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EUROPEAN RESEARCH PROJECT //

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

France-Belgium-Germany-Luxembourg

Border profile

March 2026



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Disclaimer

This document is a final report.

The information contained herein is subject to change and does not commit the ESPON EGTC and the countries participating in the ESPON 2030 Cooperation Programme.

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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

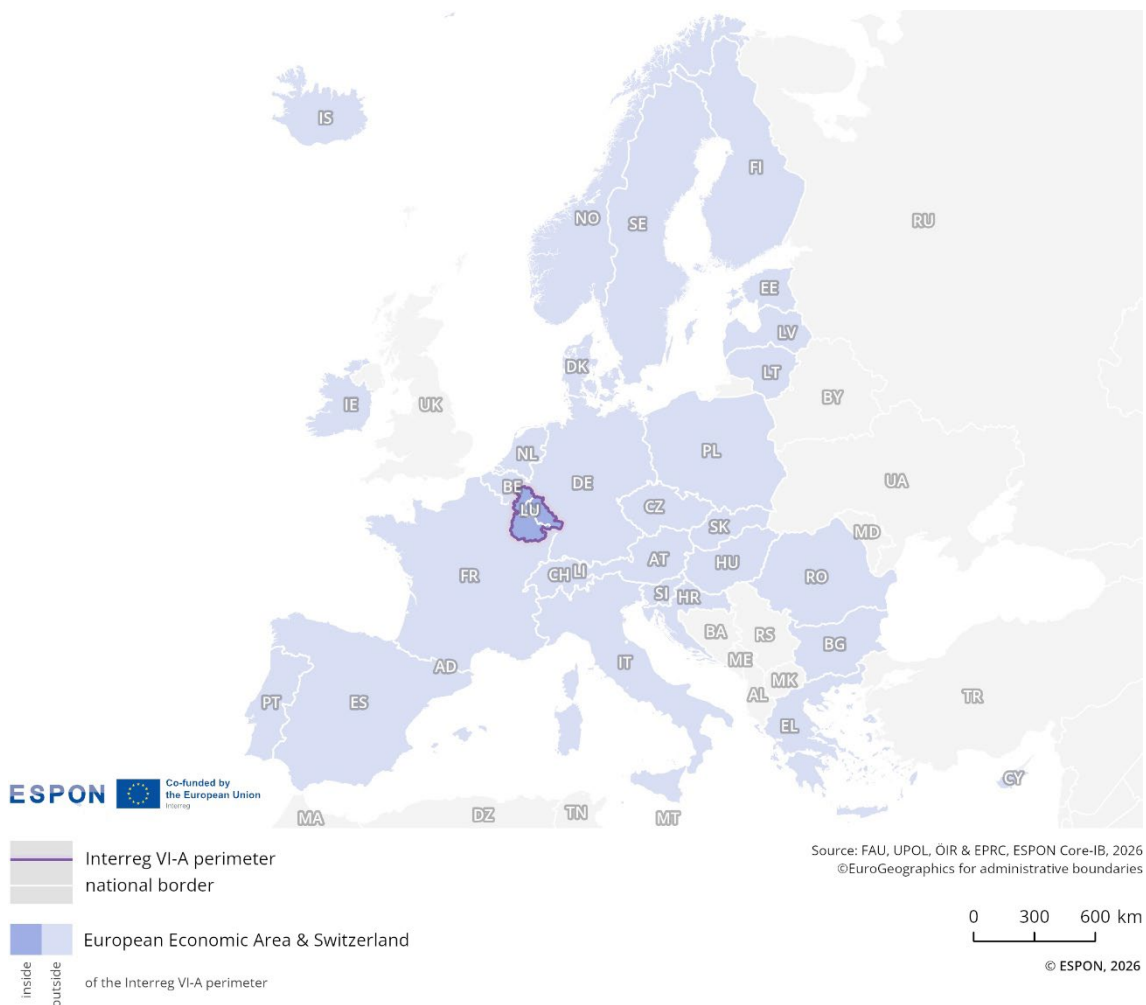
Within the ESPON framework, the CROSSGOV project (Governance mechanisms for cross-border functional areas) has been implemented in parallel to Core-IB. The CROSSGOV hub² provides a comprehensive platform for interactive data exploration, and selected data have been incorporated into this study.

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 ‘Grande Région/Großregion’ covers the area between north-eastern France, south-eastern Belgium, south-western Germany, and Luxembourg (see Figure 1.1).

Figure 1.1: Overview map

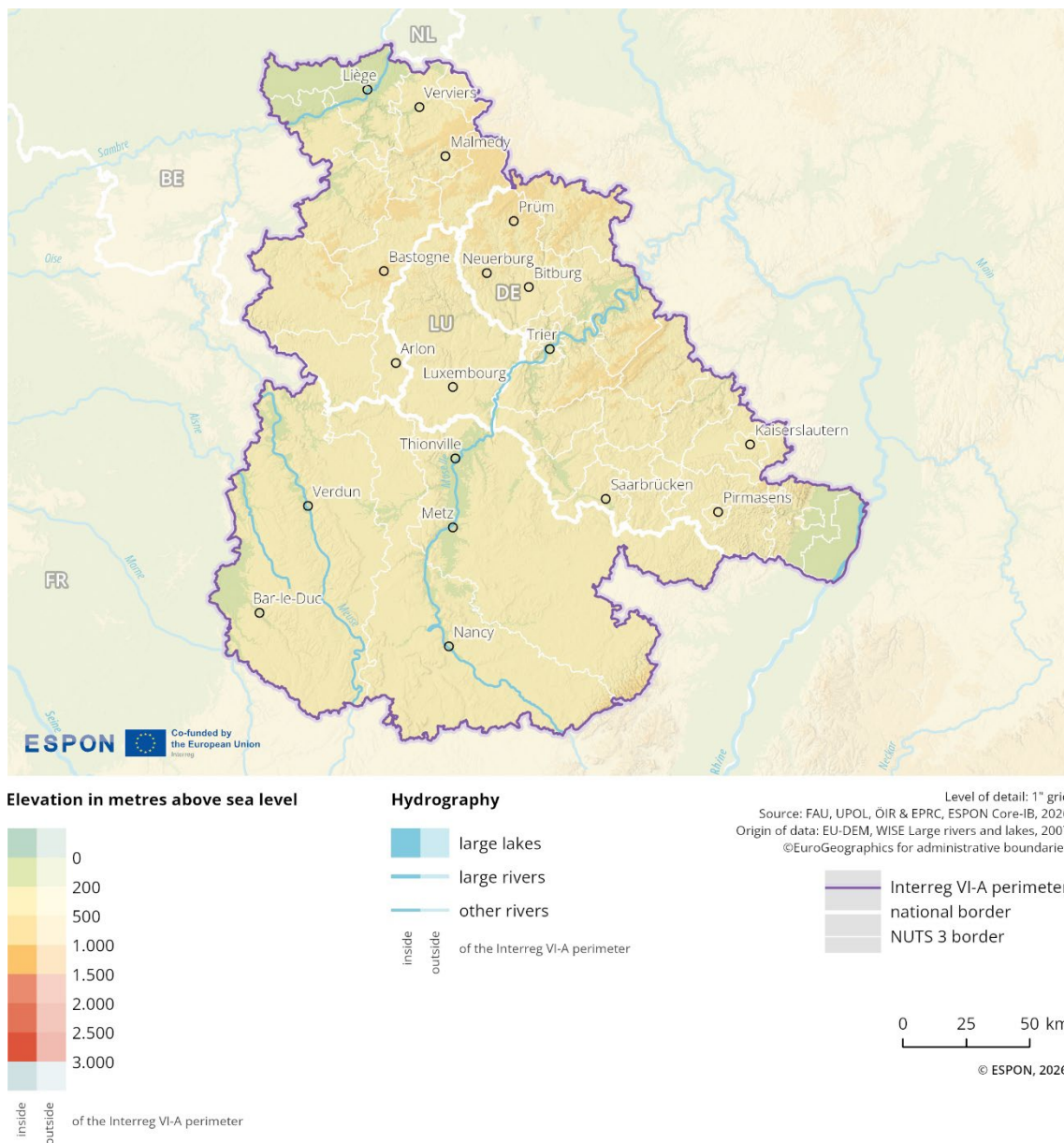


In France, the programme area includes most of the départements of Lorraine in the Grand Est region, comprising a total of 3 NUTS3 regions. In Belgium, it covers parts of the provinces of Luxembourg and Liège in Wallonia, encompassing a total of 10 NUTS3 regions. In Germany, the programme area includes most of the federal states of Rhineland-Palatinate and Saarland, specifically the regions of Trier, Koblenz, Rheinhessen-Pfalz, and Saarland, comprising a total of 21 NUTS3 regions. The area

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

includes the entire territory of Luxembourg. One has to differentiate the perimeter of the Interreg programme from the cooperation format of the “(Summit of the) Greater Region” (Grande Région) which covers a far larger area: Spanning approximately 65,406 km², the Greater Region involved 4 European Union member states: the entirety of the Grand Duchy of Luxembourg; the Belgian region of Wallonia, comprising the Wallonia-Brussels Federation and the German-speaking Community (DG); the German federal states of Rhineland-Palatinate (RLP) and Saarland (SAR); and the French departments of Meuse, Meurthe-et-Moselle, Moselle, and Vosges, which are part of the Grand Est region. The Interreg programme contributes to the implementation of the strategy of the wider Grande Région as a political project. Figure 1.2 illustrates the region's geomorphological features and the perimeter of the current Interreg VI A programme area.

Figure 1.2: Geographical features and characteristics³



The area comprises the metropolitan regions of Luxembourg, Saarbrücken, Liège, and Nancy. The landscape is characterised by diverse topography ranging from lowland plains and river valleys to low

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.

mountain ranges. The Ardennes Massif and the Lorraine Plateau further structure the terrain, creating moderately hilly to gently undulating relief across much of the region.

Several important river systems traverse the region, including the Moselle, Meuse, Sûre and Saar. These rivers contribute to the region's hydrological connectivity and form natural corridors across national borders. The natural environment is marked by extensive forests, agricultural areas, and former mining landscapes, especially in Lorraine and Saarland. Karst formations, sandstone plateaus and loess soils in parts of Wallonia and the Rhineland-Palatinate region further diversify the physical landscape.

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/km²

Please refer to the technical annex for more information.

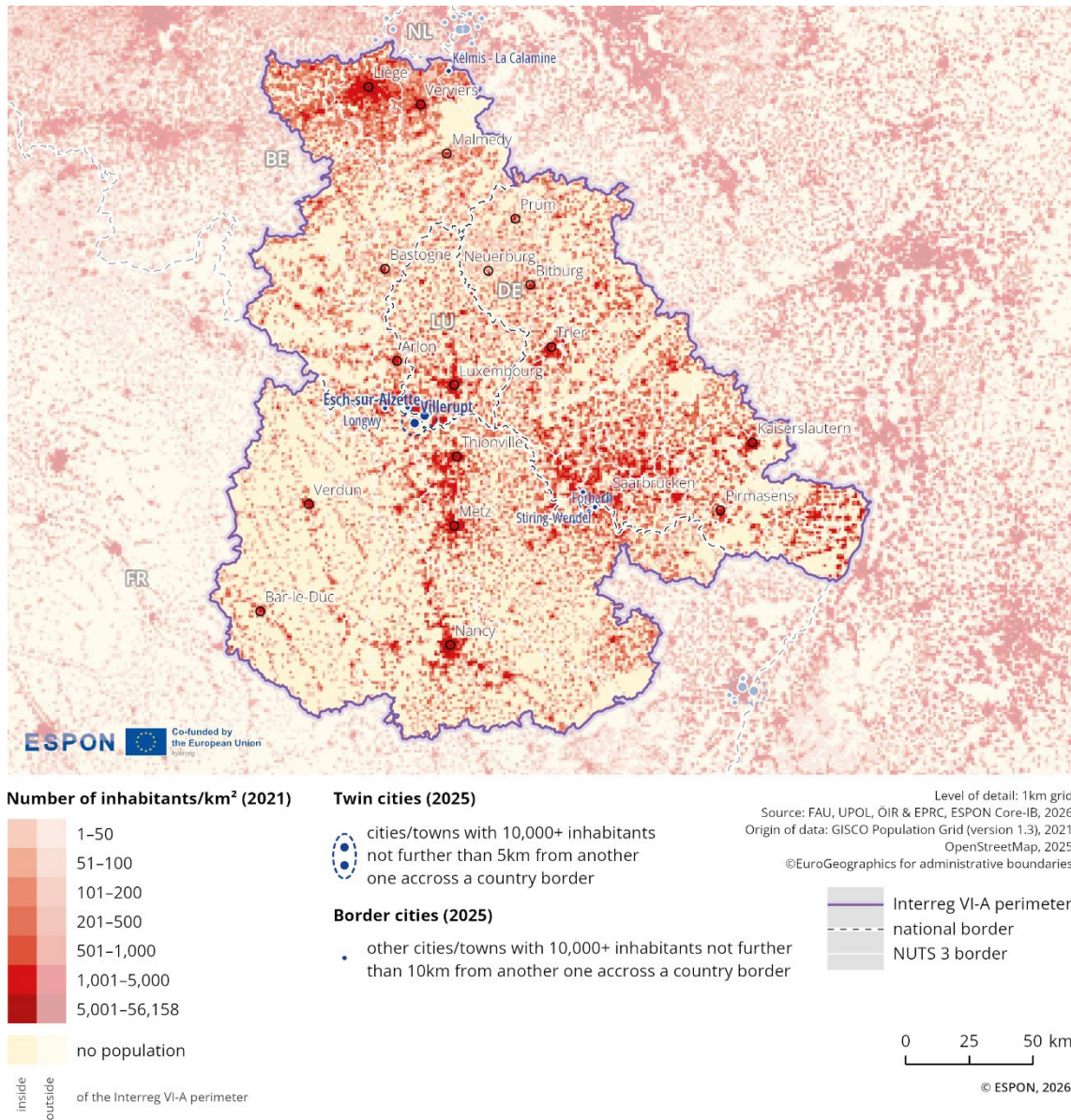
The border region comprises several urban centres with populations exceeding 30,000 inhabitants. The most densely populated areas include Liège (approximately 195,000 inhabitants), Trier, Nancy, Metz, Saarbrücken, and Luxembourg City (around 128,500 inhabitants). As illustrated in Figure 2.1, population concentrations are higher in the northern and eastern parts of the region, while the western part of the cross-border area, particularly the French territory, exhibits the lowest population density. The highest population densities, reaching up to approximately 14,000 inhabitants per square kilometre, are observed in Luxembourg City and Nancy.

The average population density across the entire border region is 154 inhabitants per square kilometre, which exceeds both the EU average of 109 inhabitants per square kilometre (according to Eurostat) and the aggregated average of all EU-evaluated border regions (125 inhabitants per square kilometre).

Within the border region, the French part has an average population density of approximately 110 inhabitants per square kilometre, which is comparable to the national average in France (102 inhabitants per square kilometre). The Belgian part records an average density of around 164 inhabitants per square kilometre, considerably lower than the national average for Belgium (372 inhabitants per square kilometre). Similarly, the German part has an average population density of about 194 inhabitants per square kilometre, which remains below the national average in Germany (231 inhabitants per square kilometre). In contrast, the Luxembourg part of the border region has an

average population density of approximately 239 inhabitants per square kilometre, corresponding to the national average, as the entire territory of Luxembourg is encompassed within the border region.

Figure 2.1: Spatial patterns of population distribution



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 %

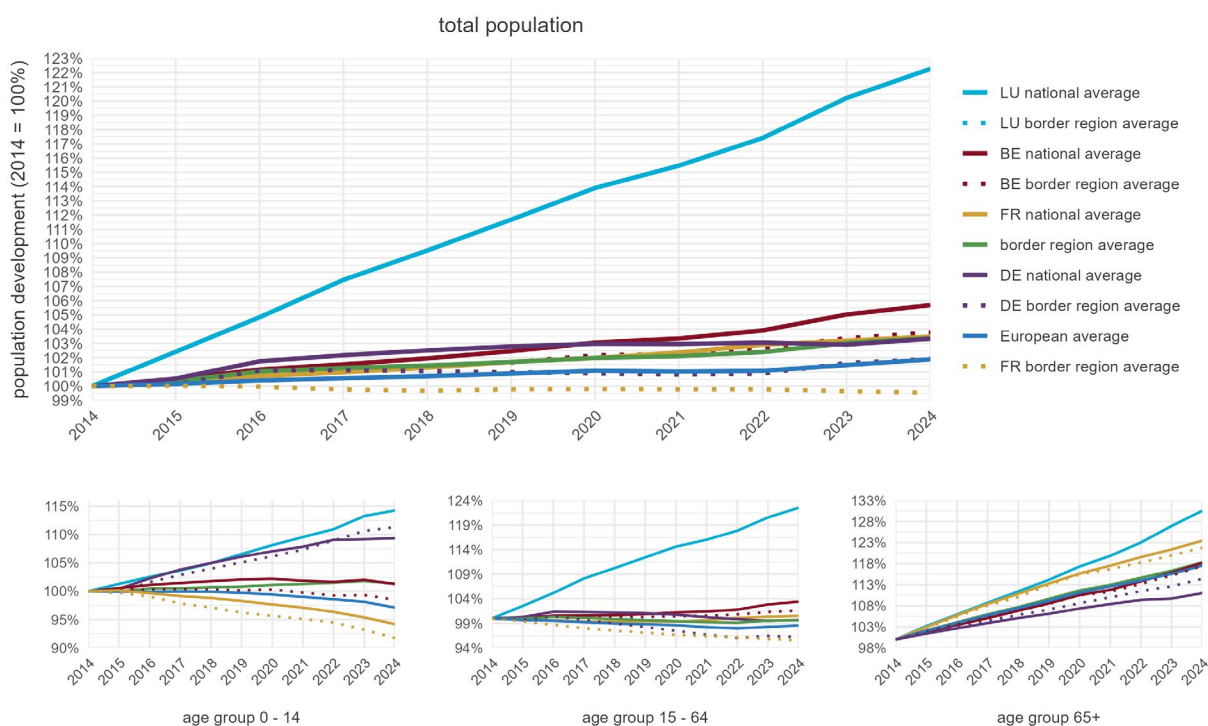
Please refer to the technical annex for more information.

Population in the France–Belgium–Germany–Luxembourg (Grande Région/Großregion) region in 2024 (Eurostat): 6.4 million inhabitants, of which:

- › 30.6% in the French border territory (2.0 million inhabitants)
- › 36.7% in the German border territory (2.4 million inhabitants)
- › 22.2% in the Belgian border territory (1.4 million inhabitants)
- › 10.5% in the Luxembourgish territory (0.67 million inhabitants)
- › Region within the border region with the highest population increase since 2014: Luxembourg (LU000) at 22.3%

The larger cooperation area of the “Grande Région” hosts 11,8 mio. inhabitants with higher shares of the German, French, and Belgium territories. Figure 2.2 shows the population growth in the France–Belgium–Germany–Luxembourg (Grande Région/Großregion) between 2014 and 2024.

Figure 2.2: Population development (2014=100)



During this period, the region has experienced moderate growth of 3.4%, with the highest growth rate observed in Luxembourg. Population growth across the border region is slightly above the European average (3.4% vs. 1.9%) and moderately higher than the average development in all border regions (3.4% vs. 1.5%). While the French border area has experienced a development below the national average (-0.5% vs. 3.5%), the German border areas show similar growth to their respective national averages (1.9% vs. 3.3% in Germany). On the Belgian side, the border area shows substantially lower growth than the national average (3.8% vs. 5.7%).

In terms of the development of individual age groups in the region, the population aged 0–14 experienced a slight increase of 1.4%, while the working-age population (15–64) remains relatively stable (-0.4%). The population aged 65 and over underwent a substantial increase of 18.3%.

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 all sides of the French-Belgian-German-Luxembourgish border. Changes are evident in particular around the urban centres of Metz, Liège, Bastogne, Trier, Saarbrücken, Kaiserslautern and Luxembourg. Nancy, Malmedy, Prüm, Neuerburg and Primasens show no significant changes during the observed time period. High growth in settlement areas is particularly evident between Luxembourg and Metz as well as around Liège, Nancy, Kaiserslautern and the valleys towards Trier. In close proximity to the national borders, the settlement area increases mainly around Luxembourg. On the German side, changes occur in and around Trier and Saarbrücken. That is also true for the Belgian cities Bastogne and Malmedy. On the French side the settlement area increases mainly between Luxembourg and Metz. The map also reflects the topographical characteristics of the border region, with hardly any changes in settlement areas in steep, hilly areas.

