook data on existing connections across the border (data for Good Meta)
- **Temporal coverage**: 2021
- **Unit**: n/a

Please refer to the technical annex for more information.

Figure 2.27 illustrates the spatial distribution of cross-border connectivity based on Facebook information in the border area. The different shades of pink indicate varying intensities of interaction, ranging from low to high, with darker tones representing stronger intensity of cross-border connectivity in social media.

The map shows that the intensity of cross-border connectivity among residents of this border region is relatively homogeneous, so cross-border differences between the included states are not noticeable. In most NUTS3 units of the region, cross-border connectivity in social media is low, including areas around the cities of Kaposvár, Pécs, Bjelovar, Virovitica, Osijek, and Vinkovci. Only in the northern part of the Hungarian area (around Zalaegerszeg, Keszthely and Nagykanizsa) is cross-border connectivity medium, and a similar medium intensity is observed in the northern parts of the Croatian area (around the city of Varaždin).

Figure 2.27: Cross-border connectivity in social media



2.4.1.2 Language similarities along national borders

Indicator description

The indicator specifies whether the language is the same across the border, whether the respective national languages have commonalities, whether while different, there are local linguistic commonalities, and whether the language is different.

- **Source/method of retrieval**: ESPON cross-border public services (CPS) 2.0 database along border segments
- **Temporal coverage**: 2022
- **Unit**: n/a

Please refer to the technical annex for more information.

2 different languages characterise the border region, with no similarities and no widespread knowledge of the neighbouring regions language recorded.

2.4.2 Tourism

This sub-dimension identifies key tourism hotspots in the border region to highlight tourism dynamics. It analyses the number of nights spent in tourist accommodation establishments in order to evaluate the attractiveness of, and developments in, the tourism sector. Comparisons with the respective countries and the EU average provide context for understanding the region's dynamics.

2.4.2.1 Nights spent at tourist accommodation establishments

Indicator description

The indicator shows the number of nights a guest or tourist actually spends in a tourist accommodation establishment or non-rented accommodation (overnight stays). This may reveal the tourism attractiveness of a region and shed light on the role of tourism in the local economy, i.e., tourists/guests staying overnight may spend more in the region than one-day visitors.

- **Source**: Eurostat
- **Temporal coverage**: 2020-2023
- **Unit**: Nights per capita

Please refer to the technical annex for more information.

The spatial distribution of overnight stays highlights the importance of key tourist destinations in border areas. Tourism contributes significantly to regional income, infrastructure development and employment, and thereby supports regional prosperity. At the same time, it affects environmental and living conditions, which may reduce local acceptance despite its economic benefits. This is in particular the case in places of overtourism, seasonal pressures, and increasing land-use conflicts.

Figure 2.28 shows the number of overnight stays per capita at tourist accommodation establishments in 2023. It includes hotels, holiday and other short-stay accommodation, as well as campsites, caravan and trailer parks. The map uses a colour gradient, with darker shades indicating a higher number of nights spent per capita in 2023. It also shows the cumulative number of overnight stays from 2020 to 2023.

In 2023, the Hungarian NUTS3 regions Zala and Somogy show 5 to 10 nights per capita[14]. The other regions in the program area comprise somewhat lower values. In terms of total overnight stays over the 3-year period, the leading tourism regions are also Zala (approx. 2.5 million) and Somogy (approx. 1.9 million).

[14] See Eurostat Statistical Atlas for NUTS3 (2021) regions: https://ec.europa.eu/statistical-atlas/viewer/?config=typologies.json&ch=NUTS&mids=BKGCNT,NUTS2021L3,CNTOVL&o=1,1,0.7&center=49.69576,14.3332,4&lcis=NUTS2021L3&

Figure 2.28: Overnight stays in tourism

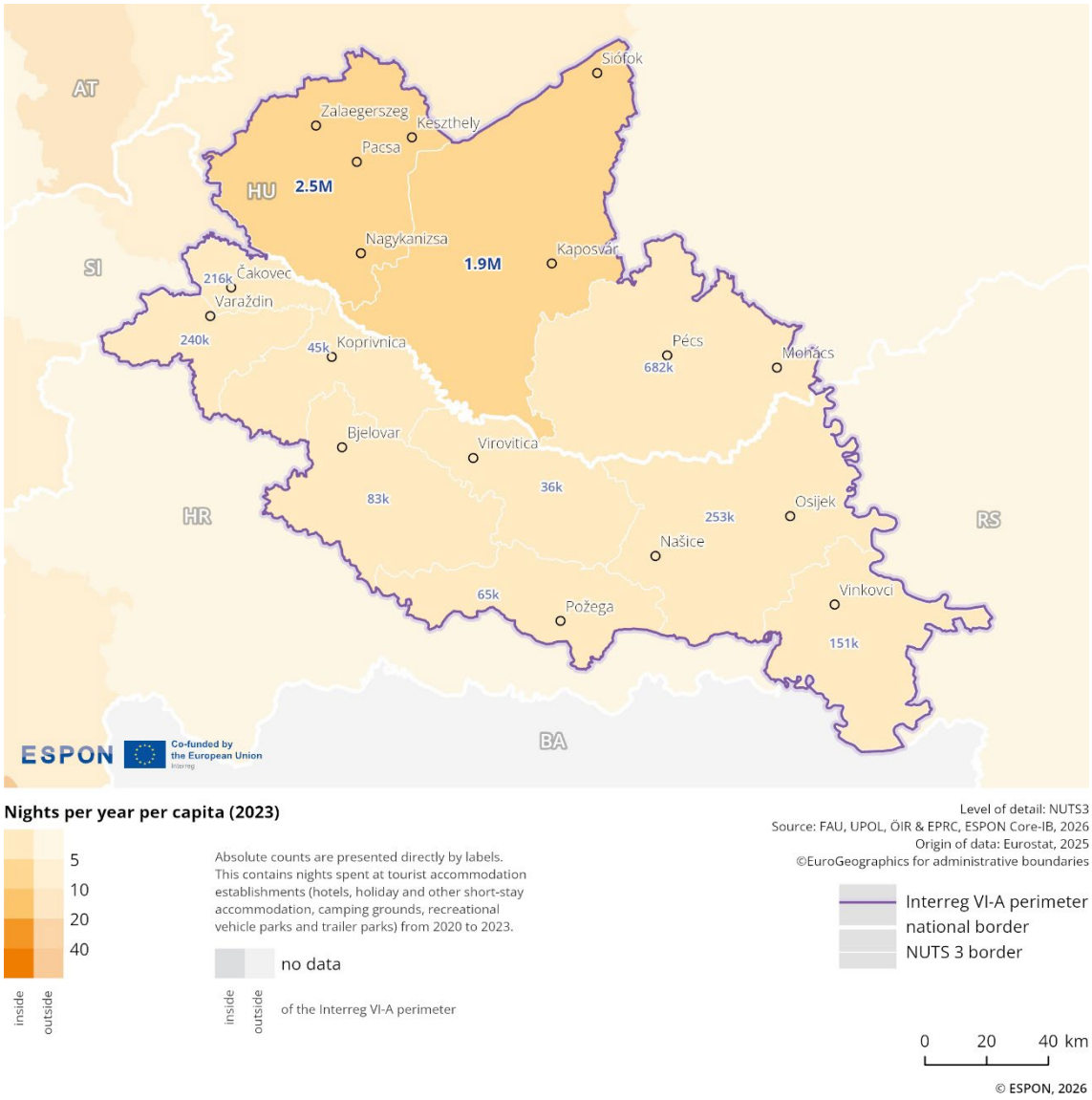
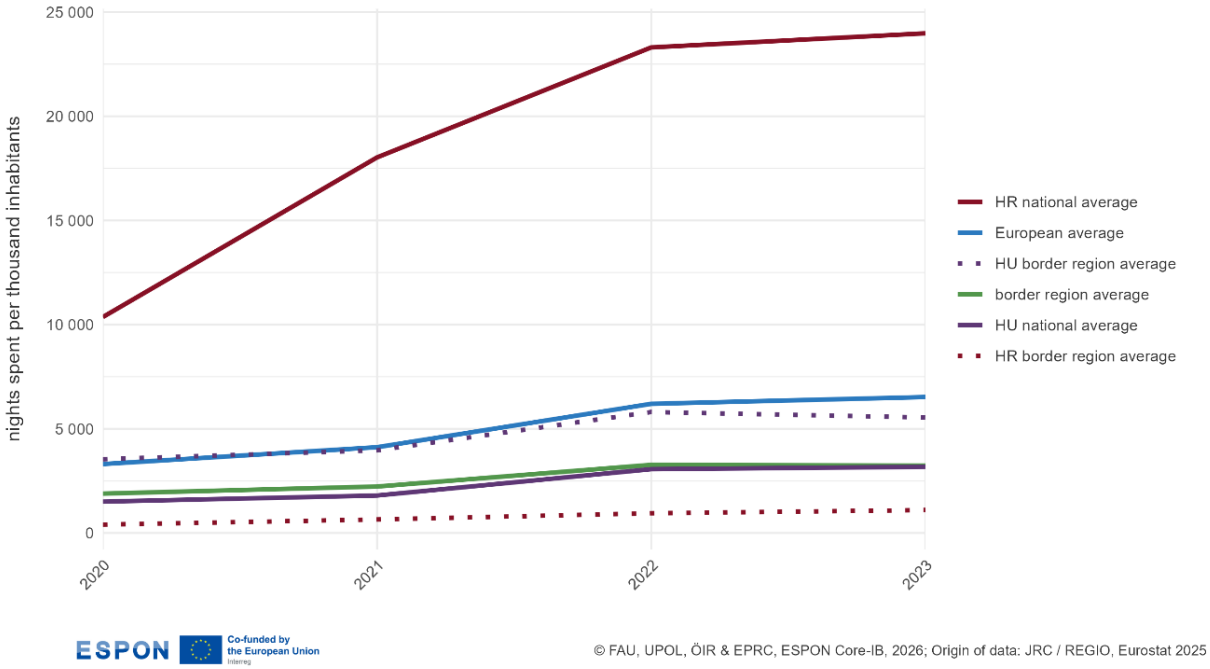


Figure 2.29 illustrates the development of nights spent at tourist establishments per thousand inhabitants from 2020 to 2023. Over the entire period, the average for the Hungary-Croatia programme area is lower than the overall European average, which includes EU member states and the EFTA countries Iceland, Liechtenstein, Switzerland and Norway. While the border regional average in Hungary is higher than the national average for all 4 years, the Croatian border regional average is lower than the national average. Additionally, the regional average for the Hungarian border area is significantly higher than that for the Croatian throughout the given period.

Touristic patterns have a series of implications for spatial development on either side of the border. Transport infrastructure has to consider peak volumes and balancing recreational activities with socio-cultural as well as environmental heritage can be a challenge.

Figure 2.29: Overnight stays in tourism (comparison)



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2.4.3 Services of general interest

This sub-dimension looks at how accessible services of general interest (SGIs) are in the border region, identifying areas that are well-served and those that are more difficult to access. It analyses access to essential services such as secondary schools, grocery shops, hospitals, doctors, pharmacies and cinemas.

2.4.3.1 Accessibility to services of general interest

Indicator description

The indicator shows, for the below listed facilities and services, the average driving time to the nearest facility of a series of services of general interest.

- **Source/method of retrieval**: Processing and analysis of standardised travel-time accessibility to secondary schools, grocery shops, hospitals, doctors, pharmacies and cinemas available in the ESPON PROFECY Update (2022)
- **Temporal coverage**: 2021
- **Unit**: Minutes (in 2.5 x 2.5 km grid)

Please refer to the technical annex for more information.

Figures 2.30 to 2.35 visualise average car travel times to services of general interest within the programme area. The maps display accessibility to:

- Secondary schools (Figure 2.30)
- Grocery shops (Figure 2.31)
- Hospitals (Figure 2.32)
- Doctors (Figure 2.33)
- Pharmacies (Figure 2.34)
- Cinemas (Figure 2.35)

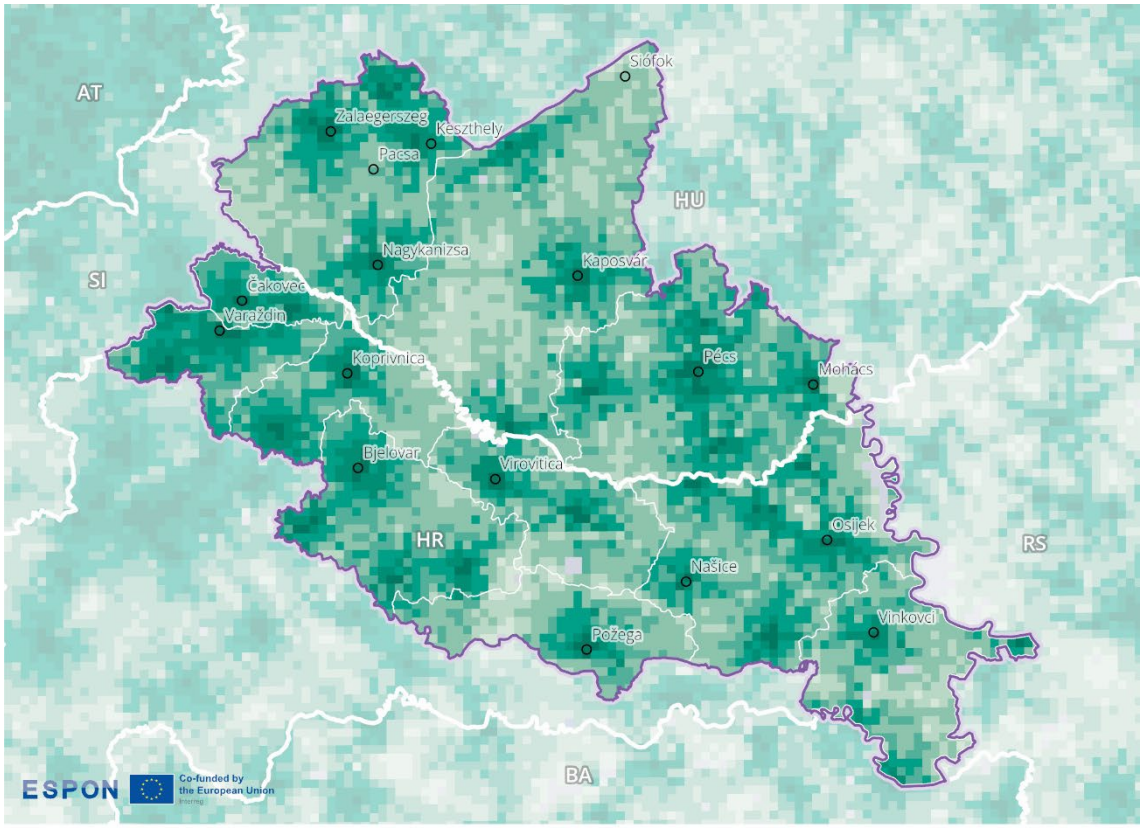
These indicators show how long, on average, it takes to reach the nearest facility by car. The data comes from the ESPON PROFECY Update project (2022) and is visualised based on a 2.5-kilometer grid.

In the Hungary–Croatia border area, essential services such as doctors, pharmacies, and grocery shops are evenly distributed across most areas in both countries. This results in travel times of less than one hour throughout the program area, except in the central part of the Hungarian side.

Near the national border, travel times to pharmacies, doctors, and schools are somewhat shorter in the eastern and western Croatian regions.

Hospitals, as medical services, are mainly located in cities and densely populated areas. This creates an urban–rural gradient with shorter travel times in and near urban centres and longer travel times in rural or remote regions. The same applies to schools as educational services and to cinemas as cultural services.

Figure 2.30: Travel time to secondary schools



Car travel time to the nearest secondary school (2021)

5min
10min
15min
20min
30min
45min
1h
2h
3h
4h
6h
12h

inside outside of the Interreg VI-A perimeter

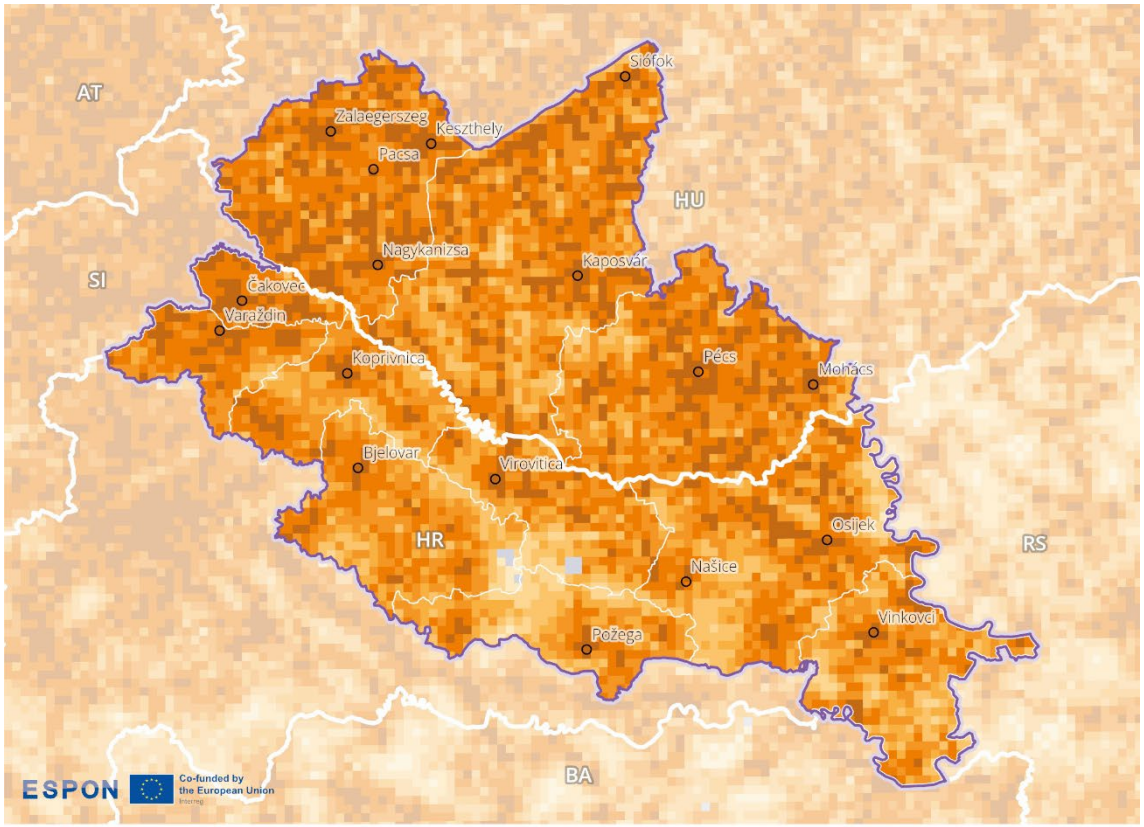
Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROFECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

© ESPON, 2026

Figure 2.31: Travel time to grocery shops



Car travel time to the nearest shop (2021)