Figure 2.3: Settlement area dynamics

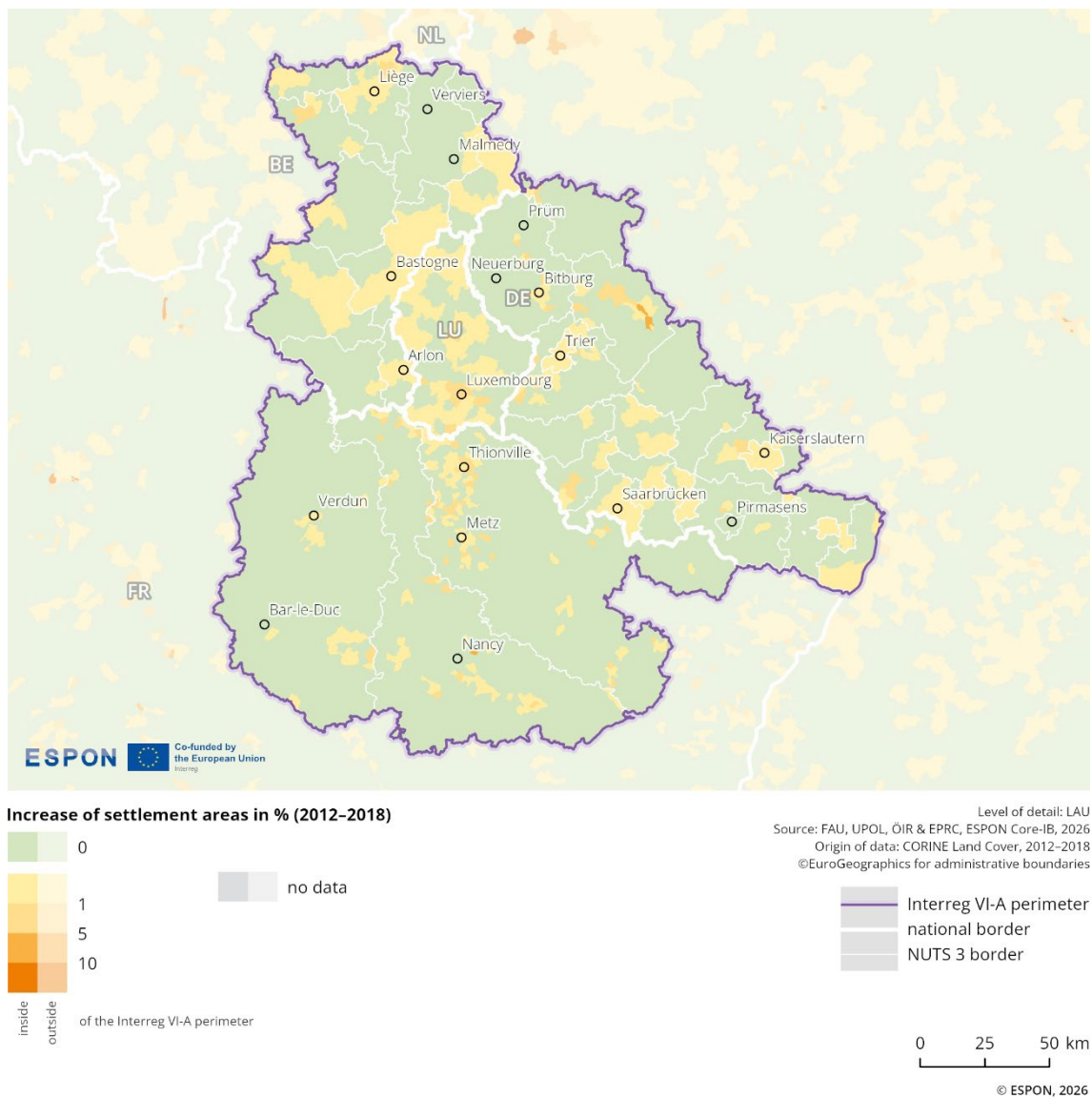
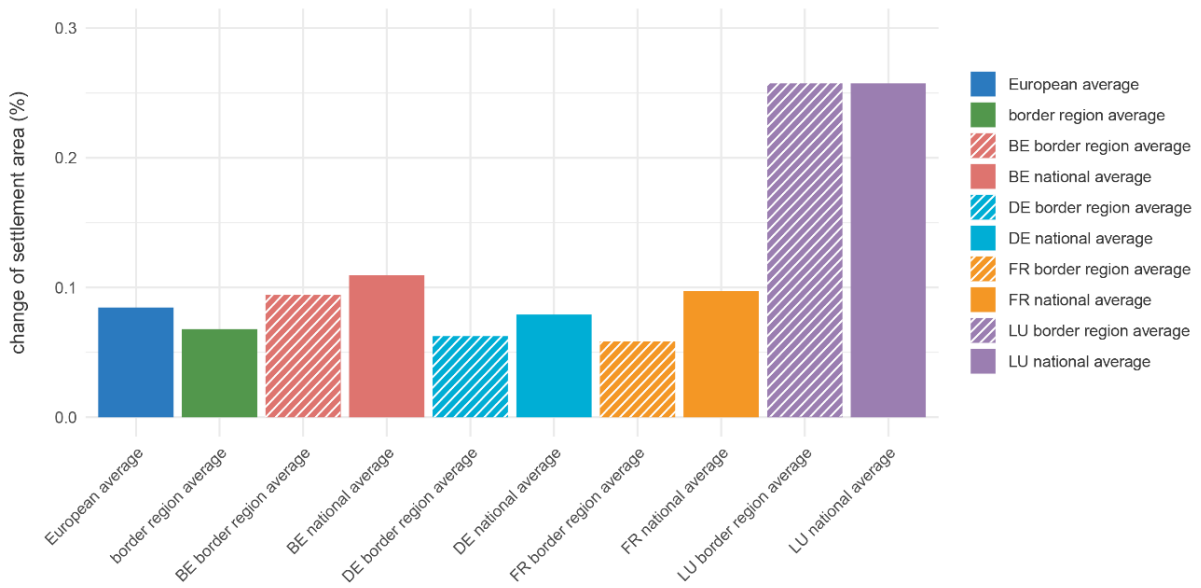


Figure 2.4 presents the change in settlement areas from a comparative perspective. The average for the France-Belgium-Germany-Luxembourg (Grande Région/Großregion) programme area is lower than the overall European average, which includes both EU member states and the EFTA (European Free Trade Association) countries Switzerland, Liechtenstein, and Norway. The national Luxembourgish value is the highest, followed by the Belgian and French national values, and finally the German national value. The Luxembourgish border-regional average lies above the German, Belgian and French border-regional averages. The Luxembourgish border-regional average is similar to the national average, whereas the Belgian and French border-regional averages lie below the national averages. The German border-regional average is lower than the national German average.

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.

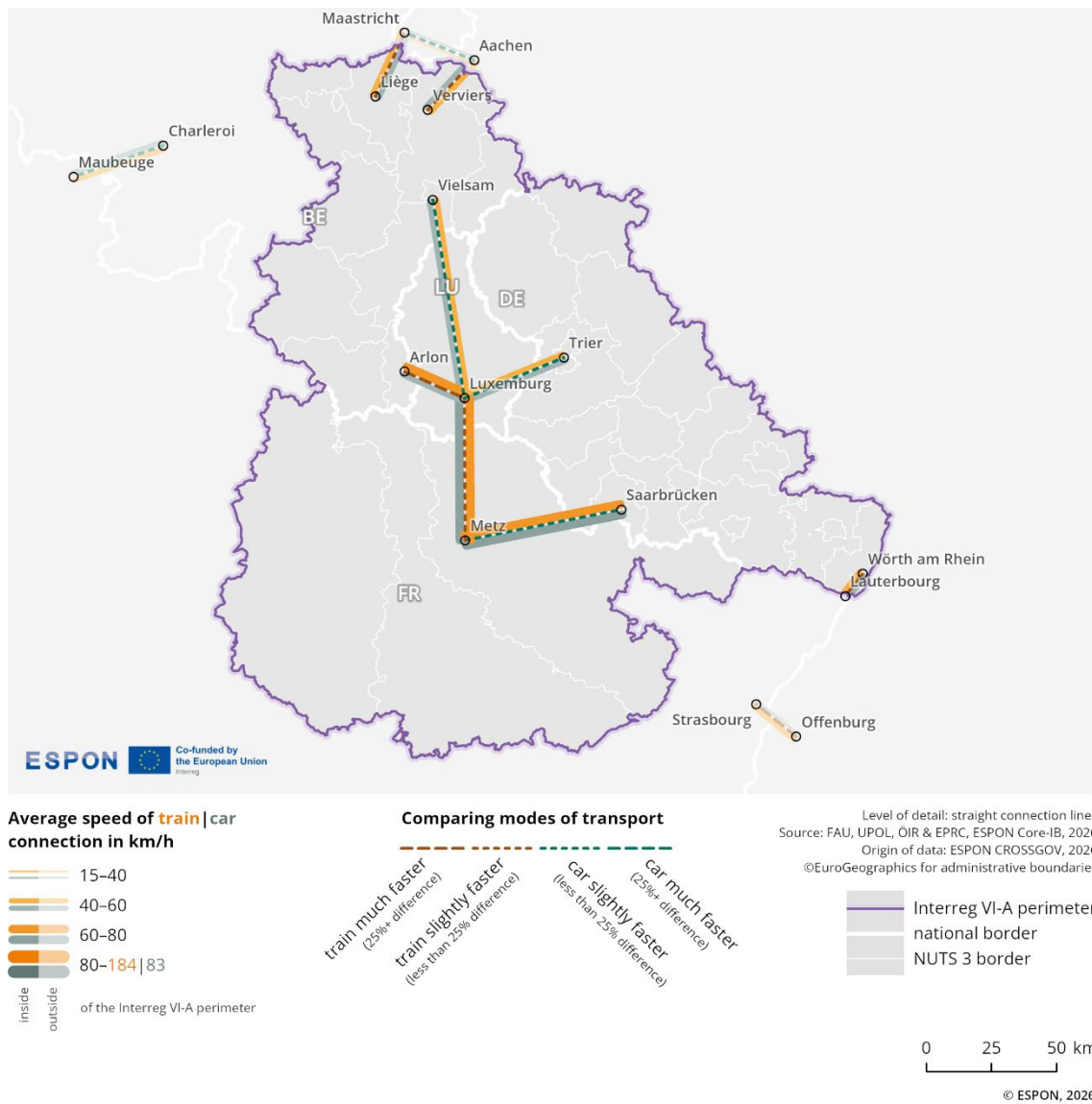
- **Source/method of retrieval:** Average number and speed of rail connections/ferries, average speed of car connections between selected cities and towns in border regions using Rail Travel Sites, Google Maps, luftlinie.org, Direct Ferries, local ferry companies
- **Temporal coverage:** 2025 (first 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 France-Belgium-Germany (Grande Région/Großregion) border region. This visualisation 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 Luxembourg–Vielsalm, Luxembourg–Trier, Luxembourg–Metz, Luxembourg–Arlon, and Metz–Saarbrücken. For most of these routes, namely Luxembourg–Vielsalm, Luxembourg–Trier, and Metz–Saarbrücken, car travel is faster than train connections. Notably, the Luxembourg–Metz and Metz–Saarbrücken connections offer relatively

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

fast options by both car and train. The Luxembourg–Arlon route is characterised by a fast train connection, while the car connection is slower.

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.

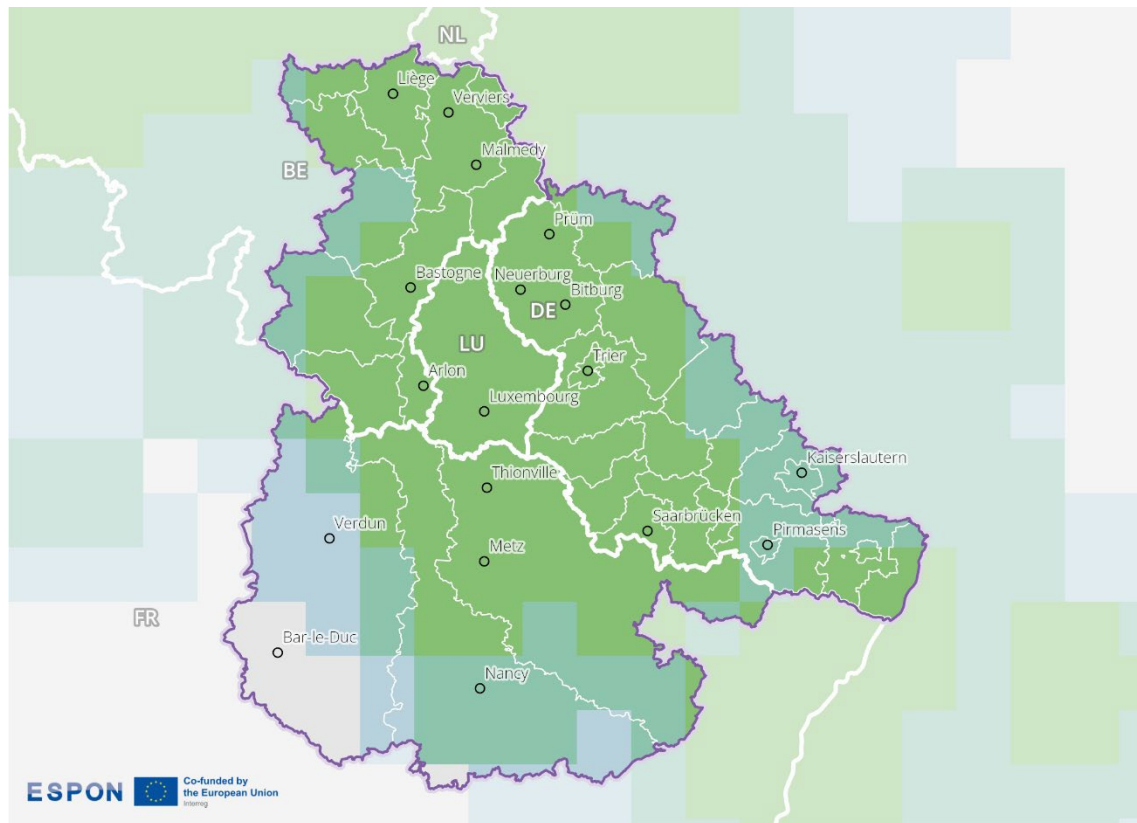
- **Source/method of retrieval:** The indicator is calculated based on Twitter (currently X) data. The digital footprint of individual users provides information about physical mobility flows and is used to calculate cross-border catchment areas of different intensity.
- **Temporal coverage:** 2013-2023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

Please refer to the technical annex for more information.

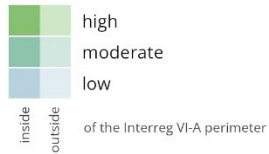
Figure 2.6 shows the cross-border catchment area in the border region based on mobility flows from 2013 to 2023, highlighting estimated cross-border mobility intensity across 3 different quartiles. The first quartile represents the 25% highest mobility intensity shown in dark green, the second quartile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

The intensity of cross-border mobility of people within this cross-border region is relatively homogeneous. The highest levels of mobility intensity are recorded across most of the region, particularly in areas near the national borders of all 4 countries comprising this cross-border region. Moderate intensity values are observed around the cities of Nancy, Pirmasens, and Kaiserslautern. Low intensity levels are primarily found in French areas located further from the national borders. One has to admit that the data shows only a limited degree of granularity and spatial differentiation. In a polycentric setting as in this case, mobility patterns can be assumed as more heterogeneous at a fine scale.

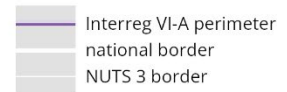
Figure 2.6: Cross-border mobility intensity



Estimated cross-border mobility intensity (2013-2023)



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



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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 area. 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

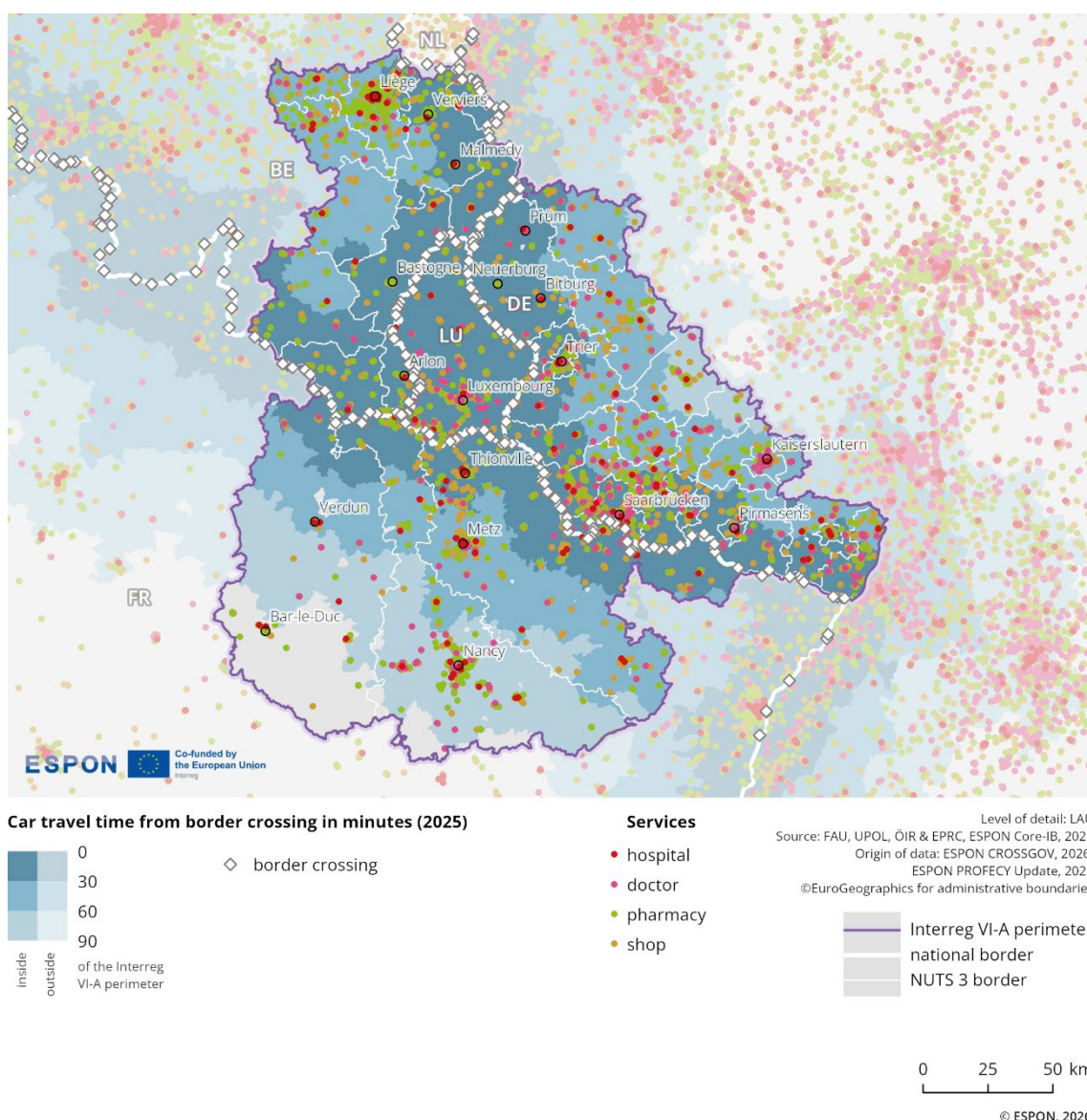
Please refer to the technical annex for more information.

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 convenient stores), with distinct coloured symbols.

The map shows that the entire cross-border area of all 4 states falls within the category of accessibility with a travel time of under 30 minutes. This includes the entire area of Luxembourg. The French border regions lie entirely within a belt with a maximum travel time of 60 minutes. The German border area is mostly located in the first 2 accessibility categories (under 30 and 60 minutes). Only the south-west part of France has a road connection longer than 90 minutes to the border. The immediate vicinity of the border has good and fast road connections along its entire length.

3 cities show the highest concentration of services, including shops, hospitals, doctors, and pharmacies. This includes Liege in northern Belgium, in the 60-minute category; in the south the town of Saarbrücken, Germany, which is very close to the border with France; and the capital city of Luxembourg. Service coverage is denser and more even in Germany than in the border regions of France and Belgium.

Figure 2.7: Travel-time accessibility from border crossings



2.1.3 Key messages on the territorial dimension

The border region is characterised by a strong polycentric structure involving 4 countries with a certain asymmetry: Territorial dynamics are clearly stronger on the Luxembourgish side than on the others, as – amongst others – the indicators for land-use change and population dynamics show. The high development momentum in the centre of the region in terms of economic growth leads to increased population growth and raising numbers of inhabitants as well as commuters. This dynamic calls for an integrated approach to spatial development across borders. This approach must balance the various demands on land use, such as residential, commercial, tourism, transport, agriculture, and nature conservation, which requires ongoing coordination and exchange. Furthermore, the strong settlement and demographic development underscores the need to enhance accessibility and transport infrastructure, including cross-border connections. Given the complexity of spatial planning and the substantial volumes of investment involved, it is essential that transport and infrastructure planning be grounded in stable 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.

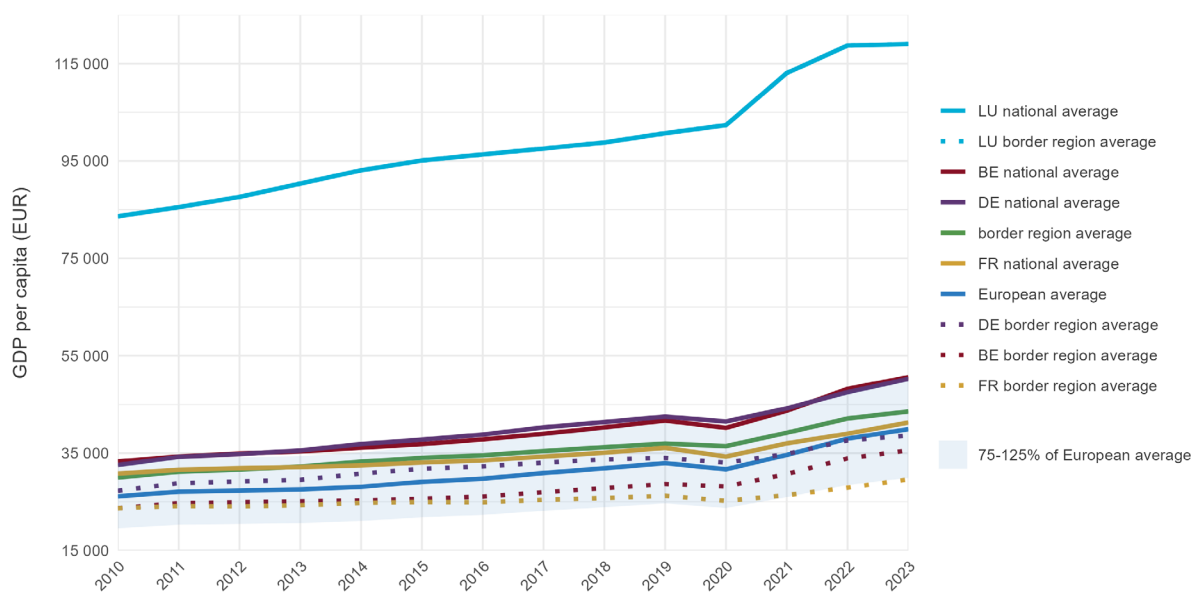
The indicator GDP/capita is a key indicator for economic and regional development European wide. In general, it provides strong evidence for the economic capabilities. However, it comes along with some severe limitations in those border regions with high shares of commuters, as it is the case for the Luxembourg region: The term 'capita' refers to the inhabitants, not the employees. This means that the higher the share of cross-border commuters, the less accurate is the calculation based on. In Luxembourg, almost half of the employees are incoming cross-border commuters. Nevertheless, due to the high prominence of this indicator in a series of policy debates, the actual numbers have to be taken into account. For the interpretation of the data, one has to be aware that a significant portion of GDP is generated by cross-border workers who contribute economically to their place of work but not directly to their place of residence.

The whole border region shows a GDP/capita value of 116.7% of the EU average in 2022 and 118.5% of the average in European border regions in general. The region marks a 27.8% increase of GDP per capita in the border region between 2014 and 2022⁵. This corresponds to a 7.8 percentage points lower increase of GDP per capita in the border region compared to the EU average. Furthermore, this corresponds to 7.4 percentage points lower increase of GDP per capita in the border region compared to the average of European border regions. Luxembourg by far outpaces its neighbouring border regions. All 3 other countries' border regions trail behind the respective national average significantly. In all 3 cases, the border region average only is around 70-80% of the national values, but also this

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.

picture has to be re-evaluated with the indicator's blindness to outgoing commuters. In terms of GDP per capita growth, the Belgian border region is on par with the EU average, Luxembourg and the German border region register a comparatively less dynamic growth, while the growth of the French border region is 22.9 percentage points lower than the EU average.

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



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

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

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).

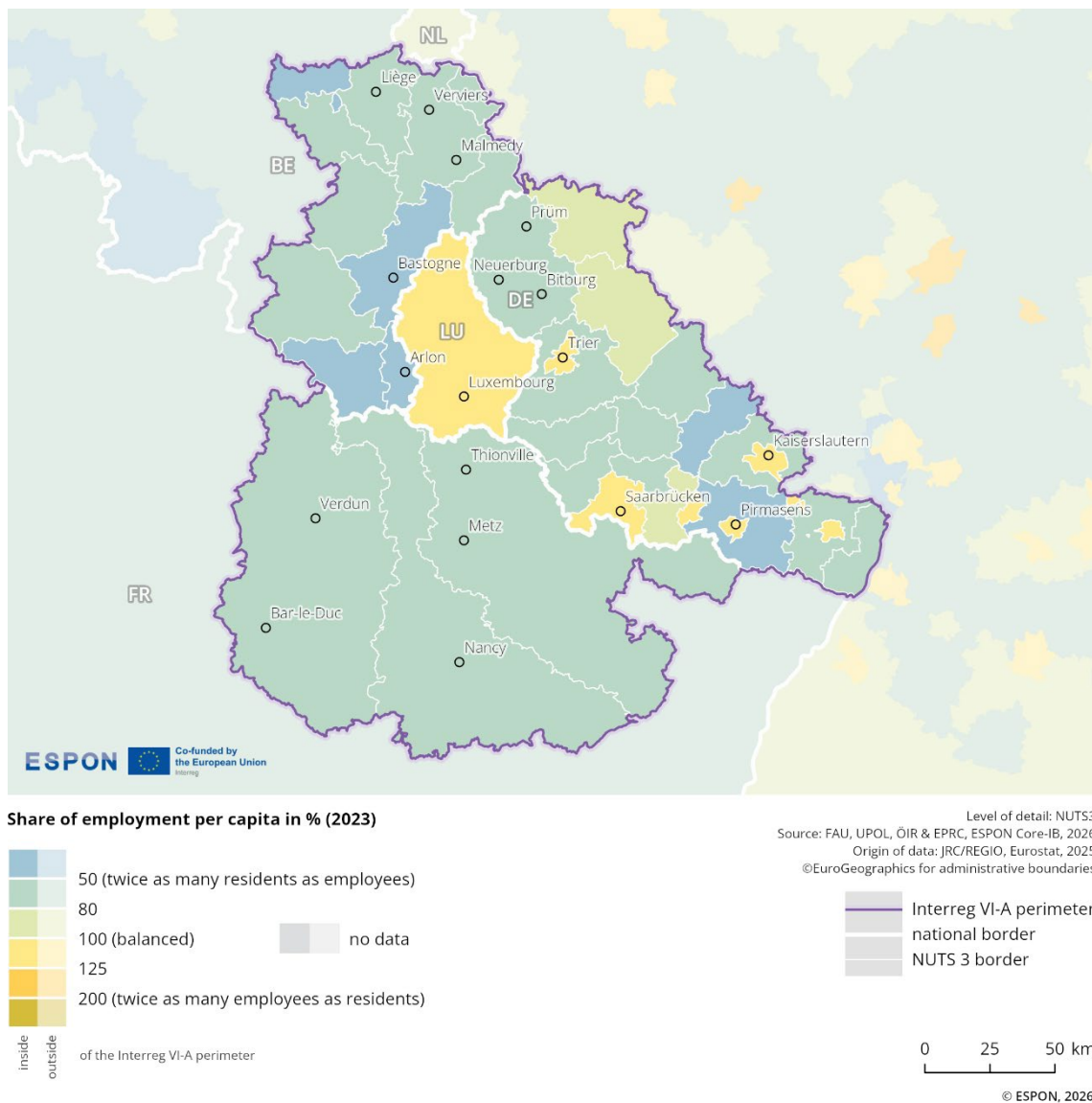
- **Source:** Eurostat, Annual Regional Database of the European Commission (ARDECO)
- **Temporal coverage:** 2014-2023
- **Unit:** Share in %

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.

The share of employment in this border region is relatively variable, with the average for the entire region at 71.76% in 2023, representing an increase of 5.79 percentage points since 2014. Due to very similar indicator values, differences between the involved countries are not very pronounced, except for Luxembourg, where values range from 100% to 125%.

Figure 2.9: Employment share⁷

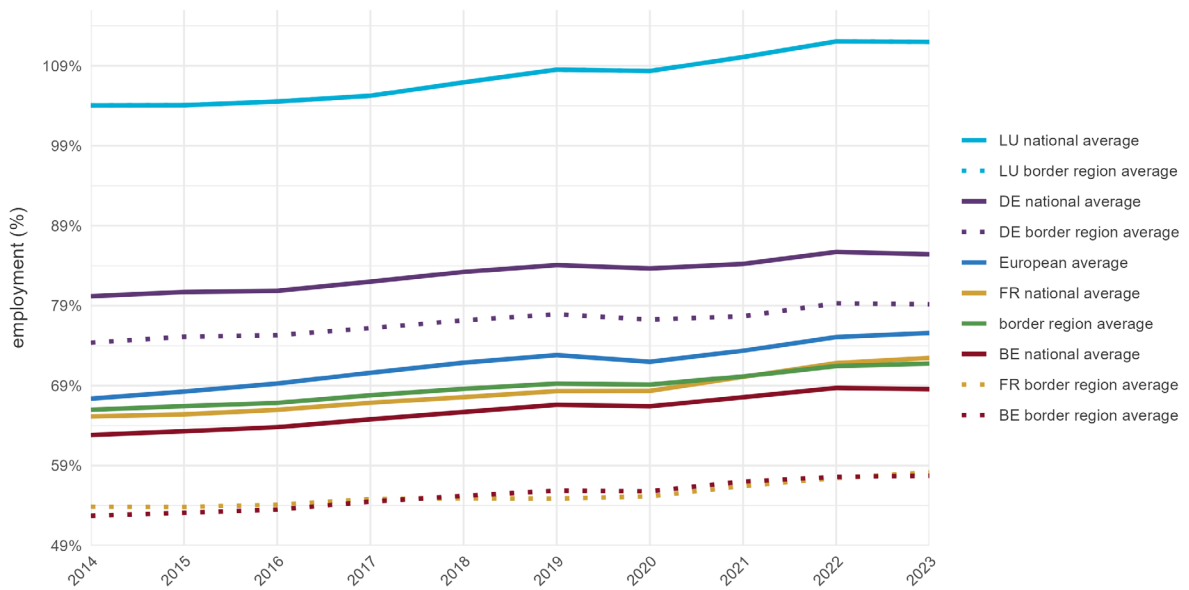


The high numbers for Luxembourg as well as for the urbanised areas on the other sides of the border have to be explained with commuting patterns (similar as the GDP values earlier in this document). The overall picture shows a concentric structure with Luxembourg as the employability center and the surrounding areas with medium values. On the German side of the border, the relatively small NUTS3 geometries show the urban centres that attract work force from the surrounding districts.

The development over time shows an overall positive trend with increasing values and a rather stable pattern amongst the territories of the border region (see Figure 2.10).

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

Figure 2.10: Employment share over time (comparison)



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.

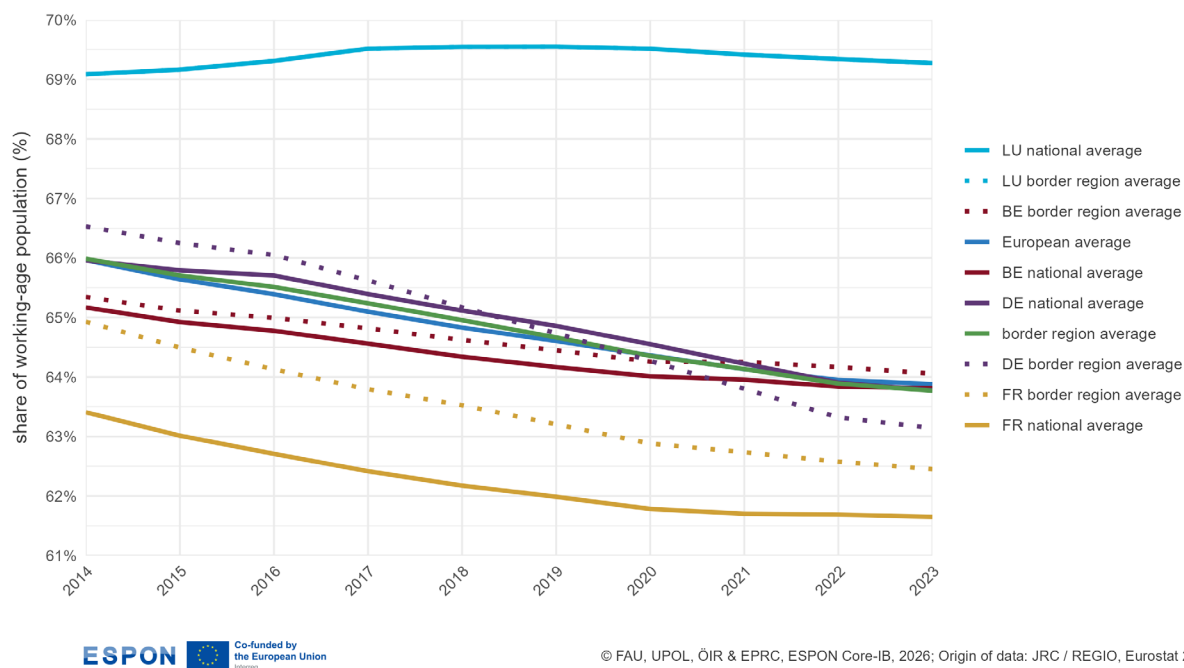
Figure 2.11 illustrates the evolution of the share of the working-age population in the France-Belgium-Germany-Luxembourg cross-border region (Grande Région/Großregion) between 2014 and 2023.

In 2023, the border region has an average working-age population share of 63.8%, comparable to the European average of 63.9% and 63.7% for all cross-border regions. The regional values show again a rather concentric pattern, with the clearly highest numbers for Luxembourg. Different to the indicators discussed earlier in this document, the differences in numbers do not result from commuting patterns.

The region experienced a 2.2 percentage point decrease in the share of the working-age population between 2014 (66.0%) and 2023 (63.8%). This decline is comparable to the European average, which dropped by 2.1 percentage points over the same period.

In summary, the entire cross-border region exhibits a downward trend in the share of working-age population, with relative stability in Luxembourg and moderate declines in Belgium, and more notable decreases in Germany and France. Nevertheless, the region remains close to both the EU and overall cross-border averages. One has to underline that the picture shows relative numbers that do not reflect the demographic growth trend in particular trends that somehow covers the increase of labour force in absolute numbers. Instead, the indicator rather reflects the demographic change in terms of ageing in many parts of this region.

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



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 %

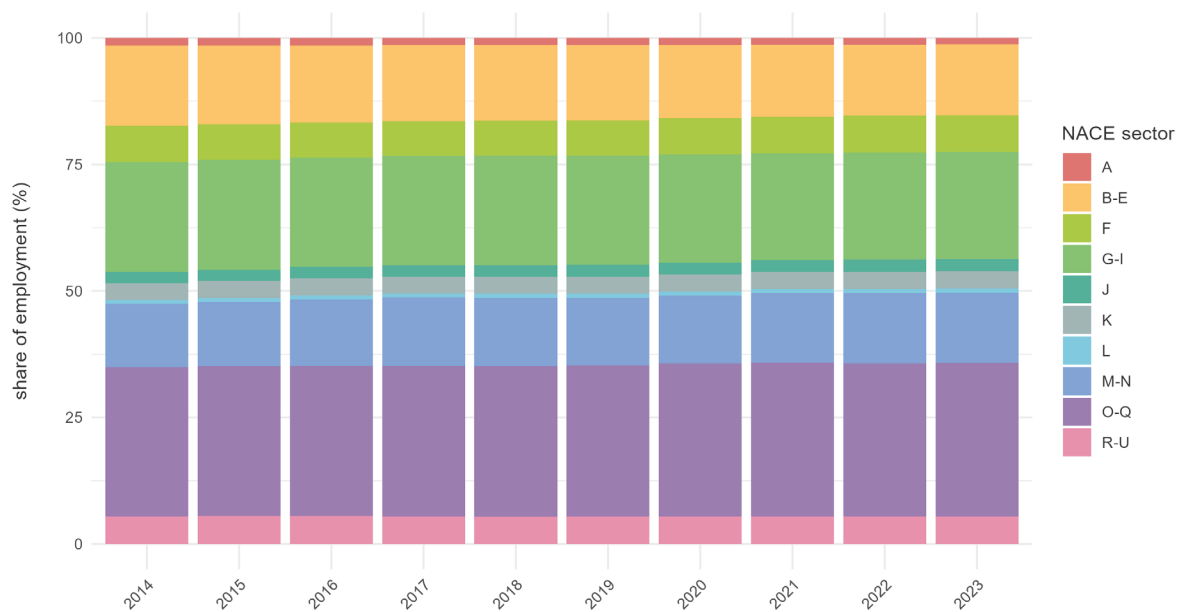
Please refer to the technical annex for more information.

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 Mining and quarrying (B), Manufacturing (C), Electricity, gas, steam and air conditioning supply (D), Water supply, sewerage, waste management and remediation activities (E) and Wholesale and retail trade; repair of motor vehicles and motorcycles (G), Transportation and storage (H), and Accommodation and food service activities (I). Conversely, there is

a modest increase in the number of jobs in professional, scientific and technical activities (M) and Administrative and support service activities (N).

Over the entire period, the sectors with the highest share of jobs are 'O-Q' (Education, Human health and social work activities), 'G-I' (Wholesale and retail trade, repair of motor vehicles and motorcycles, Transportation and storage, Accommodation and food service activities) and 'M-N' (Professional, scientific and technical activities, Administrative and support service activities). Overall, the graphic shows that the trend towards the service sector and knowledge economy.

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 % (share of outgoing commuters among the residential population of the age group 15-64)

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 data. It shows strong cross-border commuting activity in areas directly adjacent to the border on the French, German, and Belgian sides. By far, most of these outgoing commuters are heading to Luxembourg (for detailed data from domestic institutions see IBA OIE)⁸.

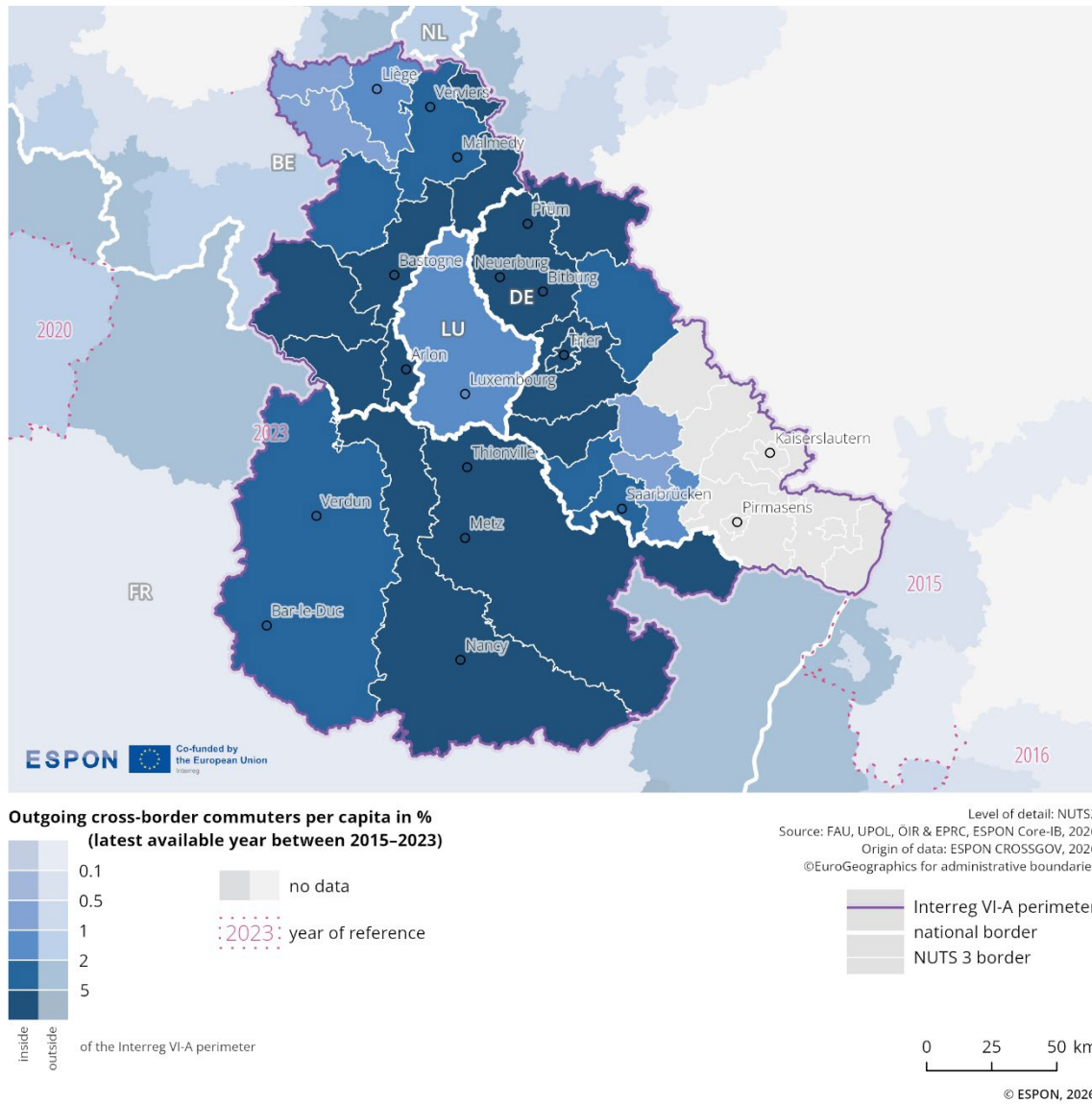
In France, all regions in the programme area show elevated shares of outgoing commuters per capita (Meuse, Meurthe-et-Moselle, and Moselle)⁹. On the Belgian side, all areas bordering Luxembourg, and some located further from the border, report high shares of outgoing commuters (e.g., Arr. Virton, Arr. Bastogne, Bezirk Verviers – Deutschsprachige Gemeinschaft, Arr. Verviers – Communes francophones, Arr. Neufchâteau). In Germany, regions directly adjacent to Luxembourg, such as Eifelkreis Bitburg-Prüm, Trier-Saarburg, Trier (Kreisfreie Stadt), and Merzig-Wadern, also show high levels of outgoing commuters.

⁸ <https://www.iba-oie.eu/fr/themes/mobilite-des-frontaliers/grande-region/les-flux-de-frontaliers-en-grande-region>

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¢er=49.69576.14.3332.4&lcis=NUTS2021L3&>

From a European perspective, this programme area stands out in particular for its high levels of cross-border commuting, underlining the key role of commuting for the economy.

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.

All countries involved in the programme are signatories of the 2023 Framework Agreement on Cross-Border Telework. Under this agreement, cross-border workers can telework from their country of residence for up to 50% of their total working time without affecting their social security affiliation.

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.

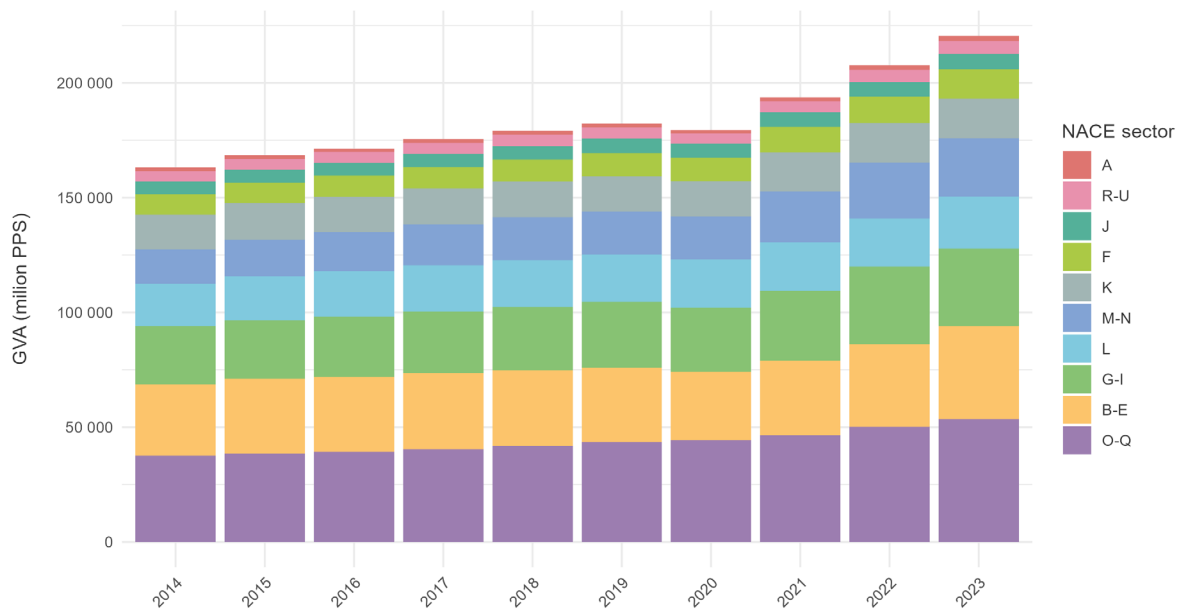
Figure 2.14 visualises gross value added (GVA), which is an important indicator of economic activity. GVA measures the value created by all economic activities involved in producing goods and services in a specific area. It is differentiated by sectors to provide detailed insights into the economic contributions 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 France-Belgium-Germany-Luxembourg (Grande Région/Großregion) increased from 163,101 million purchasing power standards (PPS) to 220,425 million PPS — a growth of 35%. 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 O-Q contributed the largest share, with a total of 53,558 million PPS in 2023. This underlines the significance of sectors such as Education (O), Human health and social work activities (Q) in the France-Belgium-Germany-Luxembourg (Grande Région/Großregion) border region. Considerable growth can also be observed in the category K (Finance and insurance activities).

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)

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

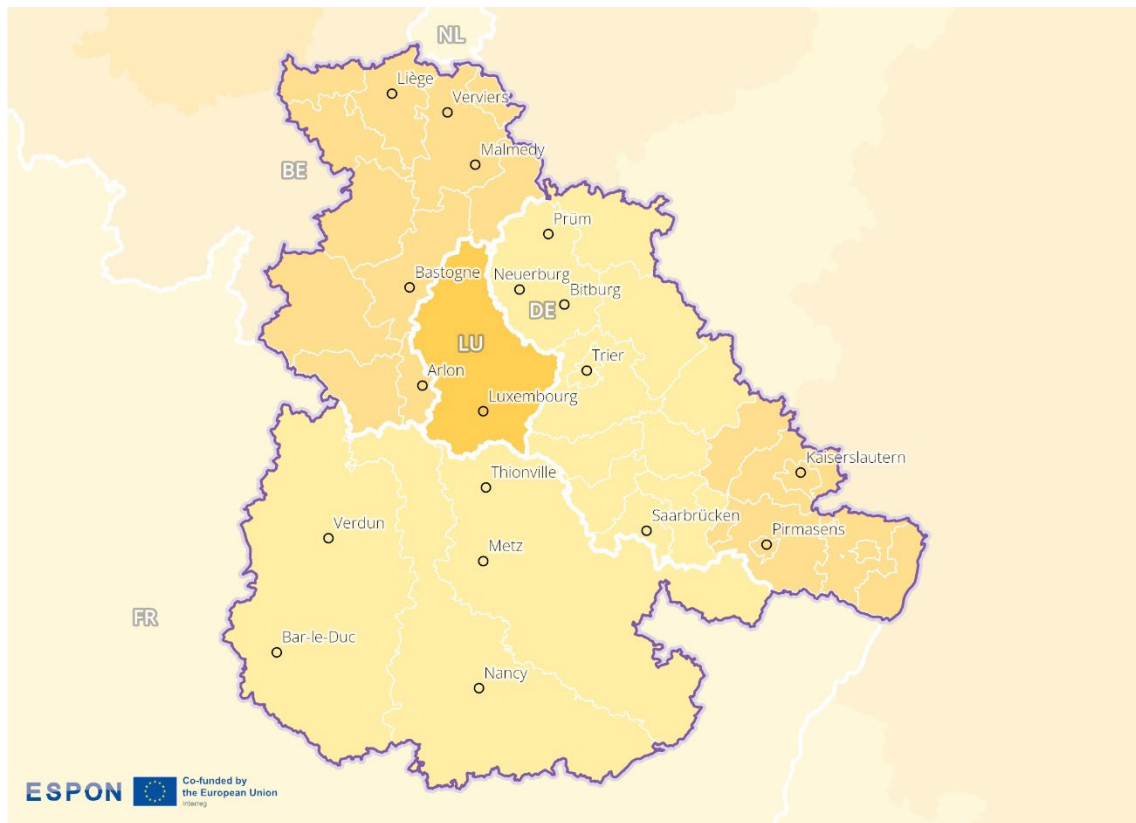
Please refer to the technical annex for more information.

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 Grande Région/Großregion border region appears to be distributed relatively unevenly. In most areas, the average hourly income ranges between €30 and €40. The Belgian and several German NUTS3 regions within the programme area report slightly higher values between €40 and €50. Luxembourg (€56) shows a significantly higher value compared to the rest of the region. To contextualize the regional pattern shown in the figure, it is noteworthy that the national average hourly compensation reaches €44.50 in Belgium, €36.30 in France, €39.40 in Germany and €56 in Luxembourg. This helps situate the border region within national labour productivity context.