5min
10min
15min
20min
30min
45min
1h
2h
3h
4h
6h
12h

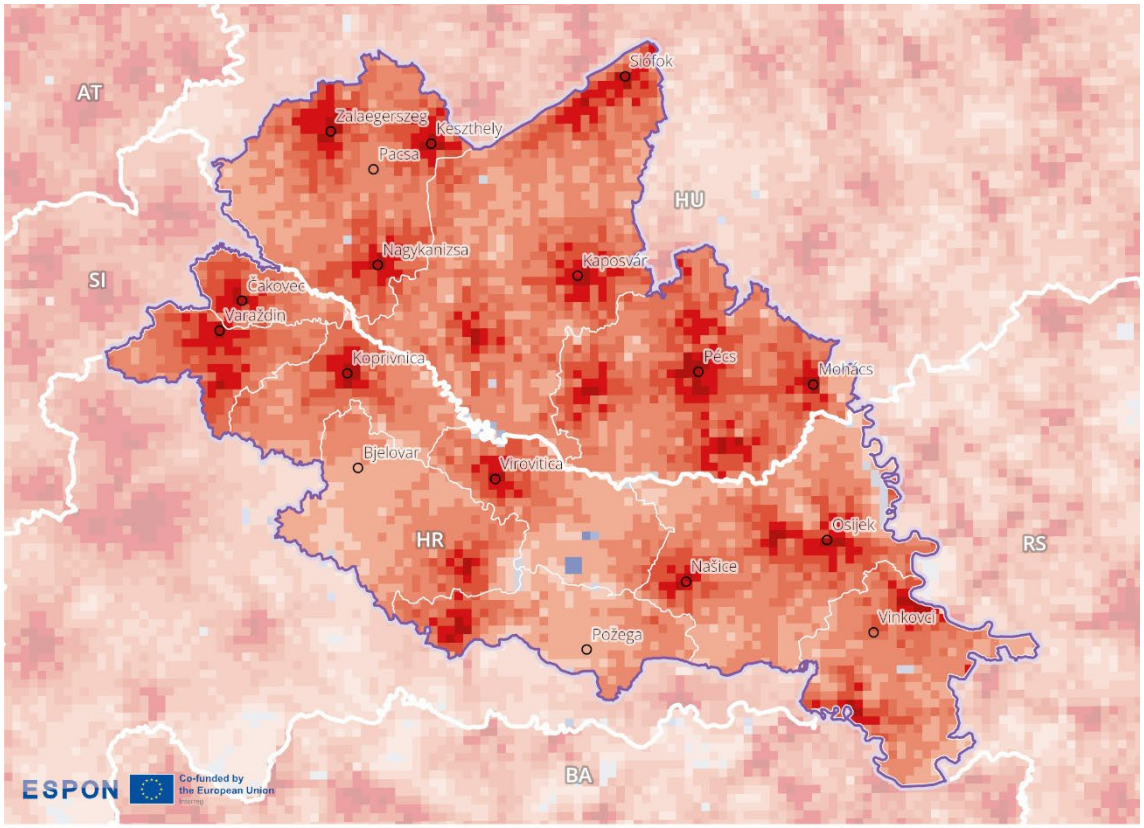
inside outside of the Interreg VI-A perimeter

Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROFECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

Figure 2.32: Travel time to hospitals



Car travel time to the nearest hospital (2021)

5min
10min
15min
20min
30min
45min
1h
2h
3h
4h
6h
12h

inside outside of the Interreg VI-A perimeter

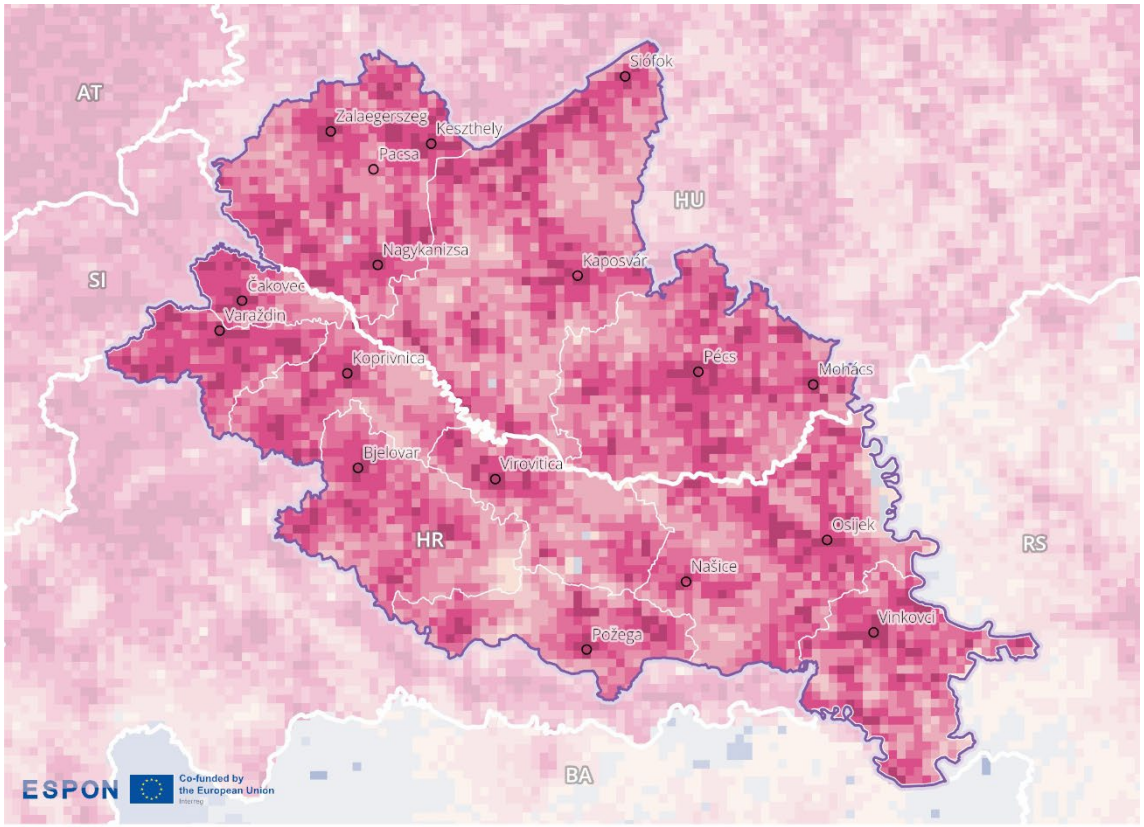
Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROFECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

© ESPON, 2026

Figure 2.33: Travel time to doctors



Car travel time to the nearest doctor (2021)

5min
10min
15min
20min
30min
45min
1h
2h
3h
4h
6h
12h

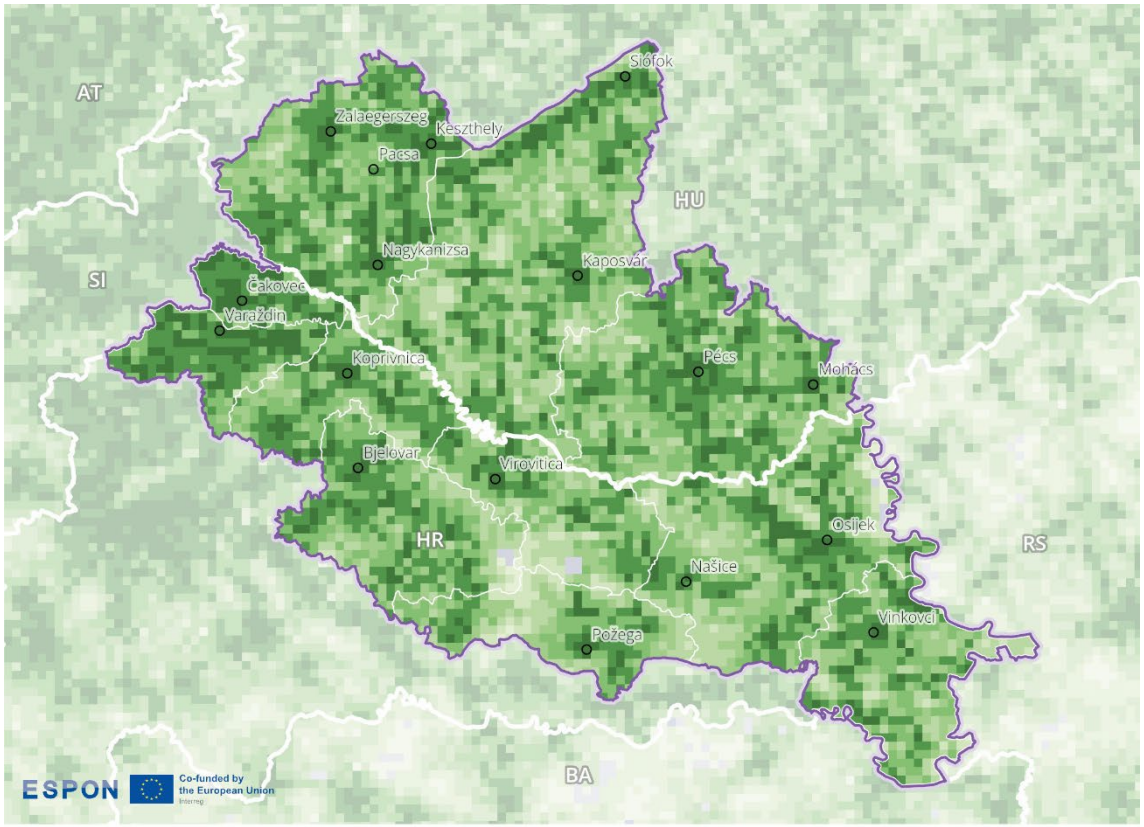
inside outside of the Interreg VI-A perimeter

Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROFECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

Figure 2.34: Travel time to pharmacies



Car travel time to the nearest pharmacy (2021)