Cross-border wage differences can encourage labour migration from lower-wage areas to more economically prosperous neighbouring regions, creating both opportunities and challenges for local labour markets and social systems.

Figure 2.15: Average income per hour



Average income per hour worked in euros (2023)



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 1-year period.
- **Temporal coverage:** 2024/2025
- **Unit:** Average price per square meter (€/m²)

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 €/m² up to more than 8,000 €/m², shown in colours ranging from purple and blue to green, yellow and orange.

Lower prices are found in the southern part, where values drop below 1,000 €/m². The average advertised sales price in the German part of the border region is around 2,130 €/m², in the French part it is around 1,600 €/m², in the Belgian part it is about 2,020 €/m², while in Luxembourg it is about 6,130 €/m². The overall average for the entire border region is 1,964 €/m², which is similar to the average across all evaluated EU border regions (1,900 €/m²). However, in several municipalities, prices reach and exceed the European average of 5,600 €/m².

Figure 2.16: Advertised housing prices

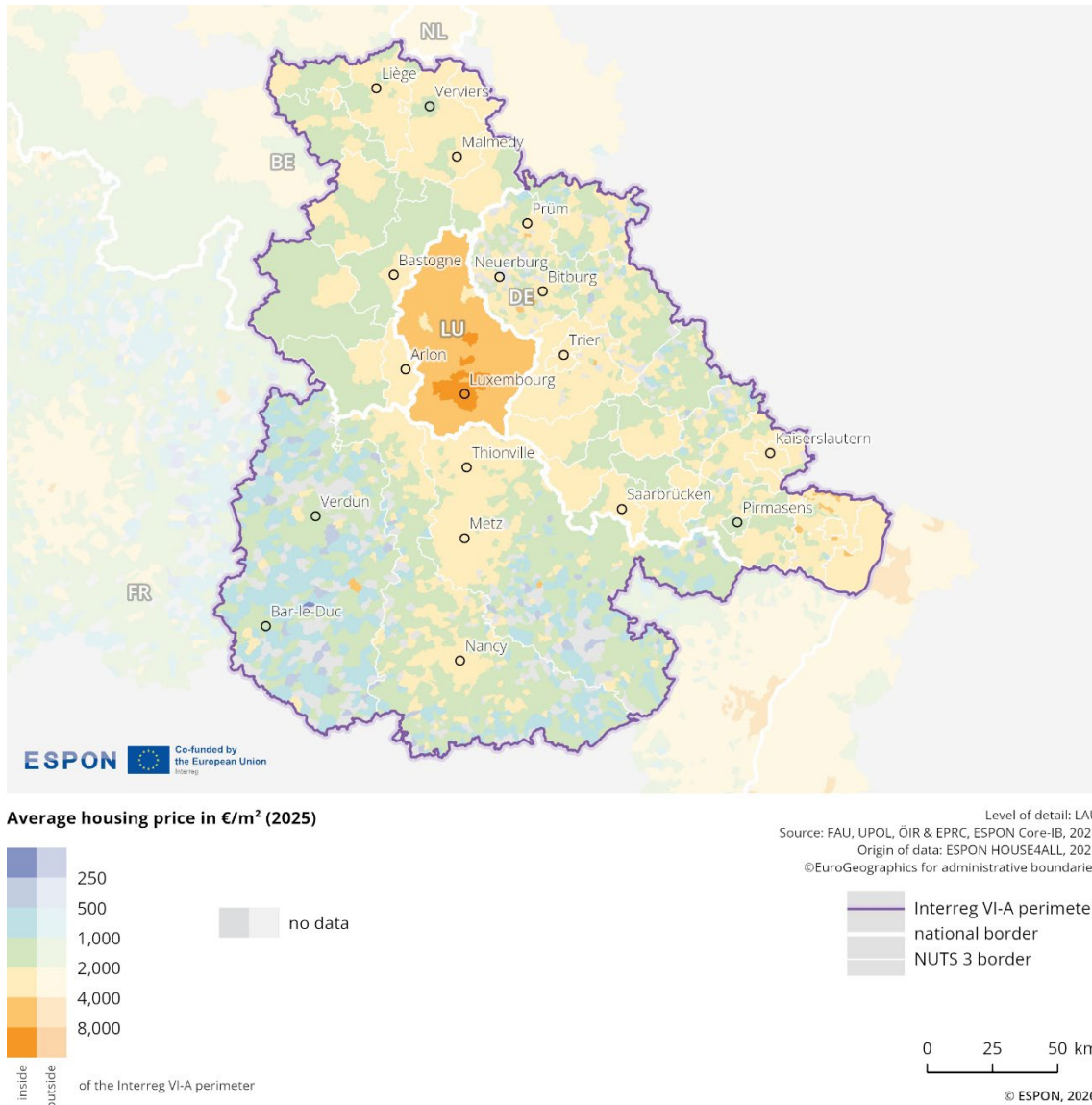
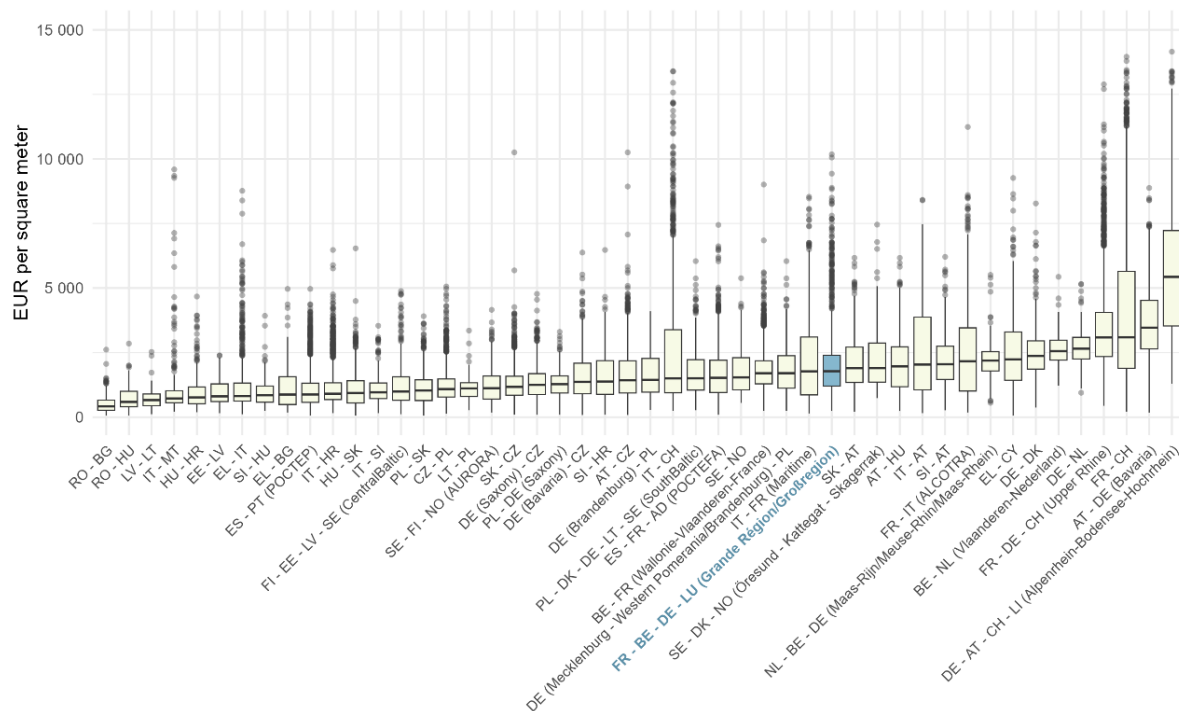


Figure 2.17 illustrates the distribution of sales prices across municipalities within the border area. The large interquartile range (IQR, represented by the box) indicates substantial variation, highlighting pronounced spatial disparities in sales prices. The boxplot also displays several extreme values (shown as individual dots), with some municipalities recording prices of up to 10,000 €/m².

Both indicators, the sales prices and the housing prices, show a large range of values. These differences ask for cross-border strategies, both in spatial planning and land use scenarios, as well as in housing policies.

Figure 2.17: Advertised housing prices (comparison)



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.

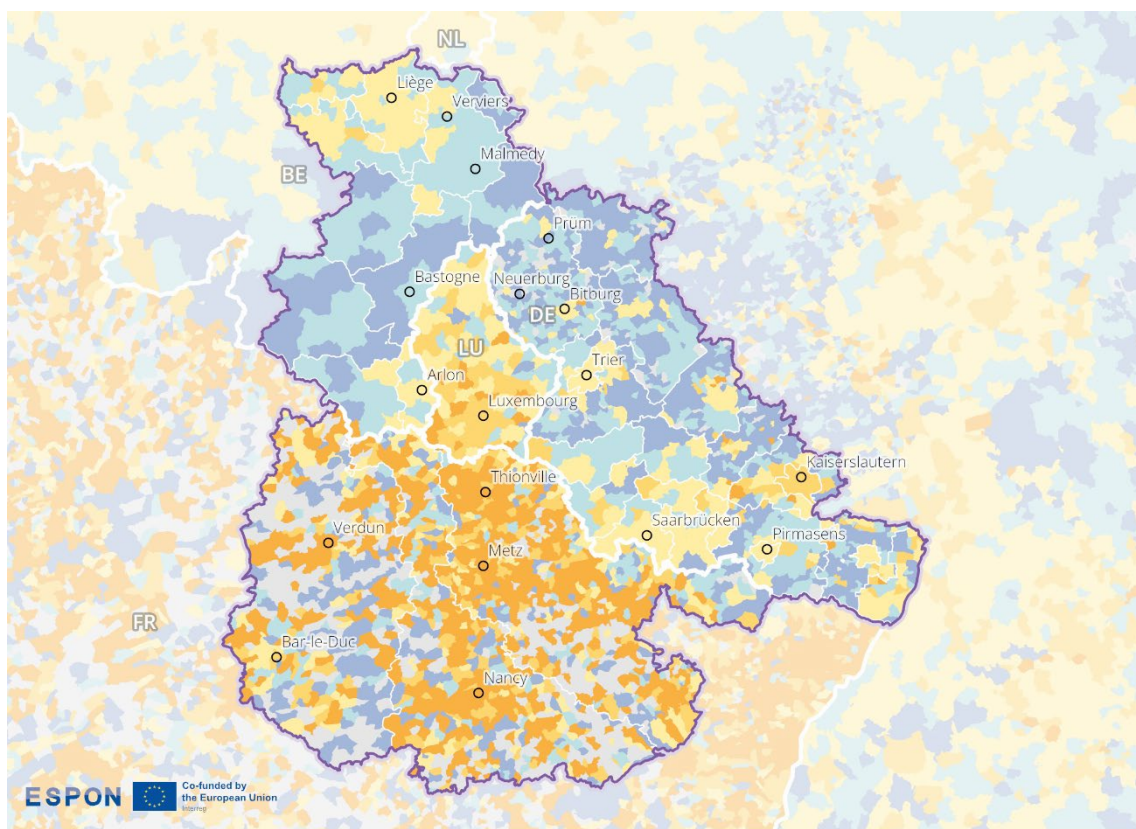
Digitalisation is a highly relevant issue in European border regions, with the overarching objective of ensuring appropriate digital access. It is widely recognised as a key precondition for successful regional and economic development. A major challenge in this process is preventing ‘digital divides’, 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

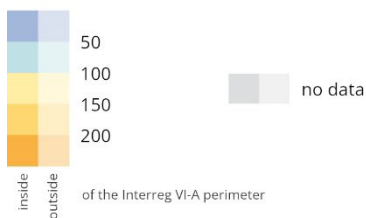
data, prepared by OBC Transeuropa for EDJNet, is based on Speedtest Intelligence data from Speedtest/Ookla's Global Fixed and Mobile Network Performance Maps for the first quarter of 2022. The average download speeds are expressed in megabits per second (Mbps), not to be confused with megabytes per second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

Figure 2.18 reveals significant differences between urban and rural areas, with values ranging from under 50 Mbps to over 200 Mbps. Cities such as Metz, Nancy, Liège, Saarbrücken, Trier, Kaiserslautern, Pirmasens, and Luxembourg report relatively high average speeds, while the 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 (scale economies). However, not all urban areas in this border region have high download speeds—for example, Malmedy, Bastogne, Prüm, and Neuerburg do not stand out in this regard. In France and Luxembourg, the average internet speed is significantly higher than in Belgium and Germany.

Figure 2.18: Average internet download speed



Average internet speed in Mbps (2022)



Level of detail: LAU
 Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
 Origin of data: Orinaldo Gjergji, European Data Journalism Network, 2022
 ©EuroGeographics for administrative boundaries



© ESPON, 2026

2.2.5 Key messages on the economic dimension

The border region shows a similar pattern across the indicators: the area has a polycentric economic structure with the outstanding position of Luxembourg. Overall, the economic indicators show a growth trend, with a dominant and even growing relevance of the service sector in the broad sense.

Some of the indicators show comparably high values, also compared to the European setting. This is true for the high relevance of commuting in the border region with 4 involved countries.¹⁰ In principle, cross-border commuting can mitigate price differences in the real estate market. However, in this region a rather high range of real estate prices, in particular along the borders along Luxembourg, is striking. Overall, it is obvious that the strong economic development path is of cross-border character in its core.

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.

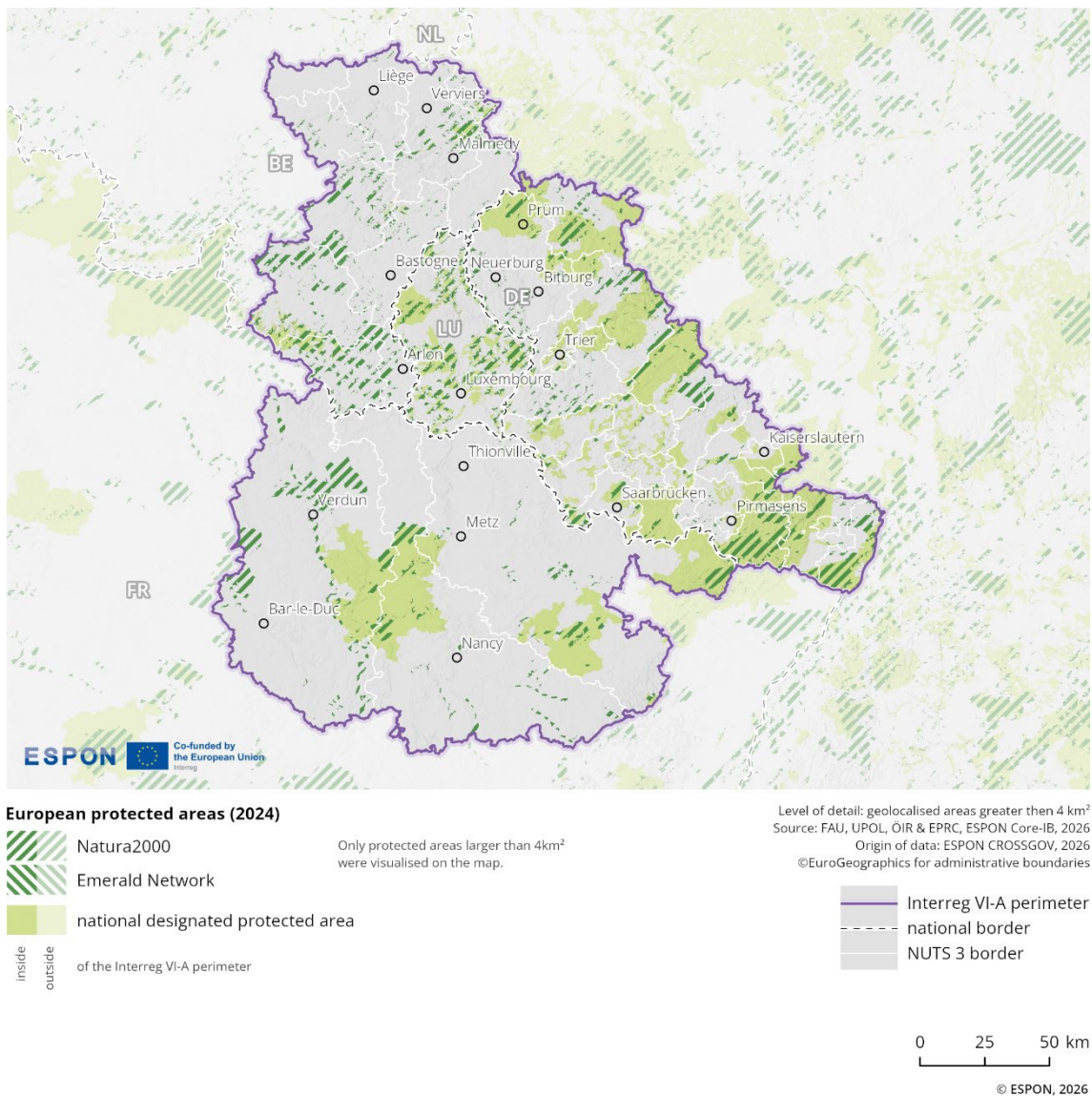
Protected areas within the Interreg region are mainly concentrated in the eastern and central zones, particularly around Trier, Saarbrücken, Pirmasens and Luxembourg, where Natura 2000 and national designated areas frequently overlap. Additional clusters are visible near Prüm, Malmedy, and Metz,

¹⁰ See also: European Commission 2024: Cross-Border Regional Labour Market Analysis, <https://op.europa.eu/s/AazM>

while northern and southern sections of the region show more fragmented coverage often with numerous small protected areas in close proximity.

Several protected areas form clear cross-border counterparts, especially between Luxembourg and Germany. These create connected corridors, particularly in the Ardennes and Moselle regions, while some gaps remain in the Belgium regions close to Prüm and on the French side south of Luxembourg and close to Saarbrücken.

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 ($\mu\text{g}/\text{m}^3$), 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 $\mu\text{g}/\text{m}^3$

Please refer to the technical annex for more information.

The concentration of fine suspended particles of less than 2.5 micrograms per cubic meter is a prominent indicator to assess air quality, pollution, and health risks. Figure 2.20 illustrates PM2.5 concentrations (in $\mu\text{g}/\text{m}^3$) across NUTS3 regions in Belgium, France, Germany and Luxembourg in the Greater Region border region. Each small dot represents an individual measurement, while the black crosses indicate the average PM2.5 concentration for each NUTS3 region¹¹.

The regions are aligned along the x-axis, with Belgian regions in red (on the left), German regions in blue, French regions in orange and the Luxembourg region in purple (on the right).

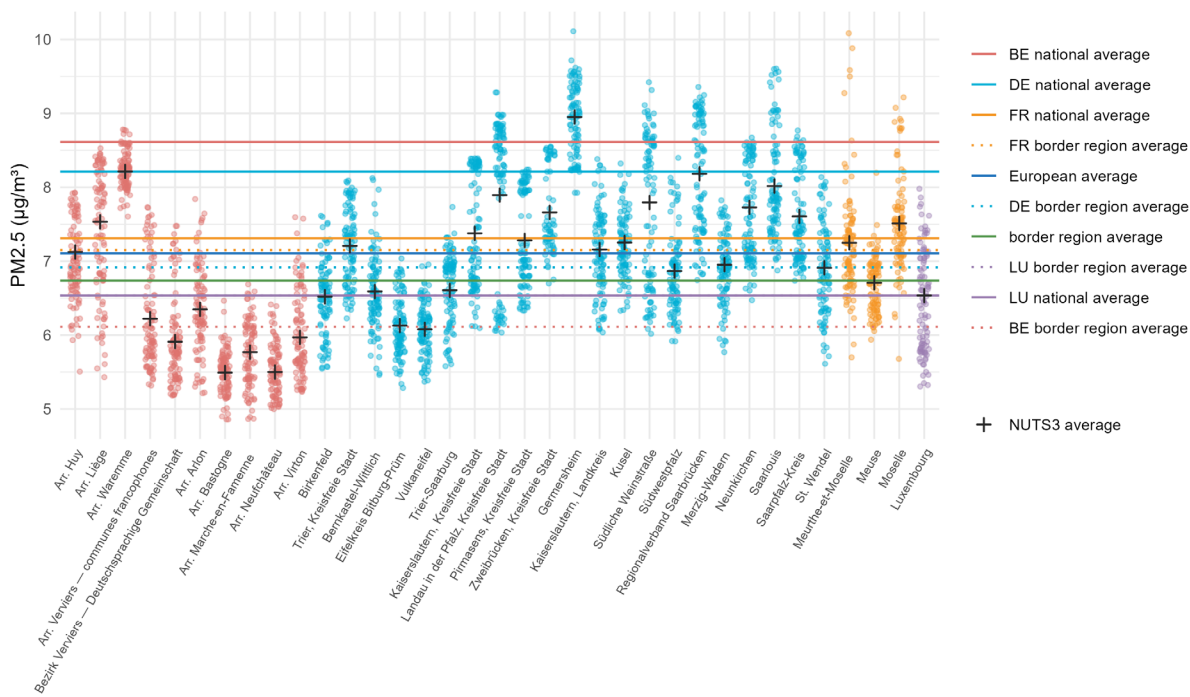
PM2.5 values vary widely across all 4 countries. Belgium shows the highest national average, while Germany shows the broadest range of values, though its average remains below Belgium's. France's national average is notably lower than those of Belgium and Germany, yet still slightly above the European average. Luxembourg reports the lowest national average.

Comparing the border regions, the German border region average is significantly lower than Germany's national average. A similar pattern is seen in Belgium, marking a stark difference within the country, as Belgium has the highest national average but the lowest border average. In contrast, the France border average lies slightly below the national average.

The European average lies above the Luxembourg average, around the French average, and remains below the national averages of Belgium and Germany. The cross-border average is slightly below the European average.

¹¹ 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¢er=49.69576,14.33324&lcis=NUTS2021L3&>

Figure 2.20: Air pollution



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 of France, Belgium, Germany and Luxembourg within the Grande Région/Großregion Interreg region in 2022. Water quality is represented using 6 colour-coded categories, ranging from "bad" to "high", including an "unknown" category¹².

In the Belgian part of the Interreg region, water quality is mostly rated as "good", with "moderate" and "poor" classifications in the northernmost regions.

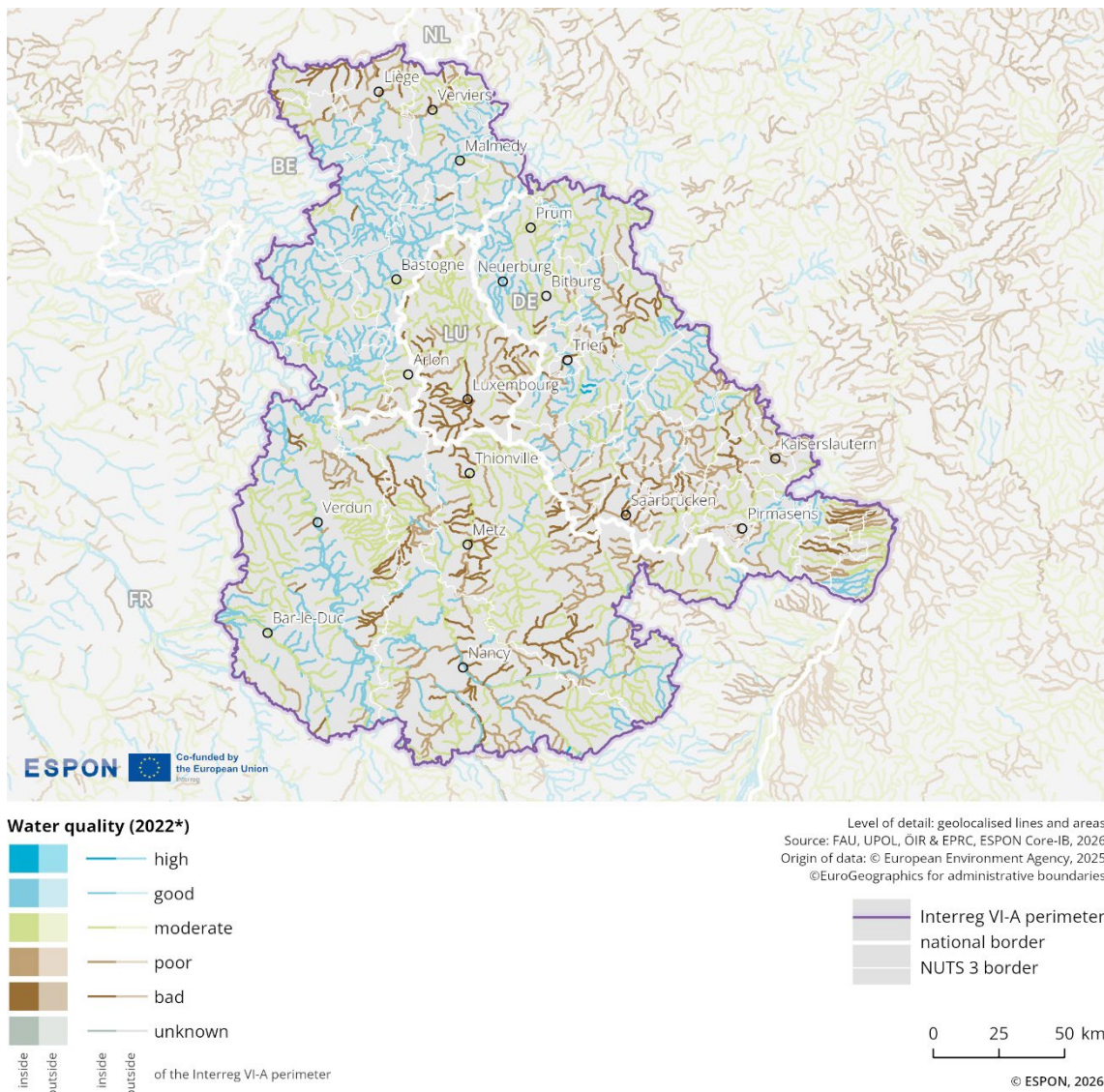
¹² For more information see the Water Framework Directive Reporting Guidance (2022): https://cdr.eionet.europa.eu/help/WFD/WFD_715_2022

In contrast, the Luxembourgish part of the Interreg region has water quality levels ranging from "bad" to "moderate". The capital city of Luxembourg and its surrounding water bodies are particularly rated as 'bad'.

The German part of the border region shows a mix of all water quality categories. Water bodies in the north are mostly rated as moderate or good, but there are inland rivers with "poor" and "bad" quality northeast of Trier. The southern part has more bodies of water rated as having "bad" or "poor" quality, particularly around the city of Saarbrücken

The French part also shows a mix of all water quality levels, with a slight change in the west towards "moderate" and "high" quality.

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.¹³

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 helps assess 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

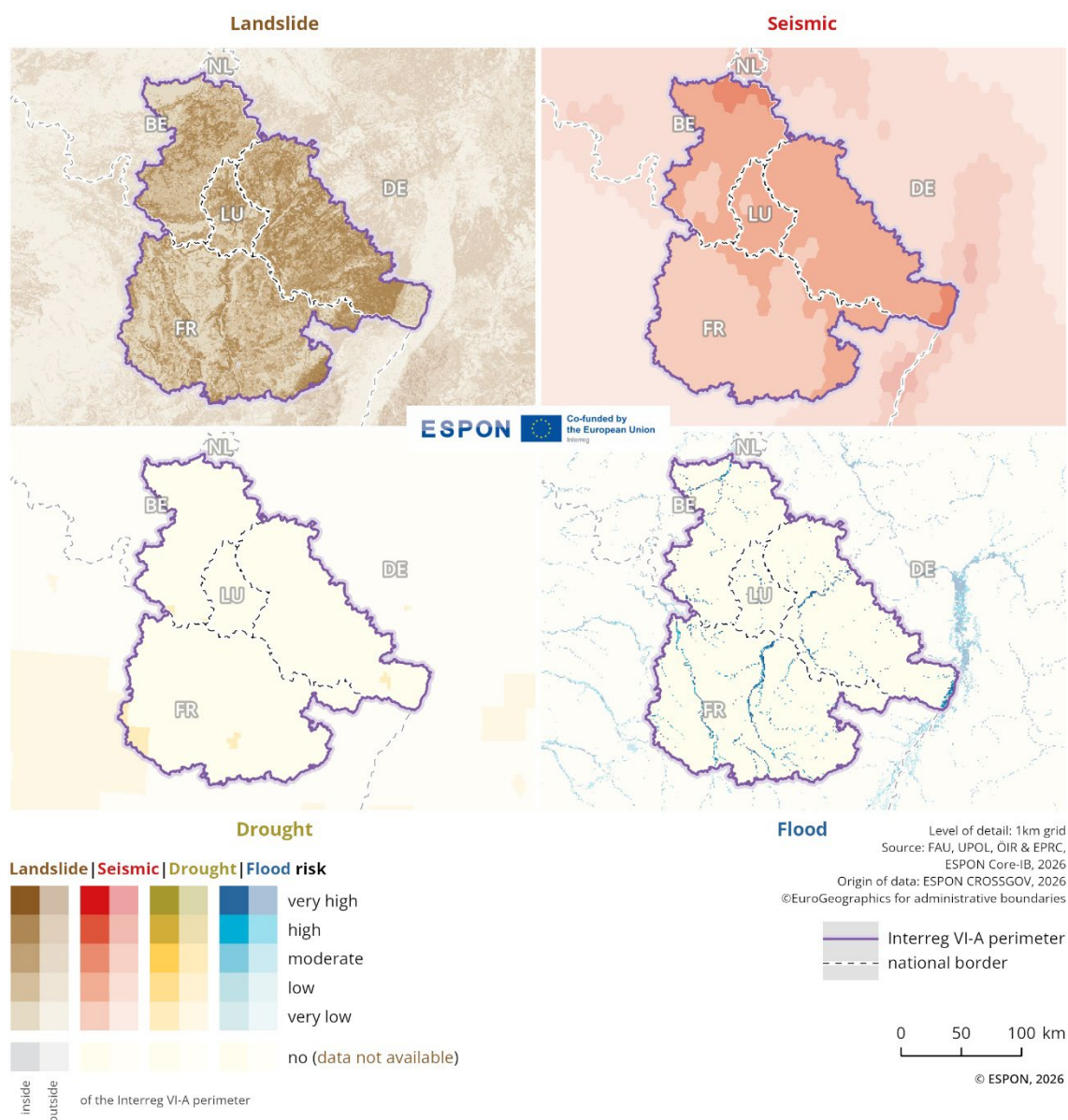
Please refer to the technical annex for more information.

Figure 2.22 illustrates the spatial distribution of natural hazards, highlighting areas where risks are shared across national boundaries and where risks are not necessarily relevant from a cross-border perspective.

The major risk for the region stems from landslides, as large parts of the regions are covered by the hills, in particular of the Ardennes and the Eifel. Considerable parts of the region are defined as high or very high risk areas, spanning across all 4 member states. Droughts on the other hand are a very minor concern. The seismic activities are generally low, but increase slightly from the southwest to the northeast. The greatest flood risks comes from the Rhine on the German side and from the Moselle on the French side. However, the main flood risk areas are not located near the border areas.

¹³ 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.¹⁴

¹⁴ 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

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.

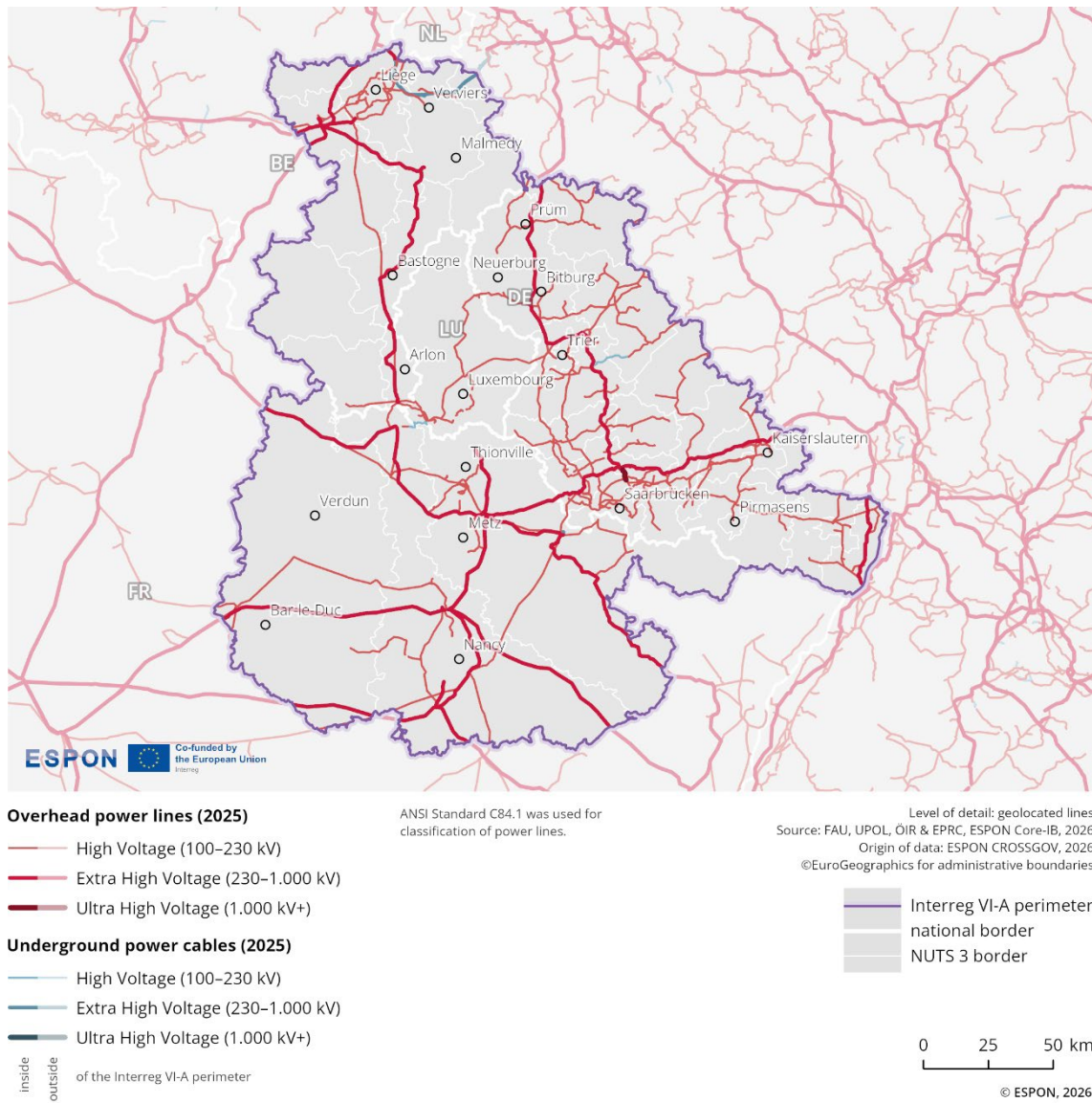
- **Source/method of retrieval:** Geodata on high-voltage energy infrastructure (100 kV and above) has been collected and processed from OpenStreetMap.
- **Temporal coverage:** 2025
- **Unit:** kV

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 cross-border region France-Belgium-Germany-Luxembourg features dense high- and extra high-voltage energy infrastructure. With the exception of Luxembourg, where there is no extra high-voltage infrastructure, the territory is covered by a fairly extensive extra high-voltage network. However, extra high-voltage lines directly connect only Germany and France (between the cities of Saarbrücken and Metz); there are no such extra high-voltage lines between other country-pairs. Between France and Belgium. The direct connection lines are lower in voltage (high voltage) for several kilometers, and then they are converted back to extra high voltage on both sides of the border.

Figure 2.23: High-voltage transmission infrastructure



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.

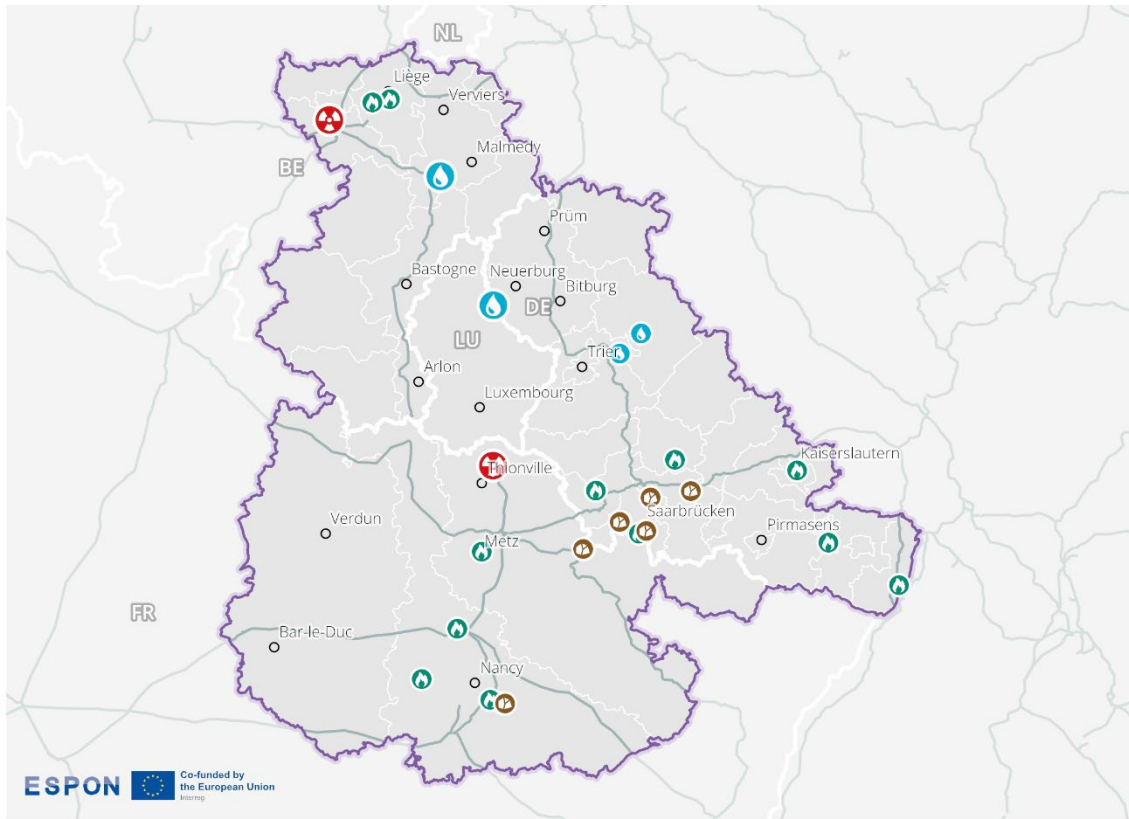
In the France-Belgium-Germany-Luxembourg cross-border region, in total, there are 28 power stations/plants locations, while the majority is represented by gas and oil power stations (see Table 1).

Table 1: Number and type of power stations







| Power stations/plants | Less than 1GW | 1GW and up |
|-----------------------|---------------|------------|
| Nuclear | / | 2 |
| Coal | 6 | / |
| Gas and oil | 16 | / |
| Hydro | 2 | 2 |

There are 2 nuclear power plants in the region, one located in France (Cattenom) in proximity to the border with Luxembourg, and one in Belgium (Tihange) (see Figure 2.24). Coal power stations are mostly placed in Germany around Saarbrücken, and 2 coal power stations are located in France (one of them, Émile-Huchet, close to the border, even if only temporarily reactivated). The most common are gas and oil power stations, 8 of which are located on the German side of the border region (due to the indicator scale, 6 are visible in the map), 6 in France (5 visible in the map), and 2 in Belgium. There are 4 hydroelectric power stations in total, 2 located in Germany, one high-power station in Belgium and one in Luxembourg.

Figure 2.24: Power stations infrastructure






Power stations (2025)

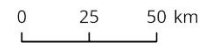
-  nuclear
-  coal
-  gas and oil (greater than 20MW)
-  hydro (greater than 20MW)
-  $\geq 1\text{GW}$
-  $< 1\text{GW}$

Power lines and cables (2025)

-  $\geq 230\text{kV}$
-  inside of the Interreg VI-A perimeter
-  outside of the Interreg VI-A perimeter

Level of detail: geolocalised point and linear features
 Source: FAU, UPOL, OIR & EPRC, ESPON Core-IB, 2026
 Origin of data: ESPON CROSSGOV, 2026
 ©EuroGeographics for administrative boundaries

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



© ESPON, 2026

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

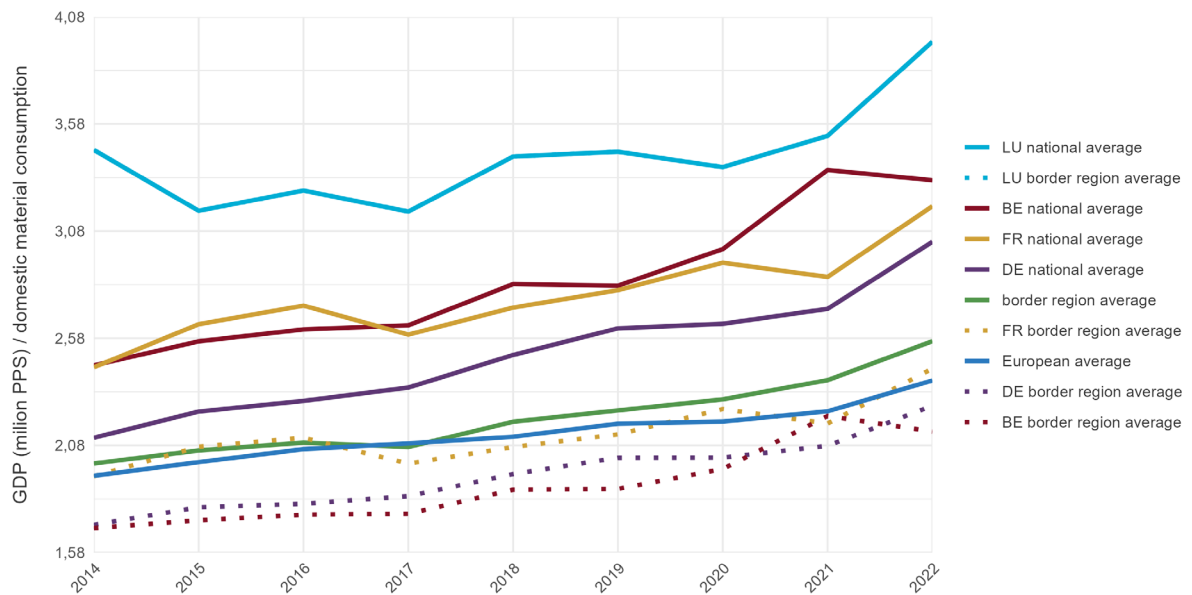
The indicator shows the economic value generated per unit of material consumed for each region within the cross-border area. Developments over time provide insights if the decoupling of productivity from resource use is progressing on regional level.

- **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



The Belgian national average steadily increased over time, reaching its highest value in 2021 at around 3.40 million PPS/DMC, before slightly declining in 2022. It is significantly higher than the Belgian border region average. The French national average also shows a general increase from 2014 to 2022, with

slight decreases in 2017 and 2021, reaching a final value of around 3.20 million PPS/DMC. The French border average remained consistently lower than the national average. The Luxembourg national average is represented by the highest line in the graph and consistently remains above a value of 3.08 million PPS/DMC throughout the observed period. The German national average, presenting a steady increase, is clearly higher than both the European average and the average of the German border region, but remains below the national averages of the other 3 countries.

The European average lies significantly below the national averages of the countries, but is closely aligned with the French border region average and the overall border region average. The overall border region average increases more steeply after 2017.

The overall border region average reflects the combined average of the countries' border regions, incorporating the lower values of the Belgian and German border regions and the higher values of Luxembourg.

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.

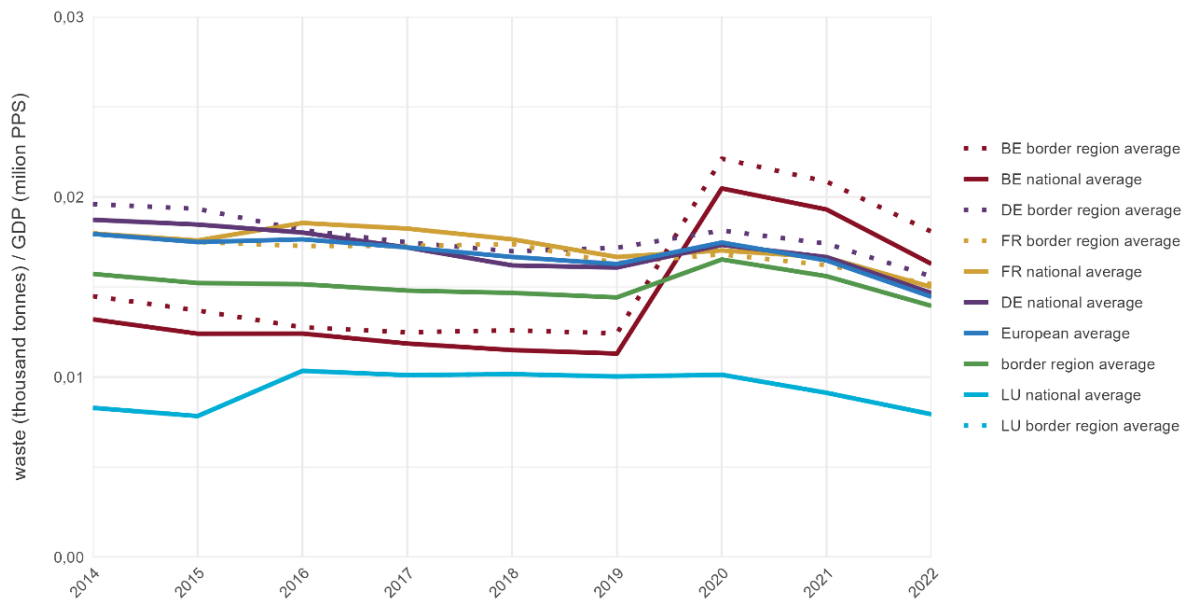
Figure 2.26 illustrates the trend in waste generation relative to economic output, measured in tonnes of waste per million PPS (Purchasing Power Standard) of GDP from 2014 to 2022 in the Grande Région/Großregion area (France-Belgium-Germany-Luxembourg).

The French and German national average of waste per GDP steadily decreases over time. Both their border region average follows a nearly identical trend, remaining very close to the national average. The Belgian national and border region averages are at a lower level than the French and German values until 2019, when both experience a sharp increase to over 0.02 tonnes of waste per GDP. Afterwards, both Belgian values decline again but remain above the French values. Luxembourg records the lowest values, with waste per GDP at 0.01 tonnes of waste per million PPS or below, consistently remaining below the European average.

The European average decreases gradually from around 0.018 in 2014 to about 0.015 tonnes of waste per million PPS in 2022. France's and Germany's national and border values remain close to the European average throughout. Belgium's national and border values are below the EU average until 2019, but then rise above it significantly from 2020 onwards. The low values in Luxembourg have to be read also against the background of important cross-border commuting flows: high shares of the workforce contribute to the Luxembourgish GDP but live outside the countries where their consumption also contributes to waste (technically, the household waste is calculated in the region of residence, not in the region of the workplace).