5min
10min
15min
20min
30min
45min
1h
2h
3h
4h
6h
12h

inside outside of the Interreg VI-A perimeter

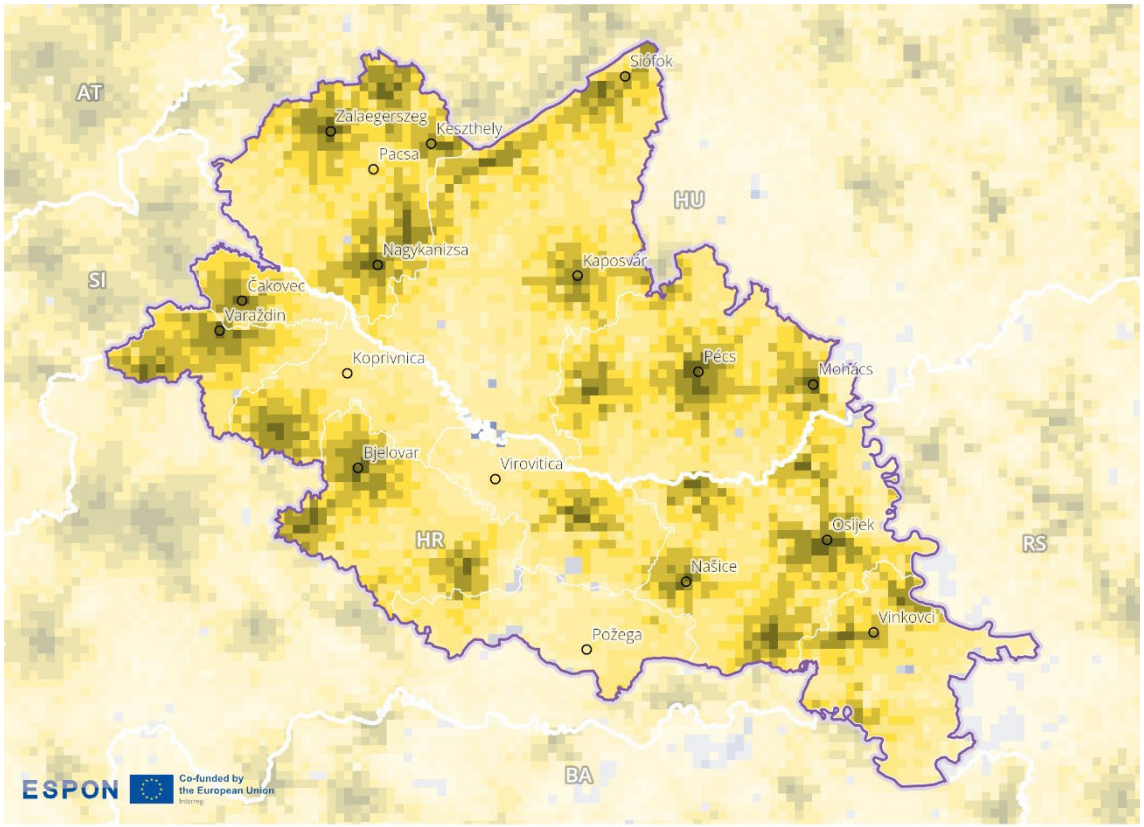
Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROFECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

© ESPON, 2026

Figure 2.35: Travel time to cinemas



Car travel time to the nearest cinema (2021)

5min
10min
15min
20min
30min
45min
1h
2h
3h
4h
6h
12h

inside outside of the Interreg VI-A perimeter

Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROFECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

2.4.4 Key messages on the socio-economic dimension

Patterns of social interaction across the Hungary–Croatia border remain relatively weak. Interaction intensity is generally low across most NUTS-3 areas, with only moderate values in the northern parts of the Hungarian and Croatian sections of the border region. The absence of language similarities and the limited knowledge of the neighbouring language further restrict informal contact and hinder deeper socio-cultural exchange.

Tourism constitutes an important socio-economic factor, albeit with strong spatial imbalances. Hungarian border regions, particularly Zala and Somogy, record significantly higher volumes of overnight stays than their Croatian counterparts, with peaks of 2.5 and 1.9 million stays respectively over the 2020–2023 period. Overall, the border region remains below the European average, yet Hungarian areas consistently outperform their national average, largely influenced by tourism

concentrations around Lake Balaton, whereas Croatian border counties fall short of national levels, partly reflecting the different tourism structure compared to Croatia's coastal destinations. These differences reflect divergent tourism dynamics and underline the need to balance economic benefits with pressures on infrastructure, housing, and the environment in areas of seasonal concentration.

Accessibility to services of general interest is broadly adequate, as most inhabitants can reach everyday services such as doctors, pharmacies, and shops within one hour. However, urban–rural divides remain evident for hospitals, schools, and cultural facilities, with access much quicker in urban centres than in more remote areas. This unevenness points to the importance of coordinated investment in transport and social infrastructure.

In summary, the socio-economic dimension of the Hungary–Croatia border region is marked by weak cross-border social ties, linguistic barriers, uneven tourism development influenced by major tourism hotspots such as the Lake Balaton area, and persistent urban–rural divides in service provision. While basic accessibility is ensured, further integration depends on strengthening cultural exchange and addressing spatial disparities.

2.5 Border security and safety

This dimension shows the security and safety conditions in border regions. It analyses the number of days on which border control is temporarily reintroduced at internal borders, using this as an indicator of security concerns and restrictions on cross-border movement.

2.5.1 Temporary reintroduction of border controls at internal borders

Indicator description

The indicator shows the number of days of temporary reintroduction of border control at internal borders, including the official reasons behind. The reintroduction of border control at the internal borders must be applied as a last resort measure, in exceptional situations, and must respect the principle of proportionality. The scope and duration of reintroduced border control should be restricted to the bare minimum needed to respond to the threat in question.

- **Source/method of retrieval**: Processing and analysis data of European Commission information pursuant to Article 25 and 28 et seq. of the Schengen Borders Code
- **Temporal coverage**: 2006-2025 (cut-off: 08 May 2025, in order to allow data treatment before work package completion)
- **Unit**: Days per year

Please refer to the technical annex for more information.

Border controls tend to have a tangible effect on the smooth functioning of cross-border flows, especially commuting and logistics, as they introduce delays and unpredictability. Hungary has joined the Schengen Area by 2007, while Croatia joined in 2023. Between 2023 and 2025 (cut-off: 08 May 2025), neither Hungary nor Croatia reintroduced border controls between the 2 countries.

2.5.2 Key messages on the border security dimension

The Hungary–Croatia border region is characterized by a relatively stable security environment with very limited use of temporary border controls. Between 2006 and 2025, Croatia did not reintroduce controls on its border with Hungary, while Hungary applied temporary measures only during the COVID-19 pandemic in 2020 and 2021. These episodes were short-lived compared to practices observed elsewhere in the Schengen Area and were exclusively linked to pandemic-related restrictions rather than broader categories such as terrorist threats, unexpected migration flows, or major events.

Nevertheless, the asymmetry in implementation is notable: Hungary imposed controls for a considerably longer duration than Croatia, creating uneven impacts on cross-border mobility. These temporary restrictions disrupted commuting patterns and logistical flows, introducing delays and unpredictability that challenged the functioning of local labour markets and supply chains.

The findings highlight both strengths and vulnerabilities. On one hand, the low frequency of reintroduced controls underscores the resilience of free movement in this border region. On the other, different duration and national implementation of temporary measures during the COVID-19 period illustrates how crisis responses can still undermine cross-border integration. Safeguarding long-term cooperation therefore requires more coordinated crisis management and governance mechanisms, ensuring that temporary measures remain proportionate, transparent, and jointly managed.

2.6 Governance dimension

Cross-border cooperation in the Hungary–Croatia border region builds on a long-standing tradition developed through successive EU programmes, including PHARE SPF, Interreg IIIA, IPA CBC (2007–2013), and Interreg V-A (2014–2020). These initiatives have resulted in established governance structures within the current programme, including a Joint Secretariat (with staff members from both member states) and a Monitoring Committee. For the implementation period 2021–2027 (Interreg VI-A), the role of Managing Authority was transferred from Hungary to the Croatian Ministry of Regional Development and EU Funds.

The programme is embedded in broader European Territorial Cooperation and macro-regional frameworks. Both countries participate in the EU Strategy for the Danube Region (EUSDR), with Hungary leading priority areas on sustainable energy, water quality, and environmental risks, and Croatia co-coordinating biodiversity and enterprise competitiveness. Institutionalisation is further supported by active EGTCs, notably the Pannon EGTC, complemented by the Mura EGTC and Croatia's involvement in the Central European Transport Corridor EGTC, as well as participation in Interreg Central Europe and the Danube Transnational Programme, strengthening multi-level governance in the border region.

2.6.1 Cross-border cooperation

This sub-dimension identifies the extent of cross-border cooperation in the border region. It illustrates areas of high cooperation intensity and identifies functional links in governance structures across borders. It also identifies areas with high awareness of obstacles and the willingness and support services to overcome them, as well as areas where Interreg cooperation intensity is already strong.

2.6.1.1 Cross-border governance structures

Indicator description

The indicator shows active institutionalised cooperation that act as cross-border entities. It includes cooperation formats such as Eurocities, Euroregions, EGTC, cross-border associations, cross-border councils, etc.

- **Source/method of retrieval**: Localisation and categorising of cross-border cooperation formats (Eurocities, Euroregions, EGTC, cross-border associations, cross-border councils, conferences, working communities), based on desktop research.
- **Temporal coverage**: Status as of October 2025
- **Unit**: n/a