The combined border regional average steadily decreases until 2019, then rise sharply in 2020, followed by a slight decline, but overall it remains below the European average.

Figure 2.26: Waste generation per GDP



2.3.5 Key messages on the green dimension

Within the environmental dimension, the presented indicators highlight several key aspects. Some of them show that the cross-border integration is lower on this field than in the economic dimension. Regarding renewable energy, there are clear border effects, in terms of both, energy production and related infrastructure. The considerable level of air pollution reflects the rather high relevance of car transport, given the polycentric structure with clear growth trends in socio-economic terms. - Nature protection measures do not appear to have a particularly strong cross-border character, even though the national borders are not often aligned with natural features, such as mountain ranges. The potential, however is large, as the Greater region hosts a large number of natural parks¹⁵.

Furthermore, landslides pose a significant risk to the area, far more than other risks linked to the environment. In waste production, a series of sustainability challenges persist, as shown for the circular economy.

¹⁵ <https://www.naturpark-sure.lu/en/projects/netzwerk-der-naturparke-in-der-grossregion/>

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 similarities, 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 social interactions 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.

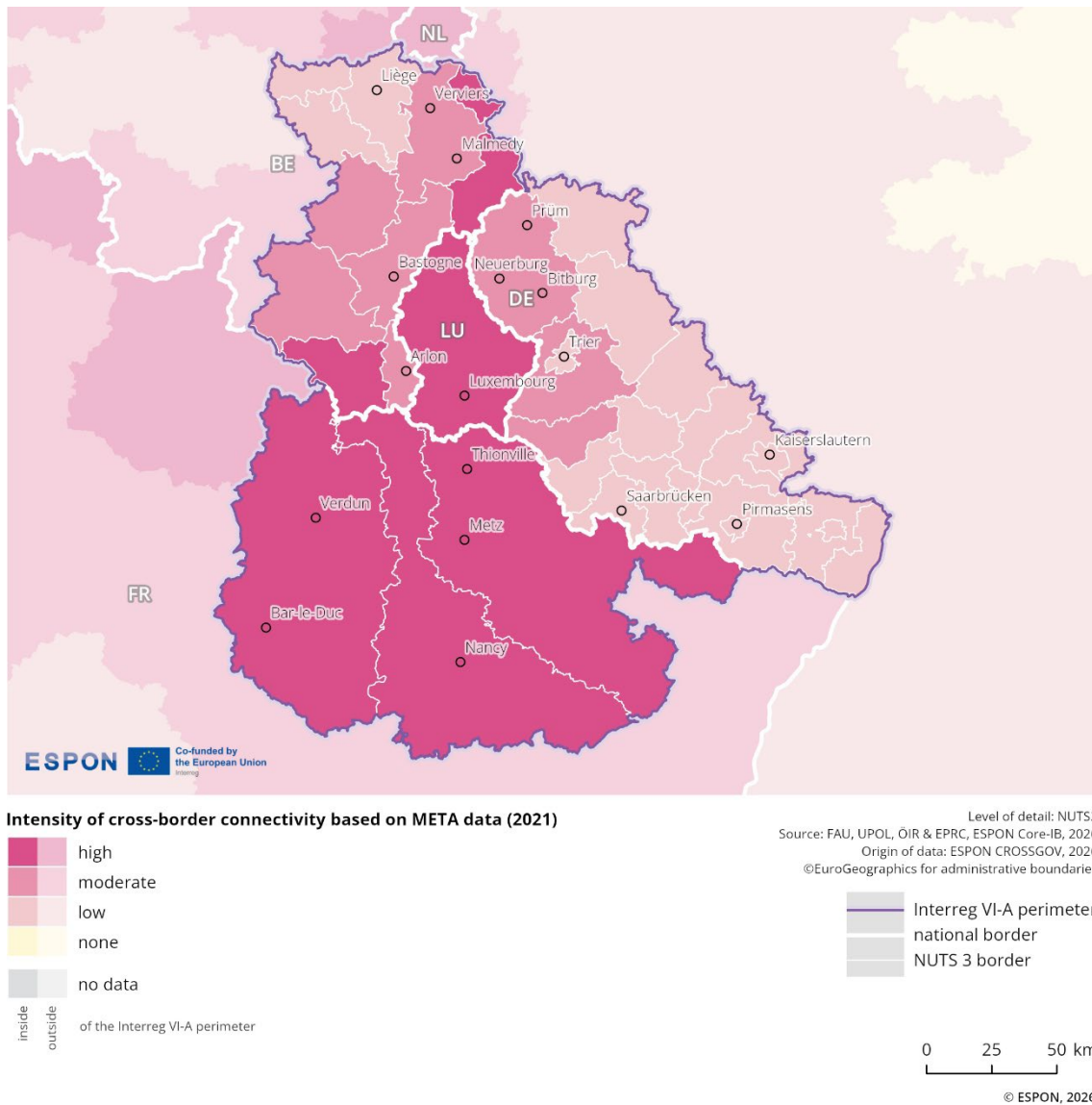
- **Source/method of retrieval:** Processing Facebook data on existing connections across the border (data for Good Meta)
- **Temporal coverage:** 2021
- **Unit:** n/a

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 connectivity, ranging from low to high, with darker tones representing stronger intensity of cross-border connectivity in social media.

Distinct cross-border differences are evident between France and Germany, Germany and Luxembourg, and Germany and Belgium due to varying levels of cross-border connectivity. On the French and Luxembourgish sides of the region, high values are recorded across all areas (including cities such as Luxembourg, Metz, and Nancy). In the Belgian part of the region, high values are observed in one NUTS3 unit in the southern section directly along the state border (south of Bastogne), with cross-border connectivity decreasing further from the border, reaching moderate levels around Bastogne and Malmedy, and low levels around Liège. In Germany, only moderate cross-border connectivity is recorded along the borders with Luxembourg and Belgium (including cities such as Prüm and Neuerburg) and in the NUTS3 unit around Trier, while in other German areas of the border region cross-border connectivity is low (including the cities of Saarbrücken, Kaiserslautern, and Pirmasens).

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.

A mix of language similarities exists within the programme region. Within Luxemburg, both German and French are official languages and a considerable part of the population speaks both languages (in parallel to Luxembourgish). Belgian regions within the programme are french-speaking with the exception of the German-speaking community and region of Verviers. Therefore, while no universal common language exists, in the immediate neighbouring regions no hard language barrier is in place.

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.

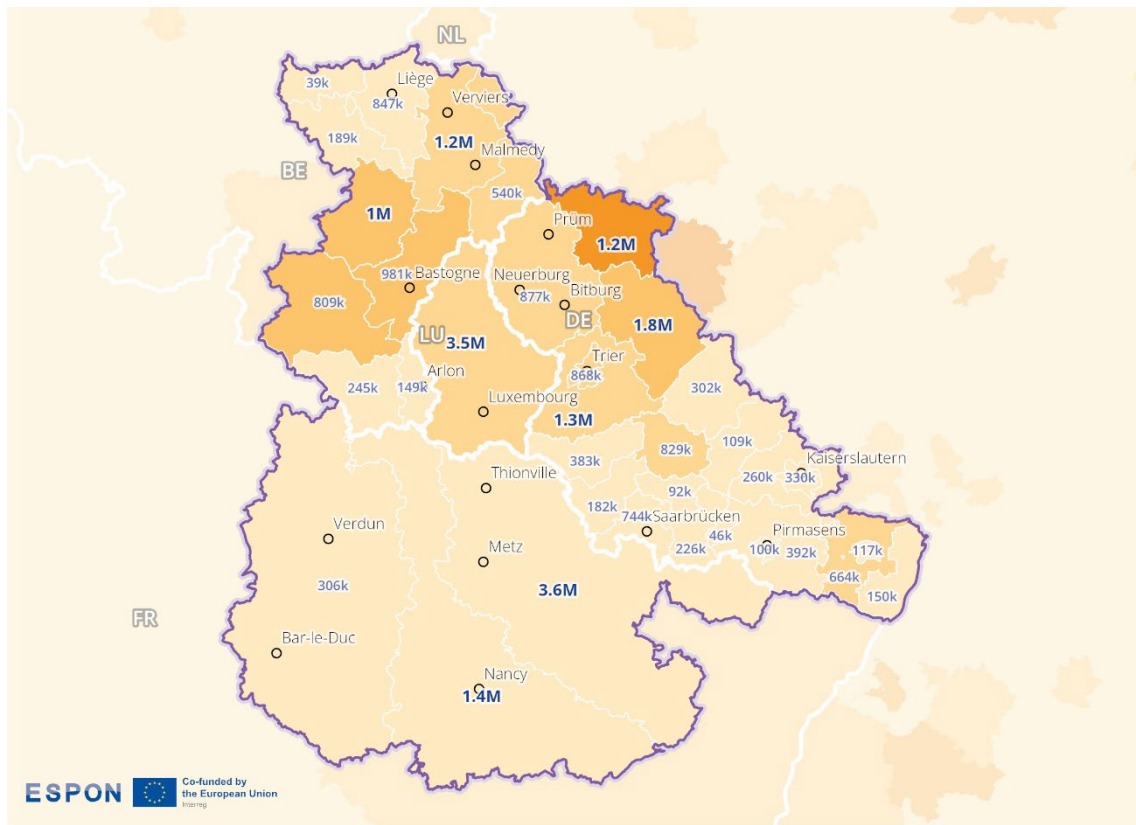
- **Source:** Eurostat
- **Temporal coverage:** 2020-2023
- **Unit:** Nights per capita

Please refer to the technical annex for more information.

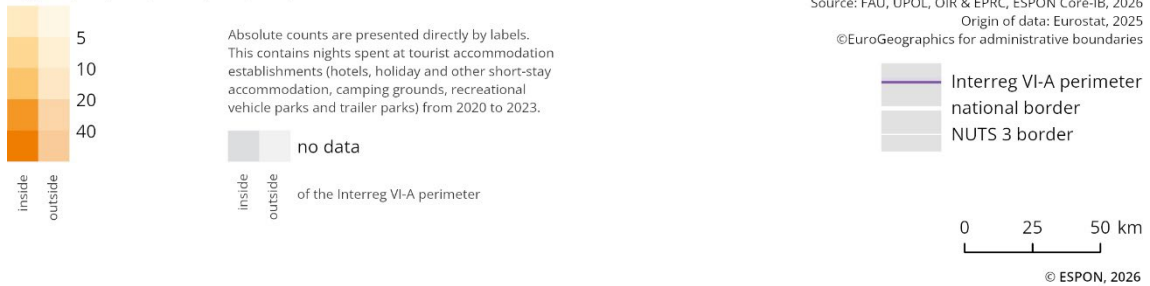
The spatial distribution of overnight stays highlights the importance of key tourist destinations in border areas. Tourism contributes significantly to regional income, infrastructure development and employment, and thereby supports regional prosperity. At the same time, it affects environmental and 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 accommodations, 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.

Figure 2.28: Overnight stays in tourism



Nights per year per capita (2023)



A particularly high intensity of overnight stays is evident on the German and Belgian side of the border. The German NUTS3 region Vulkaneifel exceeds 20 nights per capita in 2023¹⁶. Several NUTS3 regions exceed 10 nights per capita, including Bernkastel-Wittich in Germany and Arr. Bastogne, Arr. Marcheen-Famenne and Arr. Neufchâteau in Belgium. On the French side, the per capita figures are somewhat lower and don't exceed 5 nights per capita. In Luxembourg, the overnight stays are between 5 to 10 nights per capita.

In terms of total overnight stays over the 3-year period, the leading tourism regions are Luxembourg and France: Moselle (approx. 3.6 million), Luxembourg (approx. 3.5 million) and Meurthe-et-Moselle (approx. 1.4 million). In Belgium and Germany, the highest total numbers are slightly above 1 million in Bernkastel-Wittich, Trier-Saarburg, Vulkaneifel and Arr. Verviers – communes francophones.

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 France-Belgium-Germany-

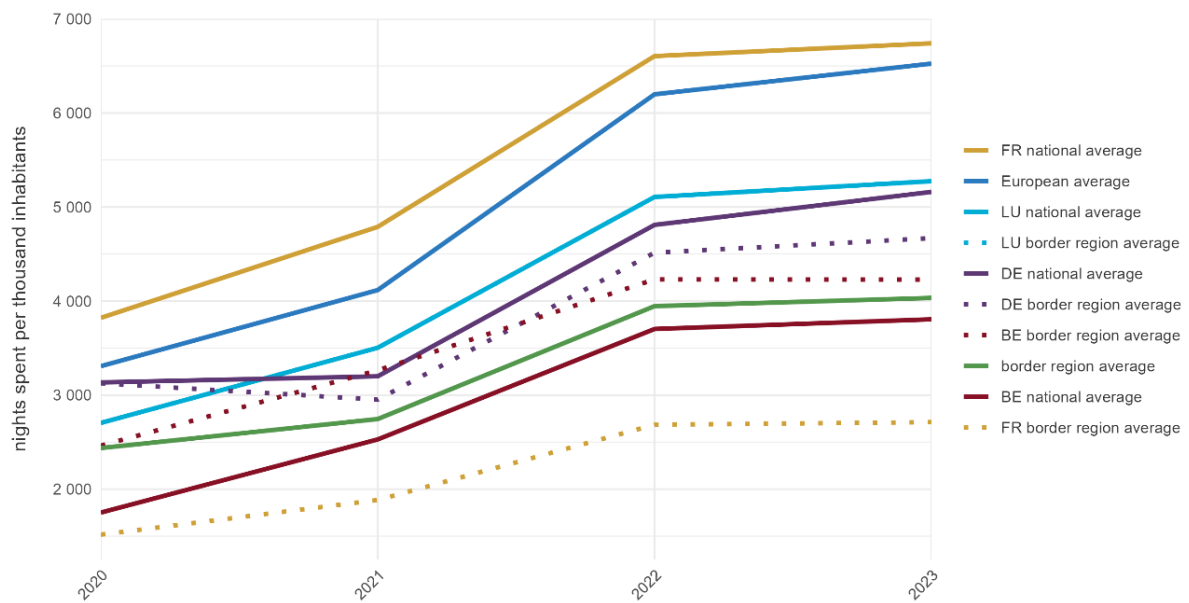
¹⁶ See Eurostat Statistical Atlas for NUTS3 (2021) regions: <https://ec.europa.eu/statistical-atlas/viewer/?config=typologies.json&ch=NUTS&mids=BKGCNT.NUTS2021L3.CNTOVL&o=1.1.0.7¢er=49.69576,14.33324&lcis=NUTS2021L3&>

Luxembourg 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 Belgium is higher than the national average for all 4 years, the French and German border regional averages are lower than the national average. In the case of Luxembourg, the border regional average is the same as the national average. Additionally, the regional averages for the Luxembourgian, German and Belgian border areas are significantly higher than that for the French 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 recreating activities with socio-cultural as well as environmental heritage can be a challenge fundamental challenge.

Figure 2.29: Overnight stays in tourism (comparison)



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)

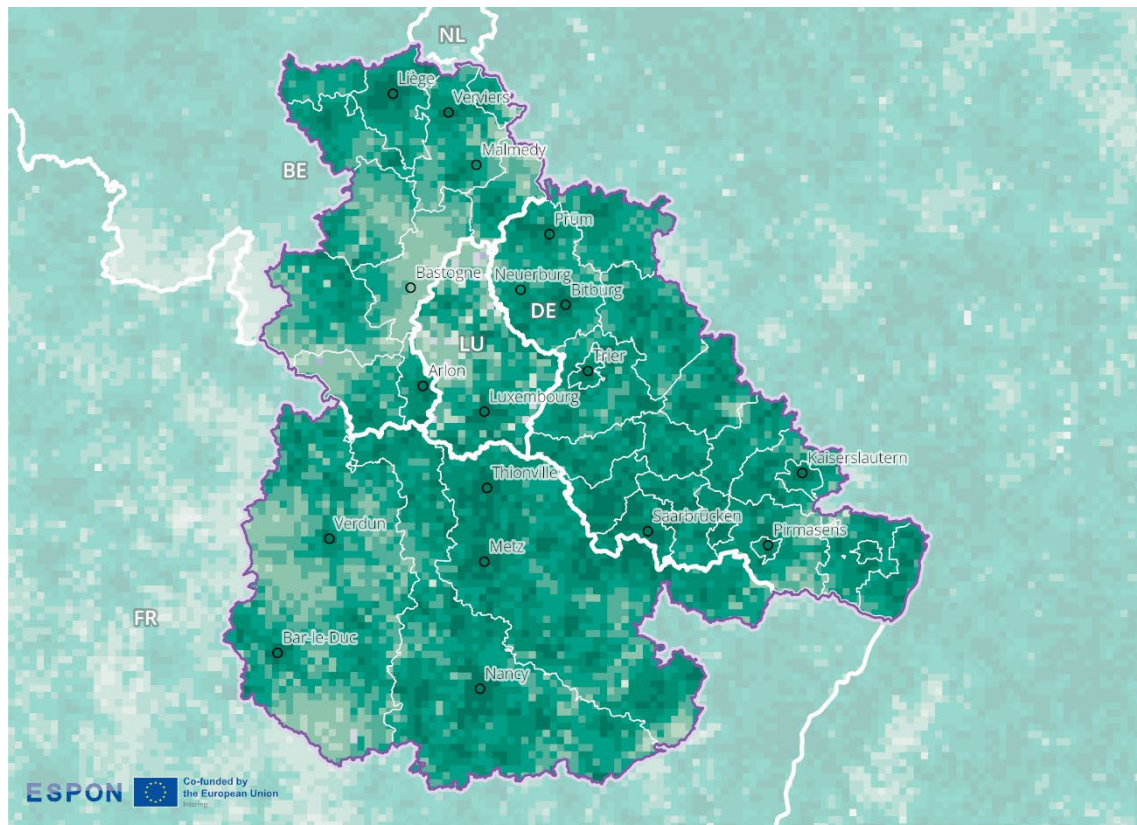
These indicators show how long, on average, it takes to reach the nearest facility by car. The data comes from the ESPON PROFECY Update project (2022) and is visualised based on a 2.5-kilometer grid.

In the France–Belgium–Germany–Luxembourg border area, essential services such as hospitals, doctors, pharmacies, schools, and grocery shops are not evenly distributed across most areas. Nevertheless, travel times are generally less than one hour throughout the programme area.

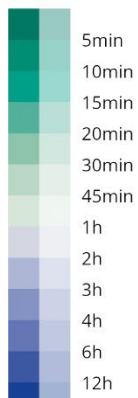
Near the national borders, travel times to hospitals and doctors tend to be longer in France, Belgium, and Luxembourg compared to Germany. For pharmacies and grocery shops, the distribution is more similar, though travel times tend to be longer in Luxembourg. For secondary schools, the longest travel times are found between Luxembourg and Belgium.

Hospitals, as medical services, are primarily located in cities and more densely populated areas. This results in an urban–rural gradient, with shorter travel times in and near urban centres and longer travel times in rural or remote regions. The same pattern applies to cinemas as a cultural service.

Figure 2.30: Travel time to secondary schools



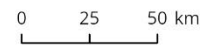
Car travel time to the nearest secondary school (2021)



inside
outside
of the Interreg VI-A perimeter

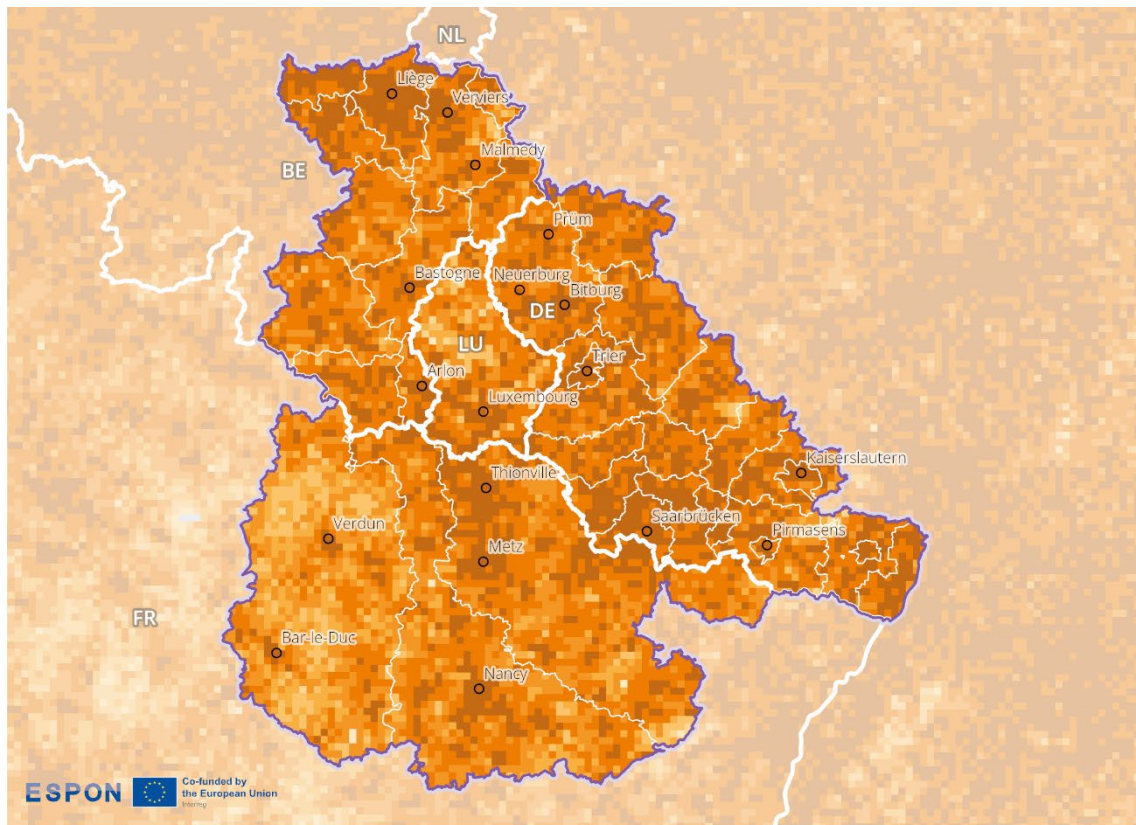
Level of detail: 2.5km grid
Source: FAU, UPOL, ÖIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROCECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