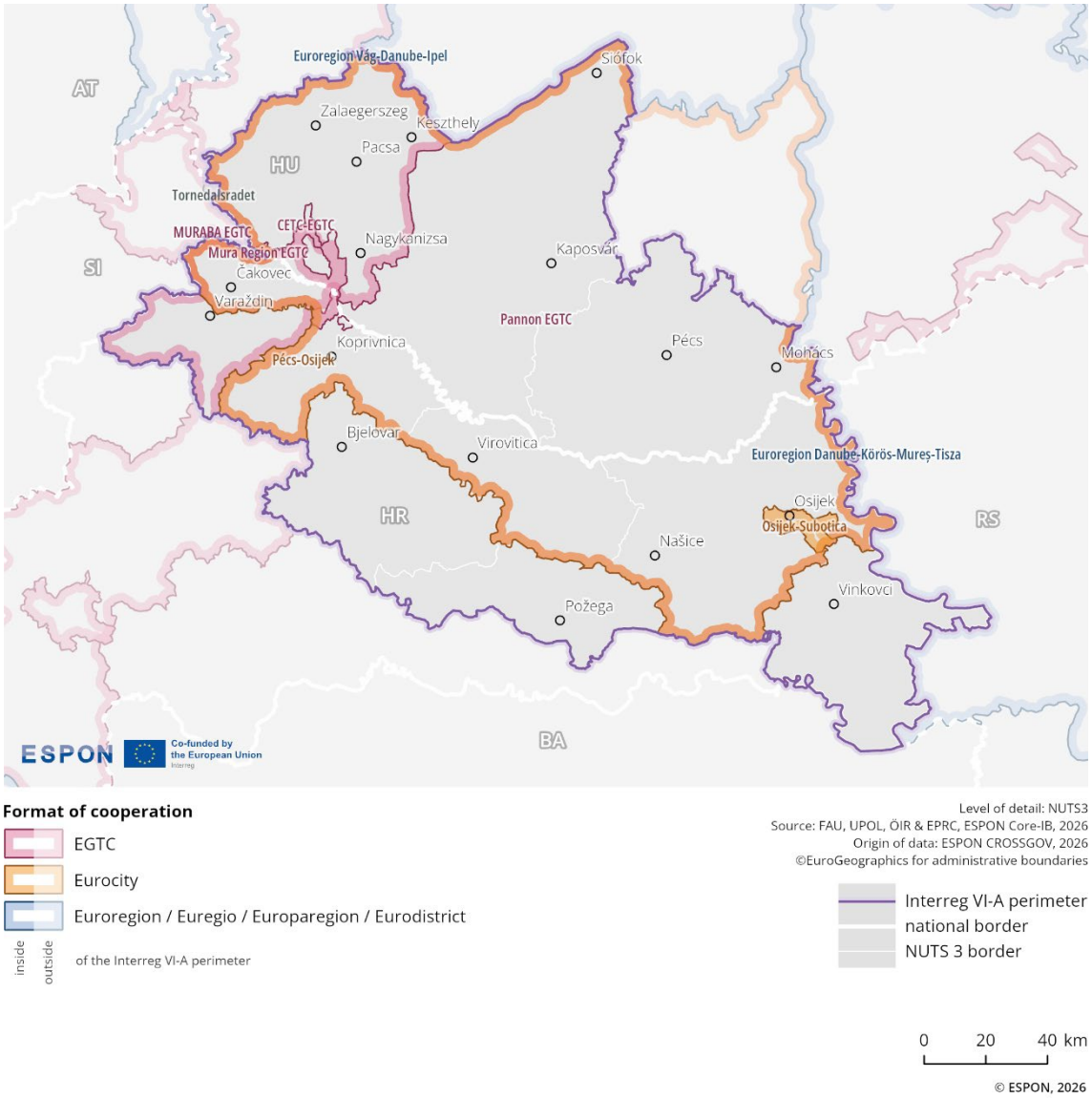
Please refer to the technical annex for more information.

Figure 2.36 shows the different types of institutionalised cooperation. The indicated connections represent cooperation linkages between urban centres and do not refer to physical transport or infrastructure connections. These governance structures either function as cross-border entities or bring together stakeholders from the cross-border region around shared topics. The governance structures covered include Eurocities, Euroregions, European Groupings of Territorial Cooperation (EGTCs), cross-border associations and councils. Project-based cooperation is not included.

The coloured markings on the map indicate different types of institutionalisation: EGTCs are shown in red, Eurocities in yellow, Euroregions/Euregios/Europaregions/Eurodistricts in blue, and other formats in grey.

The multi-level governance structure in this programme area shows broad spatial coverage along the borders. Overall, the region exhibits a high level of institutionalised cooperation across national borders. EGTCs are the most prevalent format.

Figure 2.36: Cross-border governance structures



2.6.1.2 Cross-border public services

Indicator description

The indicator shows different services specialised on cross-border challenges and development potential, including their domain of operation. As a specific form of services of general interest, cross-border public services (CPS) address joint problems or development potentials of border regions that are located on different sides of one or more national borders.

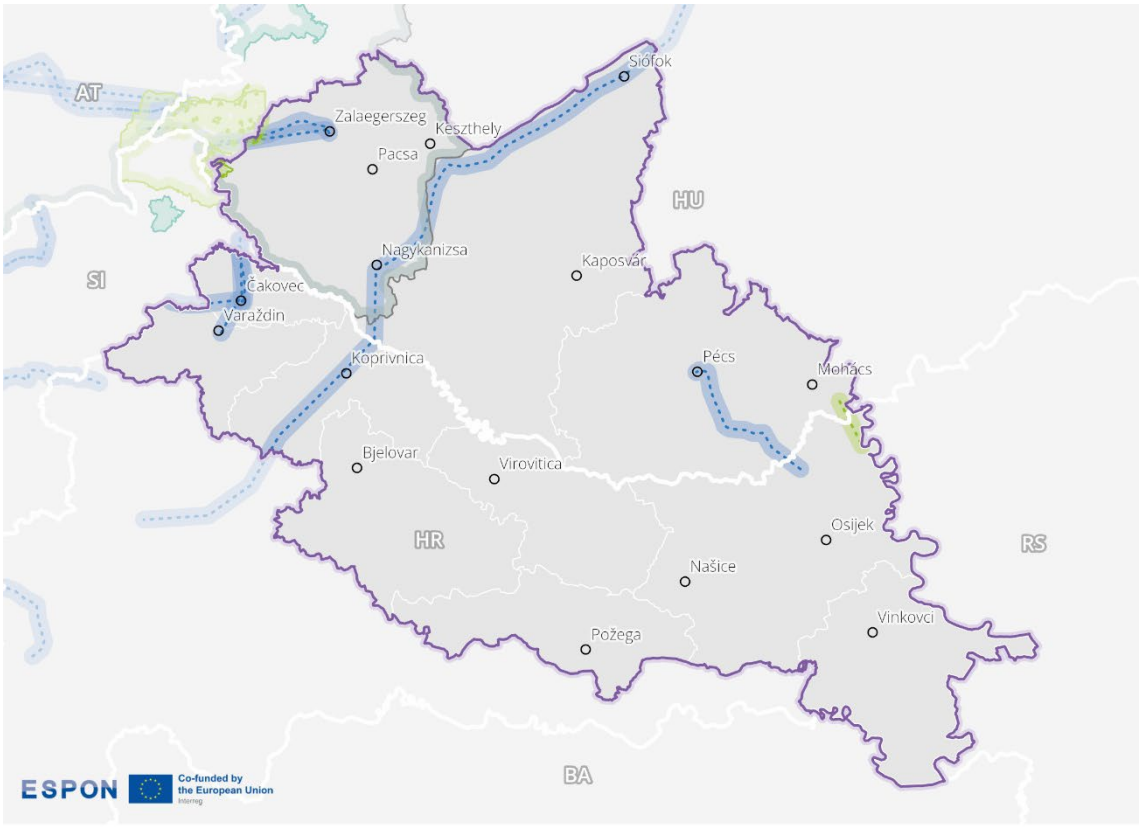
- **Source**: ESPON cross-border public services (CPS) 2.0 database
- **Temporal coverage**: 2022
- **Unit**: n/a

Please refer to the technical annex for more information.

Figure 2.37 depicts the geographical extent of cross-border public services in the border area in 2022. Different thematic areas are represented by distinct symbols and colours, indicating services such as disaster management, health care, transportation, education, environment, energy, job placement, and culture. The visualisation highlights where these services operate across the national boundary.

The map shows that the Hungarian–Croatian border reveals a sparse network of cross-border public services primarily featuring transportation links. These services form continuous north–south connections, linking the cities of Zalaegerszeg, Nagykanizsa and Pécs in Hungary and Varaždin in Croatia. Aside from these transport links, only isolated public services in environment & water are evident, at the east end of the Hungarian-Croatian border. Another “other” services cluster can be found in the north-west of the Interreg area.

Figure 2.37: Cross-border public services



Geographical extent of cross-border public service themes (2022)

areal linear character of the service

- Disaster management
- Health care
- Transportation
- Tourism & information
- Education & research
- Environment & water
- Heating & energy
- Job placement
- Culture

inside outside inside outside of the Interreg VI-A perimeter

Cross-border public services covering more than one theme have been assigned only to one. Furthermore, some polygons have been excluded because they were only approximately and not accurately spatially defined.

Level of detail: geolocalised lines and areas
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON CPS, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

0 20 40 km

© ESPON, 2026

2.6.1.3 Perceived cross-border obstacles in b-solutions

Indicator description

The indicator shows cases of legal or administrative obstacles selected in the framework of the b-solutions initiative. This indicator lists the number, location and nature of suggested solution of cases in the b-solutions initiative, including the topic and parties involved.

- **Source/method of retrieval**: Processing and analysis of the b-solutions initiative data
- **Temporal coverage**: 2018-2025 (first quarter)
- **Unit**: n/a

Please refer to the technical annex for more information.

The b-solutions initiative is a European Union project that supports the resolution of legal, operational and administrative cross-border obstacles. It offers funding for pilot actions and legal expert advice in border regions. A high level of cross-border integration often reveals strong barriers of cross-border functioning. In order to exploit the cross-border potentials, these obstacles have to be overcome or at least addressed. Both the number of reported obstacles and the general interest in solutions serve as important indicators of cross-border interaction.

As part of the ESPON CROSSGOV project, all b-solutions initiatives were analysed to deepen the understanding of the thematic focus of the perceived cross-border obstacles across different border regions and the suggested solution, in particular from the European perspective.

In the border area of Hungary–Croatia, several b-solutions pilot actions were identified. These include initiatives focused on enhancing cross-border sales at local farmers' markets, cross-border employment, enabling tour guides to work on both sides of the border, supporting the conservation of biodiversity along the Mura River, and aligning fishing rules on border rivers. Applications for these pilot actions were predominantly submitted by EGTCs and regional or local authorities in collaboration with academic and environmental institutions.

In this border area, economic development and innovation relate to entrepreneurship, local product promotion, and multilingual administration. Institutional cooperation focuses on improving the mutual recognition of qualifications, harmonising legal frameworks, and enhancing transparency and coordination. In terms of public services, tourism plays a central role, particularly regarding nature-based activities like guided tours and fishing. Environmental protection efforts are strongly connected to the European Green Deal, specifically regarding the preservation of biodiversity and water-based ecosystems.

The solutions proposed in these pilot actions are mainly hybrid, combining legal, administrative, and operational approaches. For example, the CrossMarkets initiative combined operational elements such as financial aid and marketing campaigns with administrative improvements like bilingual procedures and harmonised food hygiene standards, as well as legal frameworks enabling reciprocal cross-border sale of food products. The tour guide pilot action proposed the legal mutual recognition of certificates and operational measures like joint training and infrastructure upgrades. Biodiversity protection along the Mura River involved administrative harmonisation of rules and operational reliance on existing joint management structures. Lastly, the comparison of fishing rules suggested bilateral legal agreements and operational coordination through local associations to align practices, ensuring better regulatory consistency along border rivers.

2.6.1.4 Institutionalised advice centres for cross-border issues

Indicator description

The indicator shows where institutionalised advice centres on cross-border issues are located, including their thematic focus and geographical perimeter.

- **Source/method of retrieval**: Localisation and thematic focus of advice centres for cross-border issues are identified via desktop research.
- **Temporal coverage**: Status as of February 2025
- **Unit**: n/a

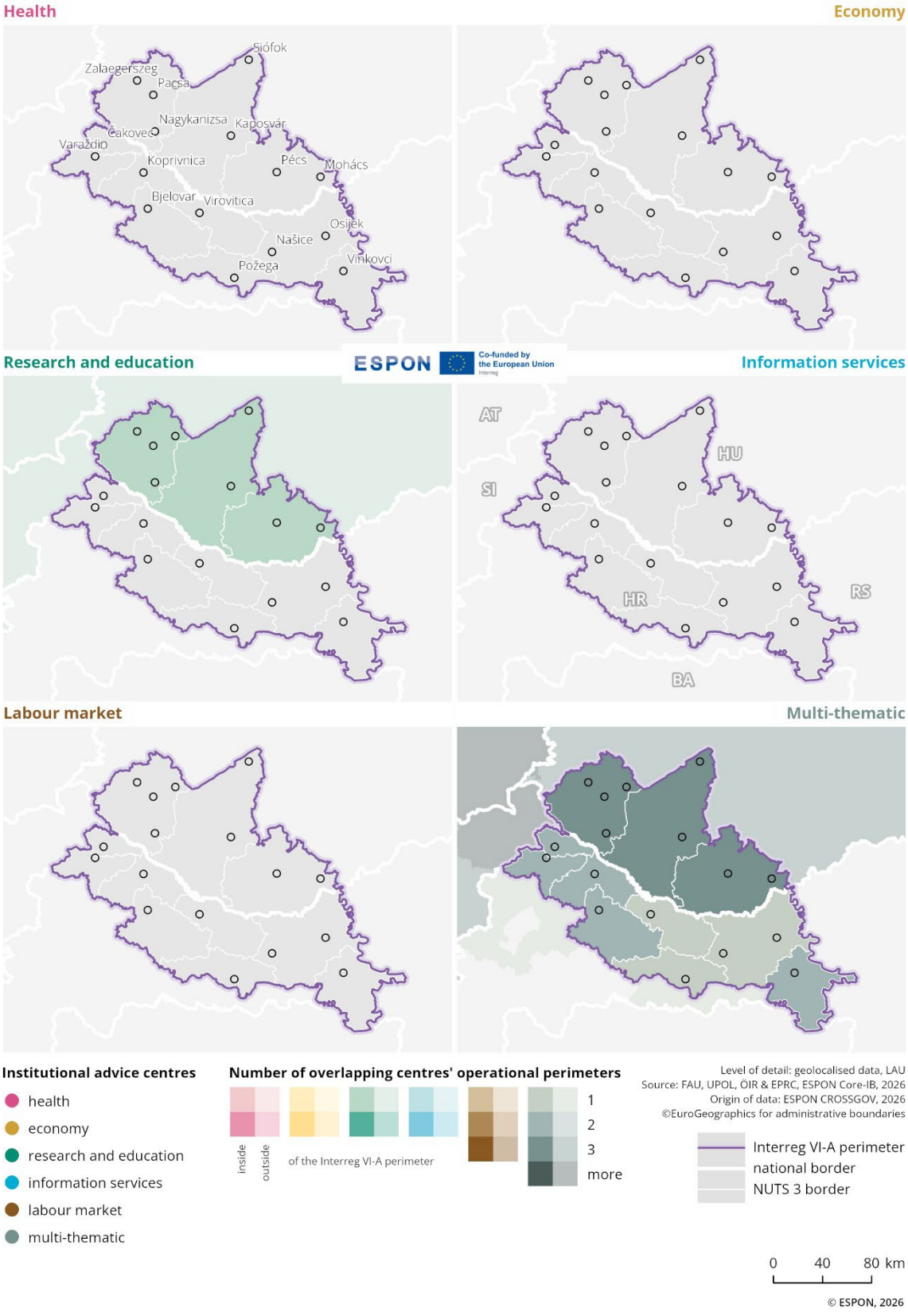
Please refer to the technical annex for more information.

Figure 2.38 shows the locations and types of institutionalised advice centres, along with their operational domains, in the cross-border Interreg region between Hungary and Croatia. These centres throughout Europe provide support in various fields such as health, economy, research & education, information services, the labour market, and multi-thematic issues. The operational domains of these centres are also indicated by coloured shading on the map. The more intense the colour, the stronger the influence of that specific domain in the corresponding area.

There are no institutionalised advice centres in the Interreg region displayed on the map, nor are there any outside the Interreg region.

Centres with multi-thematic operational domains are represented in both countries within the Interreg area, though with regional differences: they are more pronounced in the Hungarian part of the Interreg region, while in the Croatian part, their presence is more fluctuating. Research and education operational domains are only active in the Hungarian part of the Interreg region.

Figure 2.38: Institutionalised cross-border advice centres



2.6.2 Outline of Interreg activities

The following section outlines the key Interreg activities in the 2021-2027 programming period. The aspects included concern the development opportunities and challenges identified (see Table 2), the budget available and split of allocation (Figure 2.39), overlapping Interreg programmes and the key aspects drawn from the programme.

Table 2: Interreg VI (2021-2027): Opportunities and challenges

Topic	Key development opportunities and challenges identified for Interreg 2021-27
Economy	▪ Marked by economic stagnation and territorial disparities ▪ Innovation is underdeveloped
Environment	▪ Climate change threatens biodiversity and agriculture due to rising temperatures, unpredictable precipitation, and flood risk. ▪ Invasive species are spreading, and environmental protection is uneven. Despite some positive trends in renewable energy and air quality, regional vulnerability remains high. ▪ Natural wealth, including Natura 2000 sites, is a strategic asset.
Education	▪ Labour productivity is behind the EU average in the border area; there is a strong mismatch between skills and demand on the labour market. ▪ Education needs be better harmonised with market demand.
Social	▪ Face severe demographic decline, with a population loss of 167,000 people between 2011 and 2021—113,000 on the Croatian side and 54,000 in Hungary. ▪ Ageing and brain drain compound these trends, with dependency ratios exceeding EU averages. ▪ Structural disparities, combined with uneven access to healthcare, education, labour market, and housing, result in persistent territorial inequalities and underutilised social and economic potential.
Transport and connectivity	▪ Cross-border rail services are very limited, with low frequency and unfavourable journey times, particularly on the Hungarian side. ▪ The natural border formed mainly by rivers creates substantial physical barriers, as bridge construction is costly and limited. ▪ Limited transport connectivity exacerbates economic disparities and social exclusion in the region
Governmental cooperation	▪ Hungary and Croatia share a long history of cooperation; their public administration and governance structures still differ significantly.

Total Budget: EUR 72,587,630.00

Figure 2.39: Split of Interreg allocation

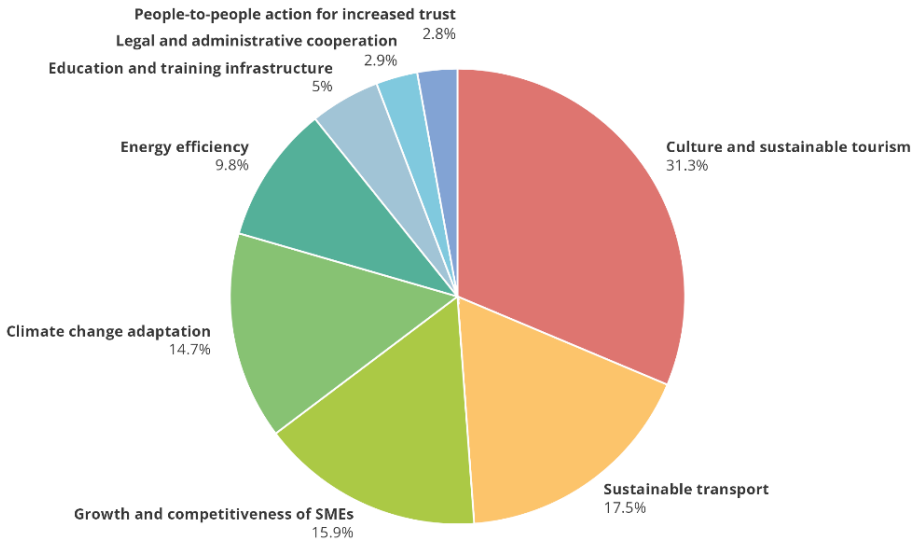


Table 3 shows the number of Interreg 2021-2027 cross-border and transnational programmes which share at least one NUTS3 region with the border area. Each programme has its own distinct rationale, value and territorial focus. However, for the purposes of, for example, planning and capitalisation activities it is potentially helpful for programmes and programme stakeholders to be aware of and connected to other Interreg programmes with which they share a direct territorial link.[15] The 4 Interreg C programmes Interreg ESPON, Interact, Interreg Europe and URBACT (Urban Action) cover the whole EU territory and provide a range of joint services and initiatives.