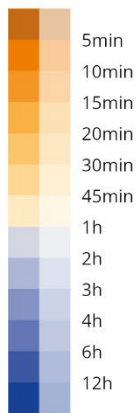


© ESPON, 2026

Figure 2.31: Travel time to grocery shops



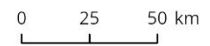
Car travel time to the nearest shop (2021)



inside
outside
of the Interreg VI-A perimeter

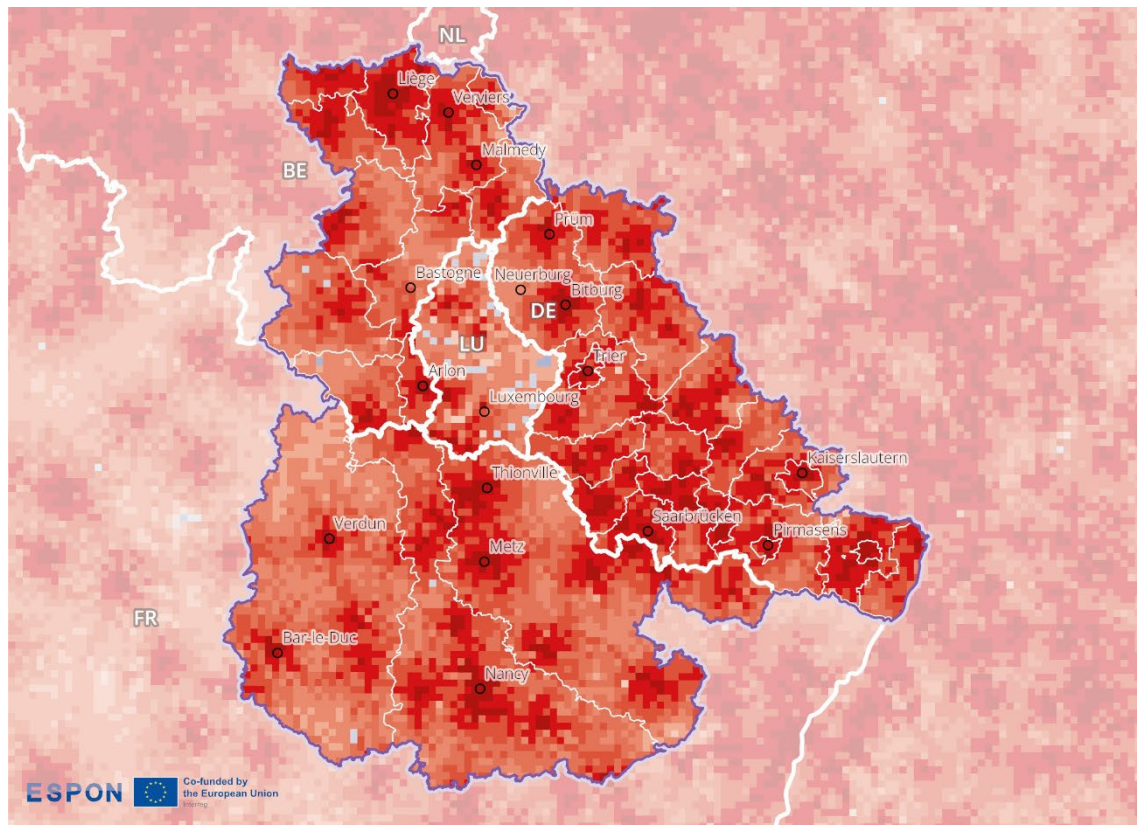
Level of detail: 2.5km grid
Source: FAU, UPOL, OIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROCECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

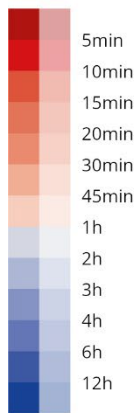


© ESPON, 2026

Figure 2.32: Travel time to hospitals



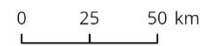
Car travel time to the nearest hospital (2021)



inside
outside
of the Interreg VI-A perimeter

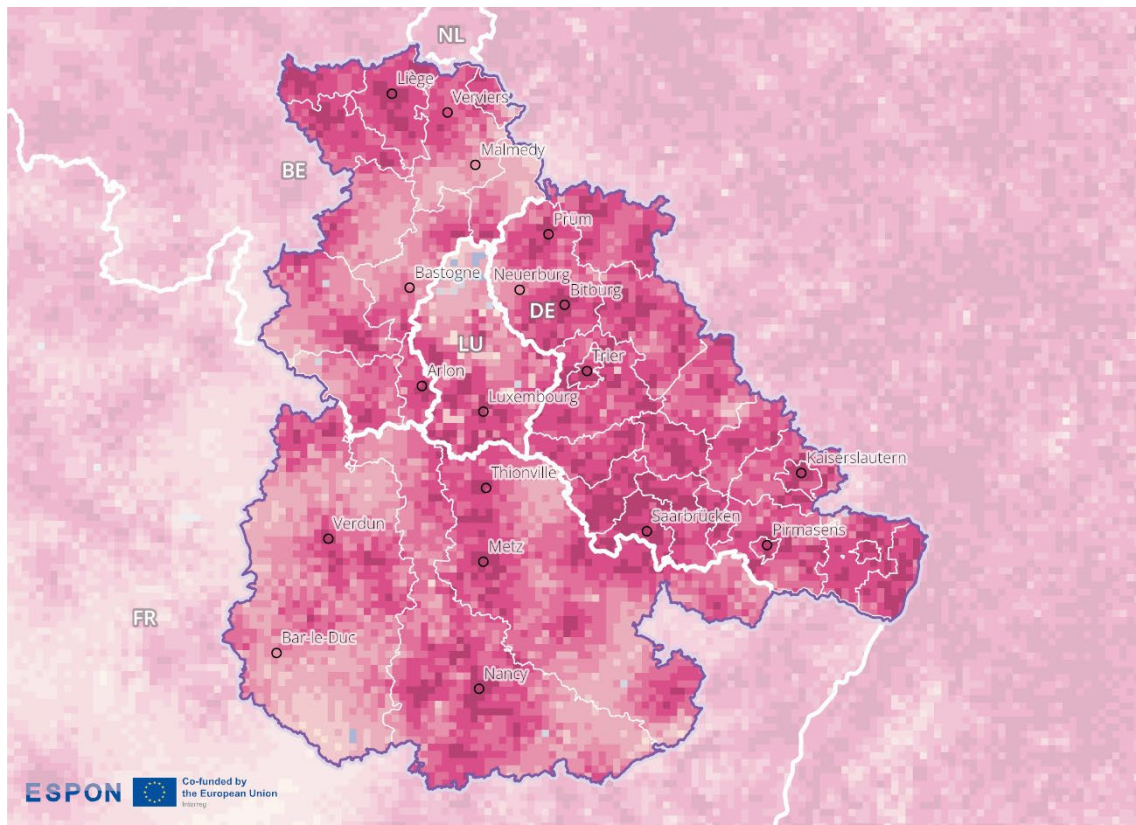
Level of detail: 2.5km grid
Source: FAU, UPOL, OIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROCECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

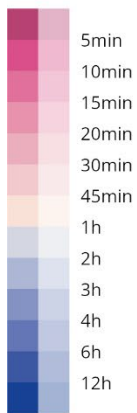


© ESPON, 2026

Figure 2.33: Travel time to doctors



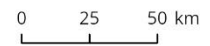
Car travel time to the nearest doctor (2021)



inside
outside
of the Interreg VI-A perimeter

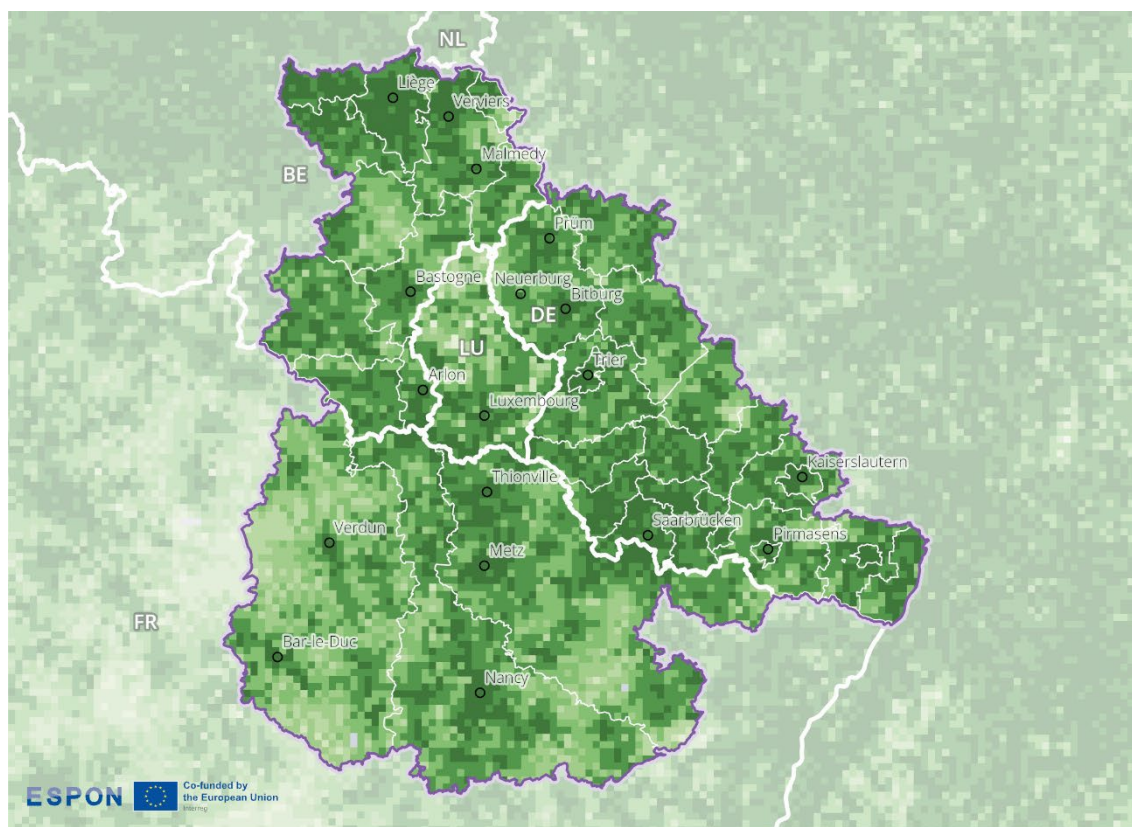
Level of detail: 2.5km grid
Source: FAU, UPOL, OIR & EPRC, ESPON Core-IB, 2026
Origin of data: ESPON PROCECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border

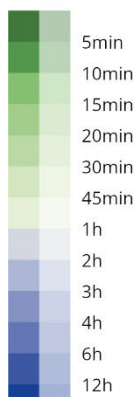


© ESPON, 2026

Figure 2.34: Travel time to pharmacies

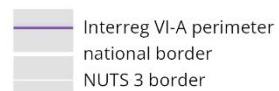


Car travel time to the nearest pharmacy (2021)



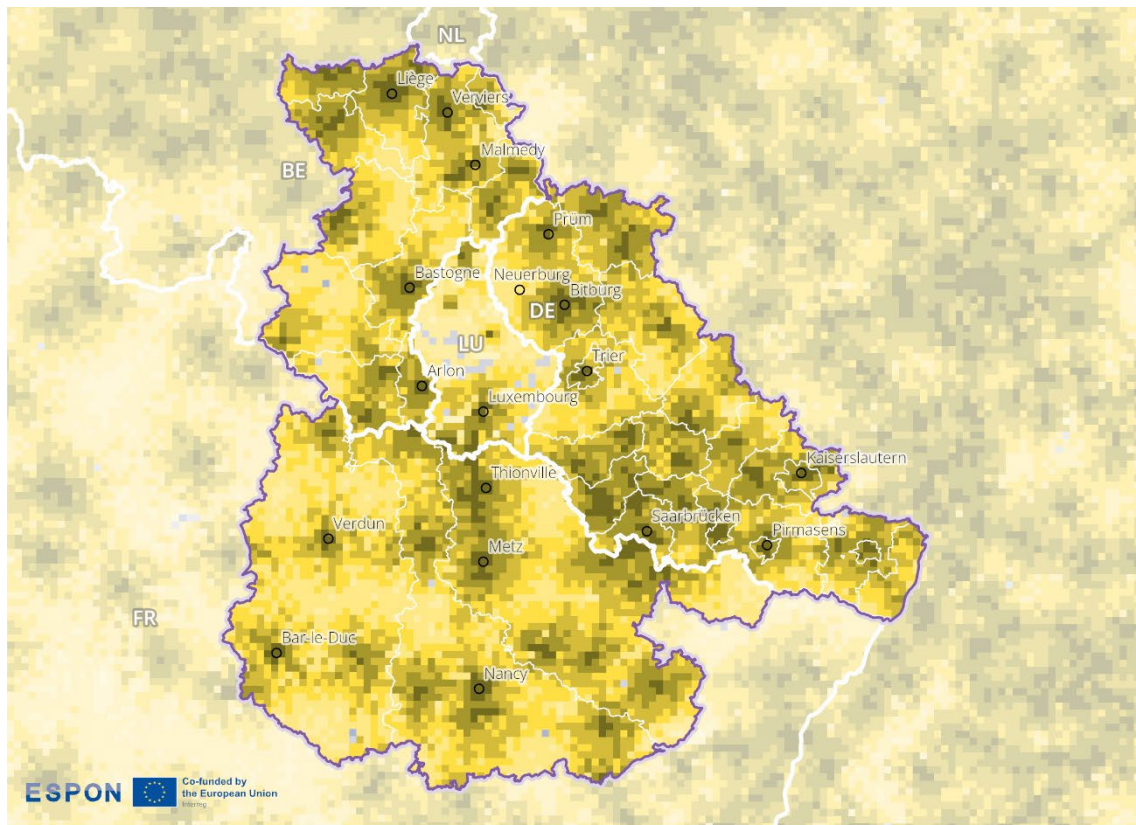
inside
outside
of the Interreg VI-A perimeter

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

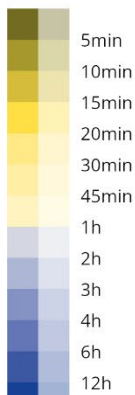


© ESPON, 2026

Figure 2.35: Travel time to cinemas



Car travel time to the nearest cinema (2021)



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 PROCECY Update, 2022
©EuroGeographics for administrative boundaries

Interreg VI-A perimeter
national border
NUTS 3 border



© ESPON, 2026

2.4.4 Key messages on the socio-economic dimension

The reflected indicators show a differentiated picture. Social integration, based on social media interaction, is relatively high in this economically integrated region. Accessibility to services of interest reflects domestic policy approaches and urban-rural gradients, with higher values in eastern parts than in the west. As a significant proportion of public services are located close to the border, there is obvious potential for cross-border cooperation in this area. In particular, the access to healthcare is an important issue in some of the areas. The tourist sector is present throughout region, with attractions in both, urban centres and natural areas. While the values are not amongst the highest in Europe, this segment plays a considerable role.

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.

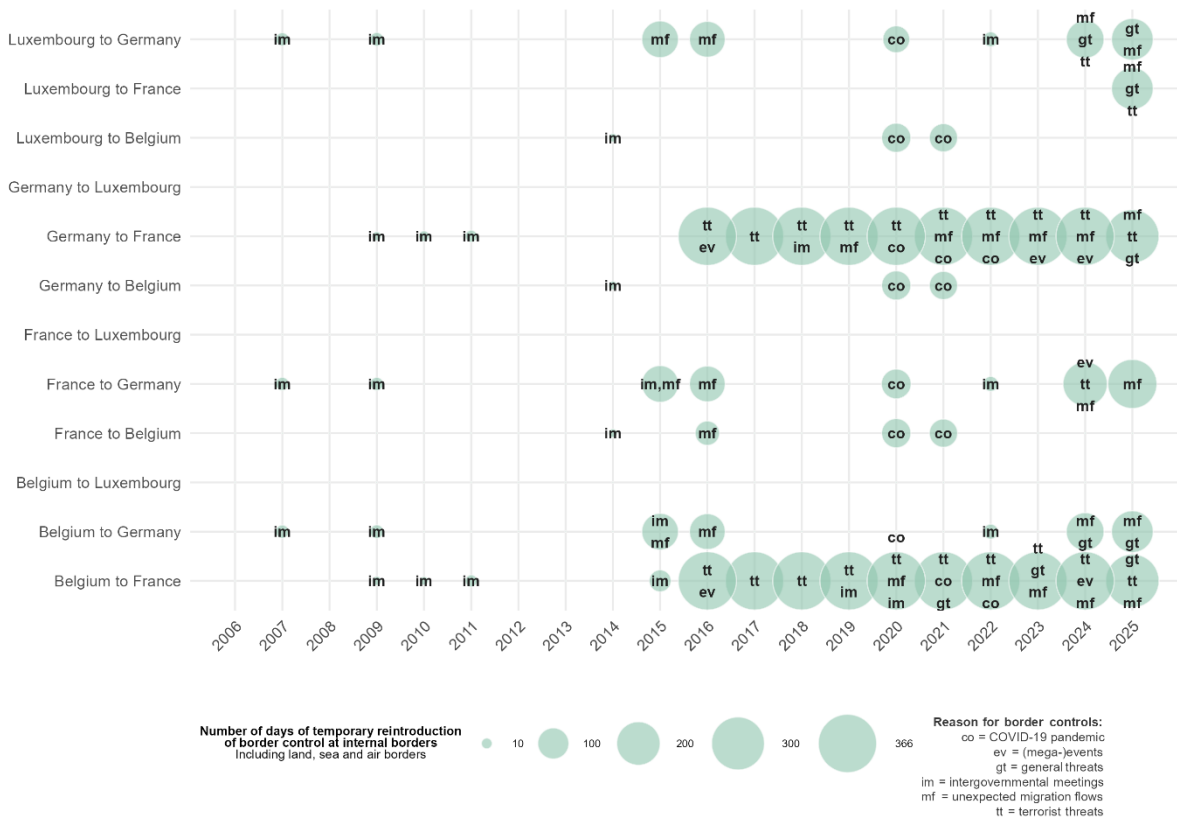
Figure 2.36 illustrates the number of days during which temporary border controls were reintroduced at internal borders within the Schengen Area. Each bubble represents a specific year with bubble sizes indicating the number of days the respective border was under control. The categories of reasons for reintroducing controls include:

- > co – COVID-19 pandemic
- > ev – (Mega-)events
- > gt – General threats
- > im – Intergovernmental meetings
- > mf – Unexpected migration flows
- > tt – Terrorist threats

The data spans from 2006 to 2025 (cut-off: 08 May 2025) and is based on notifications from the European Commission information pursuant to Article 25 and 28 et seq. of the Schengen Borders Code. In line with Schengen rules, the reintroduction of controls is to be used only as a last resort, for exceptional circumstances, and with strict adherence to the principle of proportionality, both in duration and scope.

France, Belgium, Germany and Luxembourg had already been part of the Schengen Area by 2006.

Figure 2.36: Temporary reintroduction of border controls



The France-Belgium-Germany-Luxembourg border area is characterised by an asymmetric pattern:

- › Crossing the border from Luxembourg to Germany: Temporary border control occurred in 8 out of 20 years, driven by a wide range of security and migration-related factors, including high-level summits (e.g., G7, NATO), persistent irregular migration (2015–2025), secondary movements, COVID-19 (2020), smuggling, and threats related to international crises such as the war in Ukraine.
- › Crossing the border from Luxembourg to France: Temporary border controls in 1 out of 20 years due to security issues like threats to public policy, rise in antisemitic attacks and internal security threats as well as unexpected migration flows (2025).
- › Crossing the border from Luxembourg to Belgium: Temporary controls in 3 out of 20 years, mainly because of COVID-19 (2020-2021).
- › Crossing the border from Germany to France: Temporary border control occurred in 13 out of 20 years, driven by intergovernmental meetings such as NATO and G20 summits (2010, 2011, 2015). From 2016 until 2024 the border is permanently controlled. The reasons are terrorist threats e.g., due to attacks in Paris and Nice (2016-2017), major sports events like the EURO 2016, the Tour de France (2016) or the Olympic and Paralympic Games (2024). Furthermore, the border has been controlled due to COVID-19 (2020-2022) and general threats like the situation at the external borders, organised criminality and smuggling (2020-2022). Another reason is the unexpected and persistent migration flows since 2019 (until 2025).
- › Crossing the border from Germany to Belgium: Similar to the patterns of temporary border controls when going from Luxembourg to Belgium.
- › Crossing the border from France to Germany: Similar to the patterns of temporary border controls when going from Luxembourg to Germany.

- › Crossing the border from France to Belgium: Temporary border controls took place in 4 out of 20 years. Reasons are COVID-19 (2020-2021) and security risks related to irregular migration (2016) and a G7 summit (2014).
- › Crossing the border from Belgium to Germany: Similar to the patterns of temporary border controls when going from France to Germany.
- › Crossing the border from Belgium to France: Similar to the patterns of temporary border controls when going from Germany to France, with the addition of a Conference on Climate Change (2015).
- › Luxembourg did not control the border with Germany, France or Belgium.

From a comparative perspective, France has implemented controls for significantly more days than Germany, Belgium or Luxembourg indicating an unequal impact on cross-border movement in one direction.

These 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.

2.5.2 Key messages on the border security dimension

Given the region's strong reliance on cross-border integration, the temporary reintroduction of controls is highly sensitive. Border controls increase transaction costs in supply chains and can complicate the daily lives of cross-border commuters and service providers. During the Corona crisis, border flows were severely disrupted; border controls due to other reasons, particularly high migration flows, are the official justification for most of the measures. Even though Schengen is part of this border region, the Schengen Agreement's regulations are often suspended. Firstly, EU migration regulations do not mandate the border regional institutions. On the other hand, lessons can be learnt from recent crises: effective information flows can be developed, including technical routines, even in times of unexpected developments. Furthermore, controls can be conducted in ways that are more or less disruptive. Increasing cross-border resilience is certainly an area with strong potential for cross-border cooperation.

2.6 Governance dimension

The Greater Region is one of the oldest structured cooperation areas in the EU. It began in 1969, with a French-German Intergovernmental Commission (together with Luxemburg from 1970) to work on the mining and steel industry crisis. In 2005, the first Summit of the Greater Region took place. In 2014, a permanent Secretariat of the Greater Region was created (as an EGTC). It has also developed a strategy with actions on the following topics: mobility and territorial development, education and lifelong learning, tourism and culture, economy and competitiveness, society – citizens – security and environment sustainability¹⁷. The territory of the Greater Region is larger than the territory of the Interreg V programme (e.g. it includes the entire Wallonia Region and the entire Land of Rhineland-Pfalz). Signed in 2019, the Treaty of Aachen is a bilateral agreement on Franco-German cooperation and integration.. The objective is to reinforce the convergence of the 2 countries in the following areas: economy, foreign policy, education, culture, research, climate, environment and cross-border cooperation¹⁸. Its implementation is based on the multi-level governance format of the Comité de Coopération transfrontalière¹⁹.

¹⁷ <https://www.grossregion.net>

¹⁸ <https://www.elysee.fr/emmanuel-macron/traite-franco-allemand-aix-la-chapelle>

¹⁹ <https://agz-cct.diplo.de/agz-cct-fr>

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 2.37 shows the different types of institutionalised cooperation. 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 as the cartographic visualisation is based on a standardised data set. In this particular case, it is important to mention that there are 9 functional areas established beyond the mapped form of institutionalization. These areas are central to cross-border cooperation and are mapped and reflected in more detail in the ESPON CROSSGOV case study report on the Greater Region²⁰.

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

The multi-level governance structure along the borders of this programme area displays a broad spatial coverage. Overall, the region exhibits a high level of institutionalised cross-border cooperation.

In the case of the Greater region, one has to consider the high cooperation dynamic beyond the classical cooperation format. In a series of cases, specific territories and challenges start to be addressed with rather 'soft' cooperation formats that 'harden' over time. The Development Concept of the Upper Mosel Valley is an important example. It is mentioned in the Luxembourgish spatial planning framework²¹. Its formal institutionalisation, however, is formally an Interreg A project.