Table 3: Shared geographies with other cross-border and transnational programmes

Interreg A (cross-border)	Interreg B (transnational)
2	2

Key aspects

- Prioritization of green and sustainable development with concentration of projects around themes such as sustainable tourism, cultural heritage, and nature-oriented tourism, with particular attention to climate adaptation, energy efficiency, and disaster risk prevention. The region's rich natural and cultural assets have enabled it to build considerable experience in cross-border tourism cooperation, including areas like gastronomy, wine tourism, event tourism, and nature tourism.
- Distinctive focus for Interreg cooperation on sustainable tourism and culture. Tourism, especially in the post-COVID-19 context, is recognised as a main engine for regional recovery and growth. The programme supports projects that foster joint cultural initiatives and sustainable tourism

[15] It is noted that synergies and links with a wide range of other territorial cooperation and sectoral programmes and initiatives are also valuable and this is reflected in the wider analyses presented in this border profile, but not specifically covered in this table.

development, leveraging the area's unique heritage and landscape assets to create new opportunities for cross-border collaboration.

- Strategic focus on strengthening competitive cooperation of SMEs across the border. The programme supports cross-border cooperation among small and medium-sized enterprises with the aim of increasing competitiveness, value creation, export and import potential, and employment, thereby contributing to a more stable and economically resilient programme area.
- Balanced Participation and Project Partnerships: Participation in the programme is relatively balanced, with strong project partnerships involving both Hungarian and Croatian organizations. For example, the first round of strategic projects approved for 2021–2027 features 19 Croatian and 12 Hungarian partner organizations, with lead partners from both countries coordinating key initiatives. This balanced approach ensures that both sides of the border benefit from and contribute to the programme's objectives.
- Potential for synergies across programmes: The Hungary-Croatia programme area is part of the broader Central Europe and Danube Interreg B (transnational) programme areas, which allows for synergies and coordinated actions at the transnational level, supporting wider EU Cohesion policy objectives in Central Europe.

2.6.2.1 Interreg cooperation

Indicator description

Based on the keep.eu database, this indicator illustrates the network density of Interreg V-A (2014–2020). It is derived from the geographical location of all partners within a project consortium and reflects the intensity of cooperation between them. For the analysis, project networks were visualised by drawing lines between the locations of partners within a consortium. These connections were subsequently aggregated and spatially abstracted by calculating line density using GIS software. Dark red areas indicate a high density of connections between project partners, while yellow areas represent a lower density of cooperation links.

An additional element in this section is the development of project partner numbers between Interreg IV-A (2007–2013) and Interreg V-A (2014–2020), based on data from the keep.eu database. The datasets were cleaned to remove duplicates, using the partner names as reported in keep.eu. For both programming periods, keep.eu indicates a high level of data completeness[16]. Nevertheless, this development should be interpreted as indicative, as variations in partner name reporting and general limitations regarding the representativeness of the dataset affect the robustness of the results.

- **Source/method of retrieval**: Processing and analysis of the keep.eu database
- **Temporal coverage**: 2007-2013 (Interreg IV-A), 2014-2020 (Interreg V-A)
- **Unit**: n/a

Please refer to the technical annex for more information.

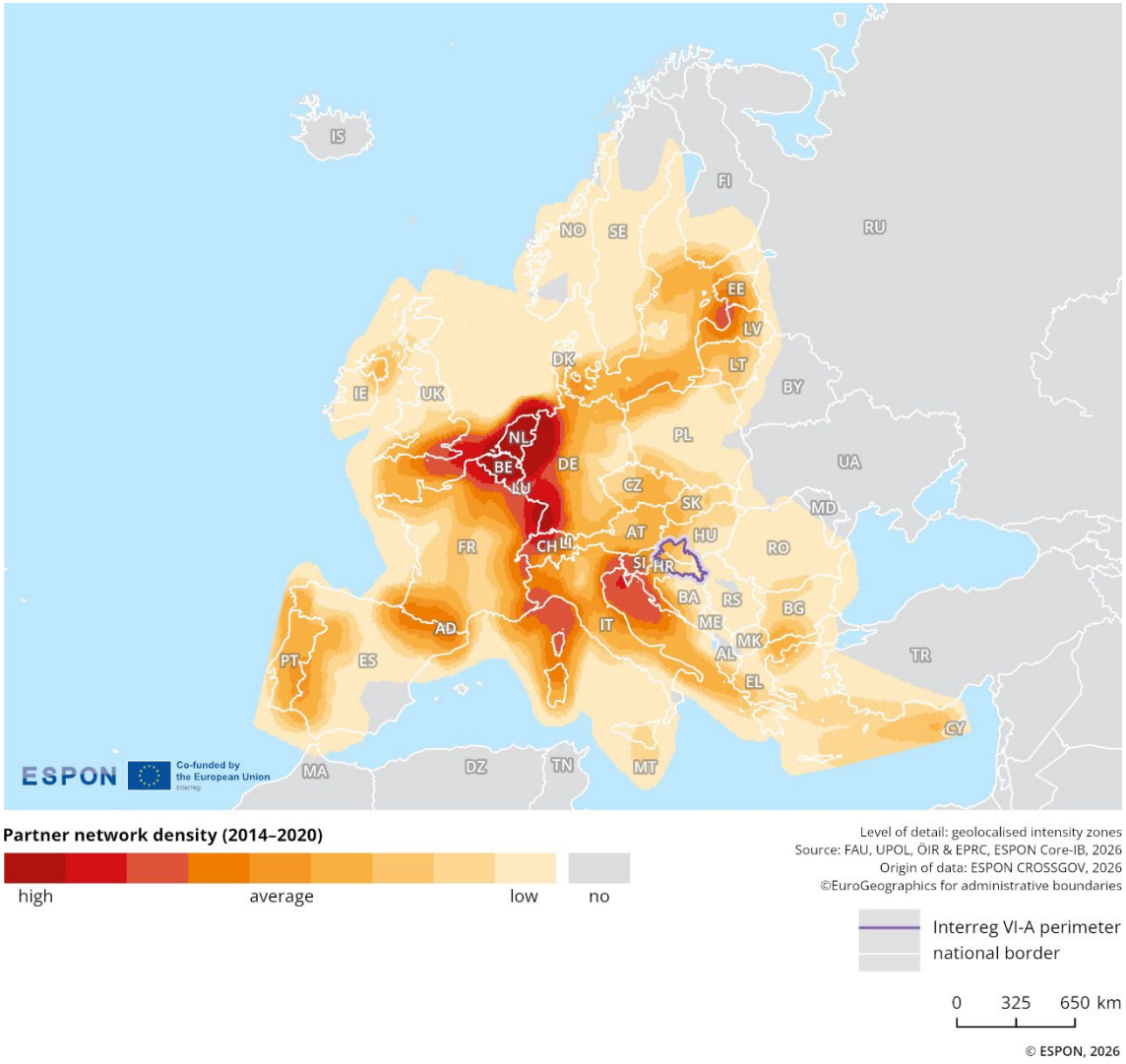
Cooperation activities and networks are among the most meaningful types of information for delineating cross-border functional areas. As such, the indicator on cooperation through Interreg can help to identify networks among cross-border actors and highlight the density of cooperation in specific border segments.

Figure 2.40 shows the density of Interreg V-A (2014–2020) partner networks. The indicator includes the location of, and links between, Interreg project partners within a project consortium. From a European perspective, partner network density in the Hungary-Croatia border area appears to be somewhat

[16] see Keep.eu representativeness: Interreg, Interreg-IPA and ENI cross-border

spatially concentrated. The partner network density in the western parts of the programme area show slightly higher levels of cooperation than the eastern parts. Overall, the partner network density in this border area is about the European average. Based on the keep.eu database and excluding duplicates, the number of project partners decreased from 330 in Interreg IV-A (2007–2013) to 266 in Interreg V-A (2014–2020), an decrease of about 19%. It is important that these changes are considered in the context of factors such as change in programme budgets between 2007-2013 and 2014-2020, emphasis on targeting impact, and numbers of strategic projects.

Figure 2.40: Interreg V-A partner network density



2.6.3 Key messages on the governance dimension

The Hungary–Croatia border region demonstrates a well-developed framework of institutionalised cross-border cooperation, with EGTCs serving as the dominant format. These structures provide broad spatial coverage and anchor collaborative governance, offering a foundation for addressing common challenges and exploiting shared opportunities.

Cross-border public services, however, remain sparse and unevenly distributed. Transport links constitute the main type of service, forming north–south connections between Hungarian and Croatian cities. Beyond these, only isolated initiatives in environmental management and other small-scale services are visible, highlighting a gap between institutional structures and service delivery.

The b-solutions pilot actions illustrate both the scope of obstacles and the innovative responses developed in the region. Initiatives such as CrossMarkets, tour guide certification, biodiversity protection along the Mura River, and harmonisation of fishing rules reveal recurring legal, administrative, and operational barriers, as well as those related to cross-border employment. Solutions were typically hybrid in nature, combining legal agreements, administrative harmonisation, and operational coordination. These actions show how governance structures, particularly EGTCs and local authorities, can act as drivers of pragmatic problem-solving.

Institutionalised advice centres, which could provide systematic guidance on such cross-border issues, are notably absent from the region. This absence limits citizens' and institutions' access to direct support and reduces the visibility of cooperation efforts.

Interreg programmes play a central role in sustaining cross-border networks, with balanced participation of partners from both countries and a strategic focus on sustainable tourism, cultural heritage, and green development. Interreg V-A partner network density is about the European average, though showing spatial clustering in parts of the border area, particularly in the west, while important cooperation links are also present in the eastern section of the programme area.

3 Summary and key observations

To support the strategic dialogue on cross-border cooperation beyond 2027, this territorial analysis provides harmonised and comparable information. Its data-driven evidence helps to inform the future direction of cross-border cooperation by facilitating alignment with EU priorities and the evolving regulatory framework. The Core-IB border profiles adopt a harmonised methodology and provide programme areas with access to recent European data. As this approach comes along with limitations, member states may hold additional or more detailed data which can further enrich or contextualise the findings beyond the Core-IB project (see final report and technical annex of this project). These national sources are essential for refining and validating territorial evidence in policymaking processes, including: a) regional, fine-scale data and b) insights from political processes related to prioritisation and objective setting. The study's findings are analytical and are intended to support reflection and discussion. They do not create regulatory or policy obligations for Member States, the European Commission, or programme authorities.

Table 4 provides 2 types of information. Firstly, it summarises the key analytical findings for the border region, as discussed earlier in this profile. Secondly, it suggests policy options based on the analytical findings. These options are intended to provide a practical and informative basis for the strategic dialogue among programme bodies, managing authorities and the European Commission.

Generally speaking, the aim of cohesion policy is to promote harmonious territorial development (also) across borders. The objective is to mitigate the impact of borders and achieve 360° functionality, thereby enhancing the quality of life and fostering prosperous development on both sides of the border. The upcoming Interreg period offers an opportunity to address these objectives and potentials through targeted cooperation projects.

Table 4: Evidence-based conclusions

Territorial dimension	
Key analytical findings	• The border region is characterised by low population density, with both sides falling well below EU and European border-region averages, and with predominantly rural settlement patterns outside the main urban centres; • Population decline between 2014 and 2024 was substantial, particularly in Croatia, with marked losses among children and the working-age population, accompanied by growth in the elderly cohort, accentuating ageing trends; • Settlement expansion has been spatially uneven, concentrated around urban nodes such as Varaždin, Osijek, Pécs and Zalaegerszeg, while overall growth rates remain below European benchmarks; • Accessibility constraints persist, with fragmented transport networks, slow travel times, and limited areas reachable within 30 minutes from the border, weakening spatial cohesion. Accessibility patterns are therefore directly linked to commuting potential and tourism-related mobility, with uneven effects across the region; • Cross-border mobility flows are relatively balanced but only moderate, with stronger intensities in the western and eastern parts, highlighting scope for further cross-border cooperation around cultural exchange and transport connectivity, including recent improvements in cross-border motorway infrastructure, and social infrastructure, in line with programming priorities.

Territorial dimension	
Policy options	**Population and settlement related aspects** • Cooperation projects could contribute to addressing or mitigating aspects of the persistent depopulation and population ageing, taking into account the more pronounced demographic decline on the Croatian side of the border; • A focus could be on the role of urban nodes (e.g., Varaždin, Osijek, Pécs, Zalaegerszeg) as functional anchors for surrounding rural areas to reduce the territorial disparities and support more balanced settlement structures. **Accessibility related aspects** • Cross-border functionality could be enhanced by addressing fragmented transport networks and limited 30-minute accessibility catchments in border areas; • The assessment of uneven accessibility patterns to clarify how future cross-border mobility and access to services may evolve across different parts of the border region. **Cross-cutting aspects** • The alignment between spatial accessibility, service provision and labour market to support functional integration in the low-density and ageing cross-border context.

Economic dimension	
Key analytical findings	• The border region is among the weakest in the EU in terms of GDP per capita, though growth dynamics have been exceptionally strong since 2014, significantly outpacing EU and border-region averages; • Employment rates remain well below European levels, with particularly low values in Croatian counties and slightly stronger performance in Hungarian areas, despite gradual convergence over time. These asymmetries suggest that cross-border integration is partly driven by functional links (commuting and labour mobility), while distributional effects remain uneven; • The shrinking share of the working-age population exceeds the EU average, constraining labour supply and reinforcing reliance on manufacturing, trade, and public services with limited structural diversification; • Labour market integration is reflected in cross-border commuting flows, mainly from Croatian border regions towards neighbouring labour markets, yet moderate differences in hourly compensation levelsbetween the 2 sides sustain outward migration pressures; • Housing markets remain relatively affordable except in areas of tourism-driven demand, while digital infrastructure shows strong spatial disparities between urban and rural municipalities. Housing costs and variable digital connectivity appear as cross-cutting constraints that can shape future labour mobility and regional attractiveness.
Policy options	**Labour market and convergence related aspects** • The translation of the strong GDP growth from a low base into more balanced socio-economic outcomes across the border region; • Adaptive approaches to cross-border labour market integration could support functional integration under the continued wage differentials and shrinking working-age populations. **Competetiveness related aspect** • The adaptation of the regional economic structure (manufacturing, trade, public services) can be supported in response to the labour supply constraints, while helping to prevent deeper asymmetries between the 2 sides of the border. **Cross-cutting aspect** • The disparities in digital infrastructure between urban and rural areas, as well as tourism-driven housing pressures, could be addressed as cross-cutting constraints on labour mobility and regional attractiveness.

Green dimension	
Key analytical findings	• Ecological connectivity is well developed along the Danube, Drava and Mura corridors, with Natura 2000 sites playing a stronger role than national designations, though inland coverage remains limited; • Air quality shows significant differences, with Hungarian areas performing better, while Croatian border counties frequently exceed the PM2.5 threshold; the cross-border average remains above European levels; • Exposure to natural hazards is varied, with floods affecting riverine zones on both sides, seismic and landslide risks confined to Croatian mountains, and drought increasingly prominent in Slavonia; • Energy infrastructure benefits from 3 high-voltage connections, though generation capacity is limited and largely concentrated in a few Croatian hydroelectric plants, while Hungary lacks major facilities in the border area; • Resource productivity continues to lag behind EU standards despite improvements, while waste generation per GDP has only recently converged, underlining efficiency challenges.
Policy options	**Climate risks and resilience related aspects** • Shared river corridors (Danube–Drava–Mura) and Natura 2000 networks can be leveraged as a basis for cross-border environmental approaches, while also addressing the limitations related to inland coverage; • A focus could be on joint resilience perspectives to be developed in response to the common and differentiated hazard profiles, including floods, droughts and localised seismic or landslide risks. **Pollution and resource efficiency related aspects** • Cross-border monitoring, learning and coordination mechanisms to address differing PM2.5 pollution patterns, while respecting national competences; • Cross-border learning and joint initiatives could support improvements in resource productivity and waste efficiency, building on the recent convergence trends. **Cross-cutting aspect** • The shared energy system context, characterised by high-voltage connections and limited local generation, can inform cross-border reflections on energy resilience and transition pathways.

Socio-economic dimension	
Key analytical findings	• Cross-border social interaction remains limited, with only moderate intensities in the northern areas and language barriers constraining deeper cultural and social exchange; • Tourism is spatially imbalanced, with Hungarian counties significantly outperforming Croatian counterparts and showing strong seasonal peaks, while overall levels remain below European averages; • Accessibility to everyday services is generally sufficient, yet urban–rural differences remain particularly regarding access to higher-level services such as hospitals, as well asschools, and cultural facilities, pointing to uneven quality of life across the region; • Socio-economic cohesion is thus undermined by weak social ties, uneven tourism development partly influenced by major tourism concentrations such as the Lake Balaton area, and service disparities, requiring greater investment in cultural exchange and infrastructure.
Policy options	**Cross-cutting aspects** • A focus could be on cross-border social connectivity in a context of language barriers, which have previously been addressed by programme measures but with limited participation, and generally low social ties; • Cross-border cooperation can reflect strong tourism asymmetries, while also addressing seasonal pressures and uneven local benefits; • Cooperation projects could support cooperation and exchange addressing urban–rural differences in access to services, including schools and cultural facilities, despite generally good access to basic everyday services; • Future cooperation can be built around the common challenges such as ageing, low density and accessibility constraints, while avoiding uniform development assumptions for the entire border region.

Border security and safety dimension	
Key analytical findings	• The border region has experienced very limited reintroduction of controls within the observation period covered by the available data (since 2006), with Croatia maintaining open borders and Hungary applying temporary restrictions only during the COVID-19 pandemic; • The asymmetrical use of controls created uneven impacts, with temporary border control measures applied during the COVID-19 perioddisrupting commuting flows and logistics, particularly for local labour markets and supply chains; • Despite these episodes, the overall security environment remains stable, with free movement more resilient than in many other Schengen border regions; • The experience nevertheless illustrates the vulnerability of cross-border integration to unilateral measures, highlighting the relevance of coordinated crisis management mechanisms for maintaining cross-border functionality.
Policy options	**Cross-cutting aspects** • Lessons from asymmetric COVID-19-related border controls could inform efforts to strengthen the resilience of cross-border commuting and logistics; • The impacts of border controls on cross-border commuting and logistics can be mitigated through coordinated and institutionalised cross-border policy dialogue; • The mitigation of border control effects can form part of cross-border cooperation projects in various sectors. Economic networks, transport infrastructure initiatives and tourism-related actions can incorporate considerations related to the impacts of border controls.

Governance dimension	
Key analytical findings	• Institutionalised cooperation is well established, particularly through EGTCs, which contribute to the existing framework for cross-border cooperation in the programme area, providing territorial coverage and a solid framework for addressing shared challenges. Governance structures therefore appear as a cross-cutting enabling context to address observed asymmetries and shared challenges across labour mobility, services, tourism-related pressures and climate risks; • Cross-border public services remain sparse, largely confined to transport links and a few isolated initiatives, highlighting the gap between governance structures and service provision; • Pilot actions under b-solutions demonstrated both recurring barriers and innovative responses, relying on hybrid legal, administrative and operational solutions to improve cooperation; • The absence of institutionalised advice centres limits systematic support for citizens and institutions, reducing visibility and accessibility of cross-border initiatives; • Interreg V-A partner network density is about the European average.
Policy options	**Cross-cutting aspects** • The strong role of EGTCs and established cooperation structures can be built upon to address the gaps between governance frameworks and limited cross-border public service provision; • Practical solutions identified through b-solutions pilot actions could be scaled up and transferred to address recurring legal and administrative barriers; • The visibility and accessibility of cross-border initiatives can be improved in contexts where institutionalised advice centres are lacking.

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ESPON 2030

ESPON EGTC
11 Avenue John F. Kennedy
L-1855 Luxembourg
Grand Duchy of Luxembourg
Phone: +352 20 600 280
Email: info@espon.eu
www.espon.eu

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