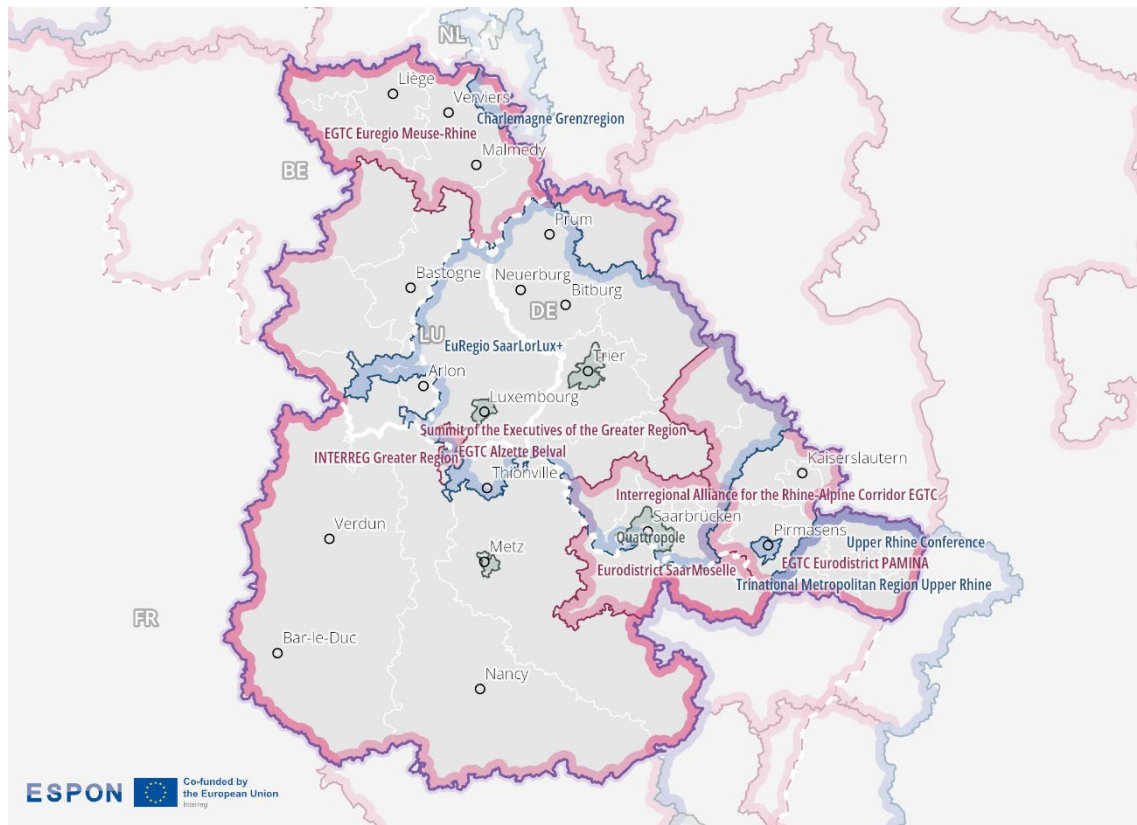
The TNT asbl is an example at the local level, developing a cross-border cooperation amongst 3 municipalities on the Luxembourgish-French border, currently institutionalised as non-profit organisation²².

²⁰ CROSSGOV - Greater Region case study (LU/BE/DE/FR) | ESPON




²¹ https://amenagement-territoire.public.lu/content/dam/amenagement_territoire/fr/strategies_territoriales/pdat-2023/annexes/pdat-programme-directeur-damenagement-du-territoire-4072023.pdf

²² asbl, cp. <https://www.tnt-chiers-alzette.eu/>




Figure 2.37: Cross-border governance structures



Format of cooperation

-  EGTC
 -  Euroregion / Euregio / Europaregion / Eurodistrict
 -  other
- inside
outside
of the Interreg VI-A perimeter

Level of detail: NUTS3
 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



© ESPON, 2026

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.

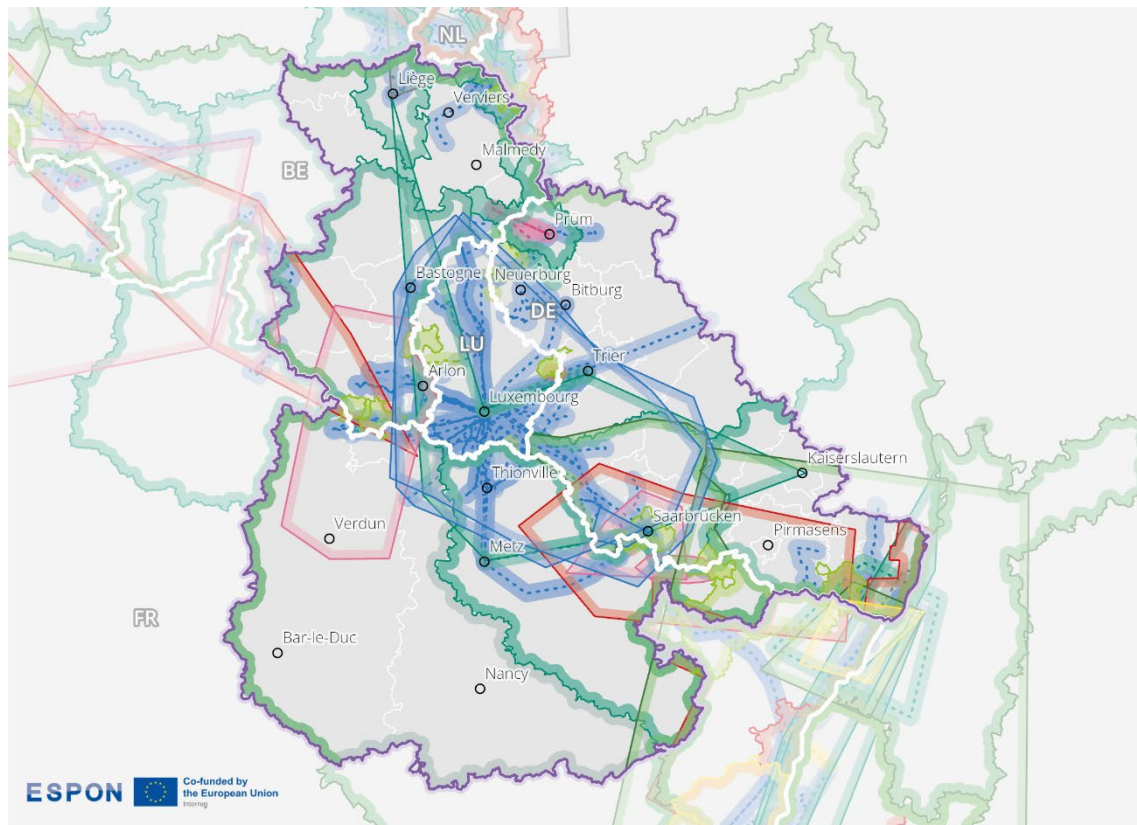
Figure 2.38 depicts the geographical extent of cross-border public services in the border area in 2022. Different thematic areas are represented by distinct symbols and colours, indicating services such as disaster management, health care, transportation, education, environment, energy, job placement, and culture. The visualisation highlights where these services operate across the national boundary.

Cross-border public services in the Luxembourg-France-Germany Interreg region are highly concentrated and multi-thematic, forming a dense network of connections radiating from Luxembourg. The capital functions as a hub for services in transportation, education & research, environment & water, and tourism & information extending into surrounding French, Belgian and German territories, especially toward Metz, Trier, Prüm and Saarbrücken.

Disaster management and health care services are broadly distributed, covering the southern half of the region and reaching into Pirmasens, Prüm and west of Luxembourg.

The multiplicity of cross-border services reflect a deeply integrated cross-border system, especially between Luxembourg, Lorraine, and Rhineland-Palatinate. Connections with Belgium are fewer and confined mostly to Bastogne.

Figure 2.38: Cross-border public services



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

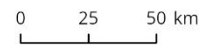
| areal | linear | character of the service |
|-------|--------|--------------------------|
| | | Disaster management |
| | | Health care |
| | | Transportation |
| | | Tourism & information |
| | | Education & research |
| | | Environment & water |
| | | Heating & energy |
| | | Job placement |
| | | 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



© 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 Belgium–Germany–France–Luxembourg, one b-solutions pilot action was identified. This initiative, called GeoConnectGR, focuses on institutional cooperation to improve cross-border data exchange and support renewable energy, maritime activities, digitisation, and technical interoperability. The application for this pilot was submitted by public/public-equivalent bodies.

In this project, the challenges focus on harmonising data infrastructures and ensuring interoperability across national borders. Key issues include data exchange, compliance with EU directives like INSPIRE, renewable energy coordination, and maritime information sharing.

The solution proposed in this pilot action is operational in nature. Specifically, it involved creating an international official dataset compliant with the INSPIRE Directive, alongside a data agreement to facilitate data sharing and technical interoperability among the involved countries.

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.

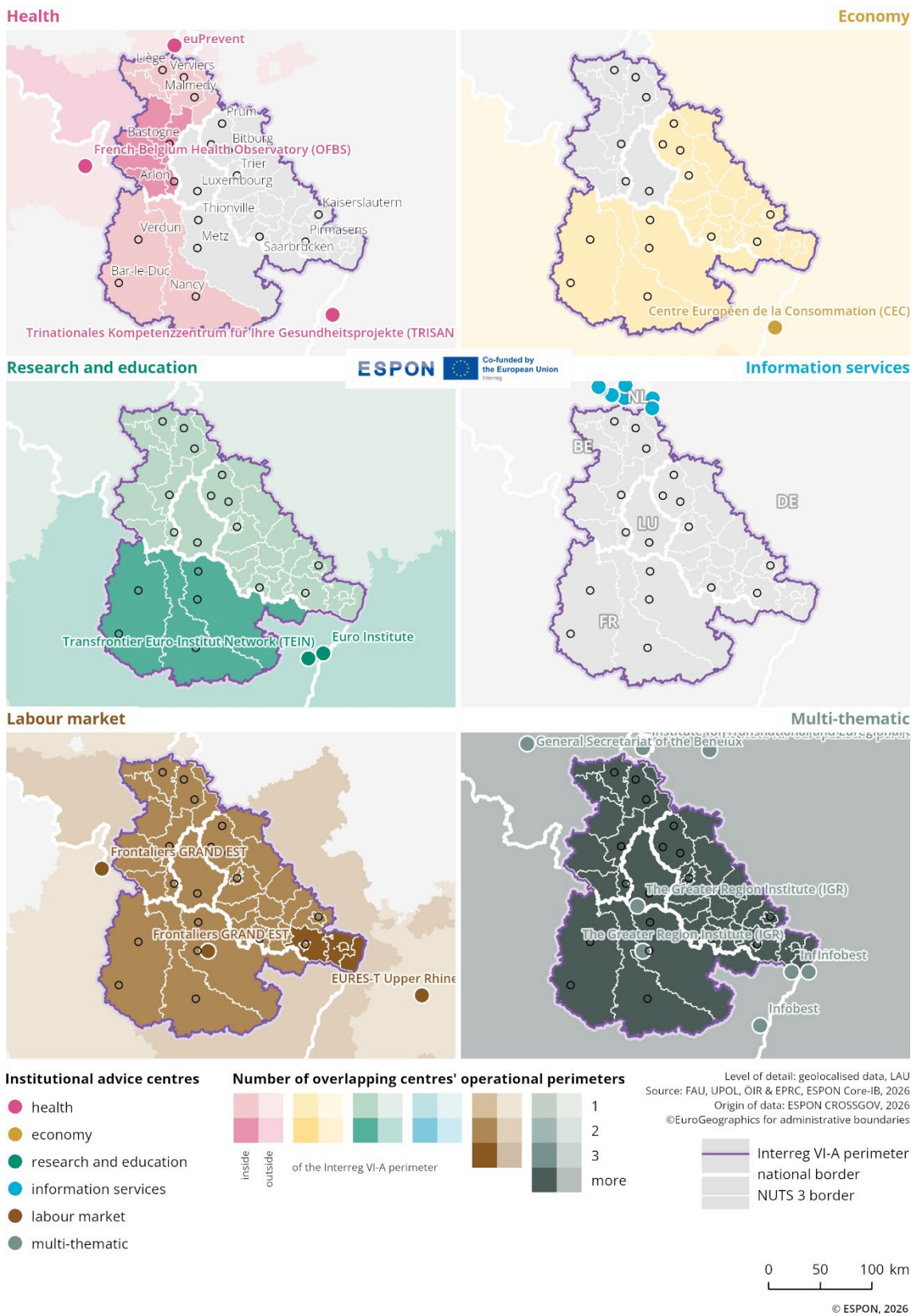
Figure 2.39 shows the locations and types of institutionalised advice centres, along with their operational domains, in the cross-border Interreg region between Belgium, Germany, Luxembourg and France (Grande Région/Großregion). These centres throughout Europe provide support in various fields such as 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.

Within the Interreg region, there are 2 multi-thematic institutionalised advice centres, both of which are part of the Greater Region Institute (IGR). One is located at the national border between Luxembourg and France, while the other is further south in the French city of Metz. Metz also has a labour market-oriented institutionalised advice centre called Frontaliers GRAND EST.

Just beyond the Interreg region perimeter, there are several institutionalised advice centres located in the north, south, and west. In the northern part, there are multiple information centres, including the Institute for Transnational and Euregional Cross-Border Cooperation and Mobility (ITEM). The western part includes both a health-focused institutionalised advice centre, the French-Belgian Health Observatory (OFBS), and a labour market-oriented centre, which also belongs to Frontaliers GRAND EST. In the southern part, a wide range of institutionalised advice centres can be found, including 2 in the fields of education and research, one with an economic focus, one health-related, and one multi-thematic centre.

Across the entire Interreg area, multi-thematic and labour market operational domains are equally presented in all 4 countries. Research and education domains are also active throughout the region, though with regional differences: these domains are less pronounced in the German, Luxembourg, and Belgian parts compared to the French part of the Interreg region. Health-related operational domains can be found in both the Belgian and French parts, although they are less prominent in the French part.

Figure 2.39: Institutionalised cross-border advice centres



2.6.2 Outline of Interreg activities

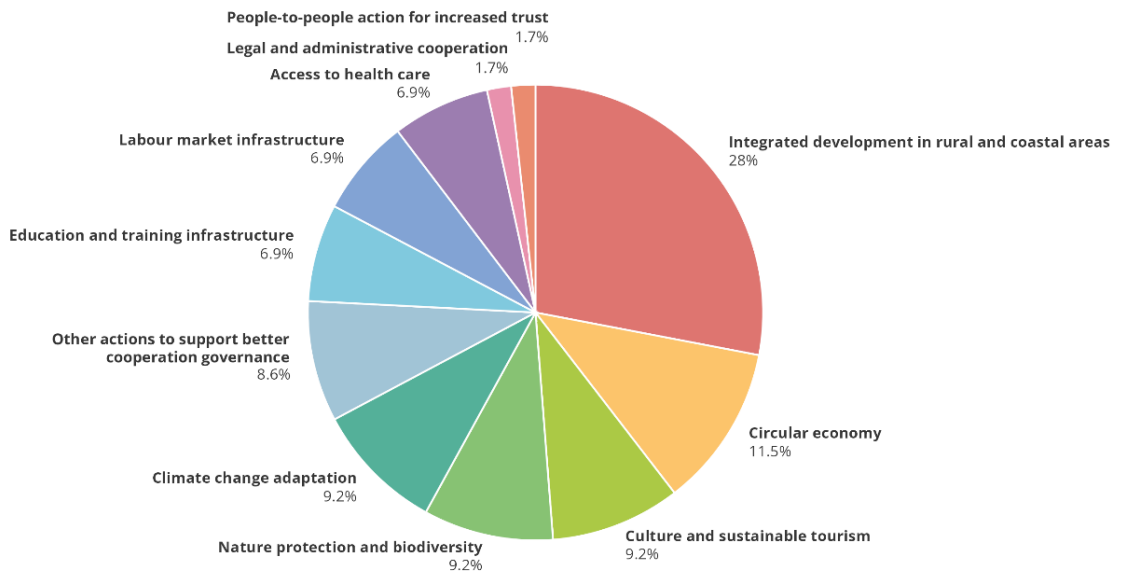
The following section outlines the key Interreg activities in the 2021-2027 programming period. The aspects included concern the development opportunities and challenges identified (see Table 2), the budget available and split of allocation (Figure 2.40), overlapping Interreg programmes and the key aspects drawn from the programme.

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

| Topic | Key development opportunities and challenges identified for Interreg 2021-27 |
|--------------------------------|--|
| Population | <ul style="list-style-type: none"> ▪ High population density ▪ Disparities, concentration of urban centres and high per capital GDP areas but areas below national averages for GDP |
| Labour market | <ul style="list-style-type: none"> ▪ High levels of cross-border commuting ▪ The GR is the EU cooperation area with the largest cross-border labour market |
| Economy | <ul style="list-style-type: none"> ▪ Challenges related to digital technologies, data centres and cybersecurity, the relocation of manufacturing, pharmaceutical, and agricultural production sectors, the greater development of future industries and the circular economy, and partnerships in the fields of artificial intelligence, biotechnology, and environmental and energy technologies. ▪ Weak cross-border cooperation in Circular economy, bioeconomy, and resource efficiency. |
| Social | <ul style="list-style-type: none"> ▪ Opportunities for mobility and exchange in a cross-border context, especially for vulnerable groups ▪ Cross-border health and education services |
| Climate and environment | <ul style="list-style-type: none"> ▪ Extreme weather events (e.g., floods, heavy rain, storms, hail, heatwaves and droughts). ▪ Addressing negative impacts on biodiversity. |

Total Budget: EUR 303,237,331.25

Figure 2.40: Split of Interreg allocation



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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.²³ 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) |
|---------------------------|----------------------------|
| 3 | 1 |

Key aspects

- › Focuses on creating a greener Grande Région by investing in green infrastructure and sustainable energy projects.
- › Foster a more socially aware region by improving healthcare cooperation through initiatives like a cross-border health observatory and joint training programmes for medical professionals.
- › Preservation and promotion of cultural heritage sites.
- › Some territories within the programme area also participate in Interreg 2021-27 Interreg A Belgium-France, Netherlands-Belgium-Germany, France-Germany-Switzerland and Interreg B North West Europe.

²³ 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.

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 completeness²⁴. 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

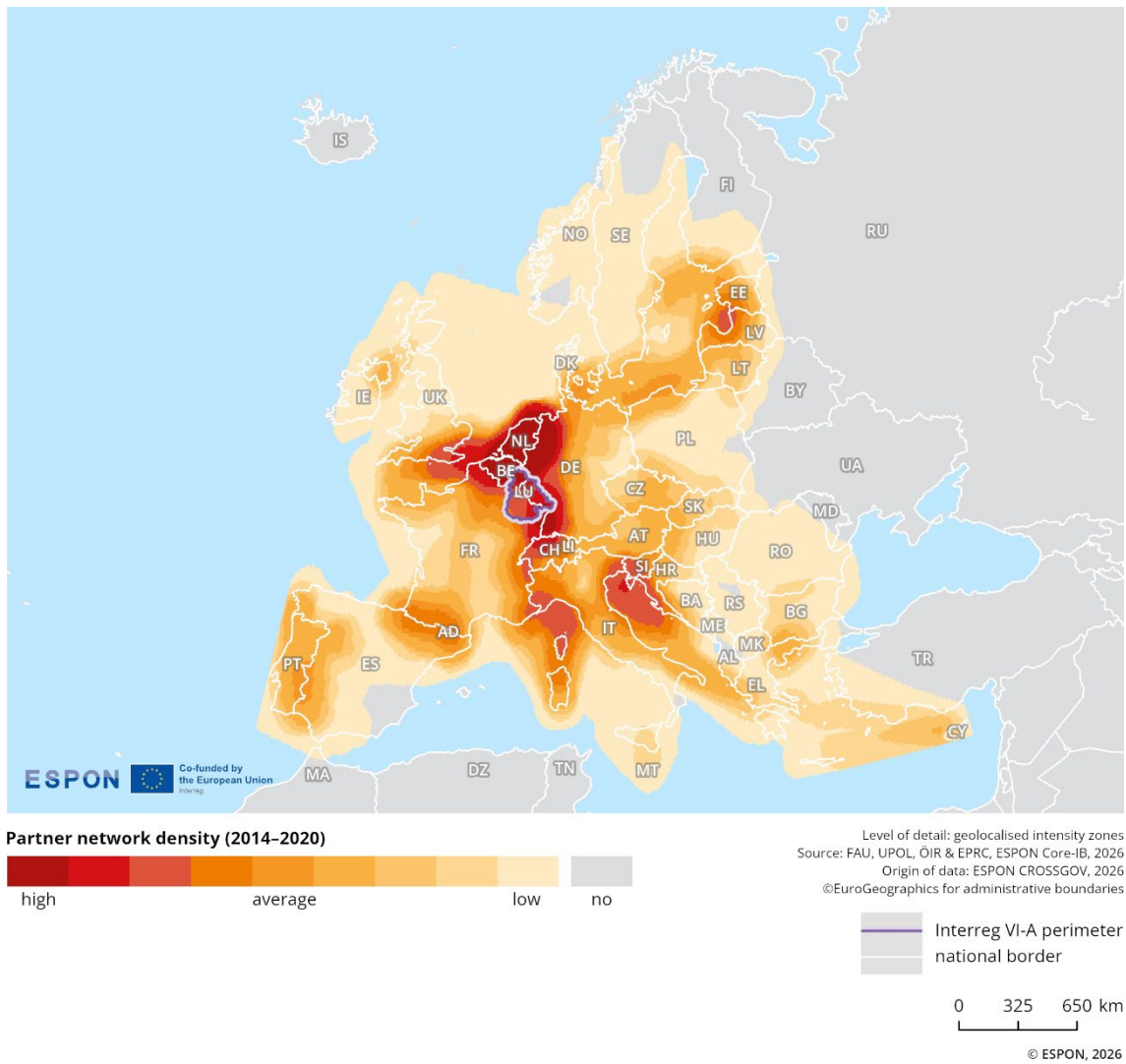
Please refer to the technical annex for more information.

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 2.41 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 Grande Région/Großregion border area appears quite evenly spread. No specific border segments within the programme area show significantly higher or lower network levels than others. The partner network density in this border area is higher than the European average. Based on the keep.eu database and excluding duplicates, the number of project partners decreased from 593 in Interreg IV-A (2007–2013) to 450 in Interreg V-A (2014–2020), a decrease of about 24%. 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.

²⁴ see [Keep.eu representativeness: Interreg, Interreg-IPA and ENI cross-border](#)

Figure 2.41: Interreg V-A partner network density



2.6.3 Key messages on the governance dimension

The governance structure of this Interreg region reflects the high level of functional integration: A large number of institutionalised cooperation structures are supported by a series of 'softer' cooperation processes that accompany the high level of cross-border integration. Cooperation involves all levels, from municipal to national, and covers a broad range of sectoral topics. Some indicator patterns may appear asymmetric, such as the presence of cross-border advice centres in only some areas, the geography of cross-border public services, and the role of bilateral agreements, particularly the Treaty of Aachen/Aix-la-Chapelle. However, these arguments must be considered in the context of the dynamic development of specific administrative cultures on either side of the border. Overall, the governance setting addresses the high relevance of cross-border functional areas for the functioning of the region as such.

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 | <ul style="list-style-type: none"> • The cross-border region shows a polycentric structure with by a metropolitan core on the Luxembourgish side; • The structure is characterised by a broad gradient of highly urbanised and very rural territories, and reflects a strong dynamic of recent years; • Ensuring an adequate and sustainable level of accessibility is a challenge, given the high dynamics and the polycentric structure. |

| Territorial dimension | |
|------------------------------|--|
| <p>Policy options</p> | <p>Population and settlement related aspect</p> <ul style="list-style-type: none"> • A relevant policy option is to address cross-border regional development that needs to ensure that infrastructure provision keeps pace with growth trends, particularly in the housing sector - while at the same time allowing for a balanced consideration of sometimes competing land-use demands. <p>Accessibility related aspects</p> <ul style="list-style-type: none"> • The border region around Luxembourg is characterised by a high degree of functional integration and socio-economic development. Strong settlement and demographic dynamics underline the potential for enhanced accessibility and transport infrastructure, including cross-border connections. Responding to this dynamic through adequate and sustainable transport infrastructure remains an ongoing challenge; • Given the complexity of spatial planning processes and the substantial volumes of investment involved, transport and infrastructure planning benefits from being embedded in stable and long-term cross-border cooperation frameworks. <p>Cross-cutting aspects</p> <ul style="list-style-type: none"> • Integrated cross-border approaches to spatial development are widely recognised as a key factor for successful regional development. In a context of strong growth dynamics, a broad range of cross-border spatial development tools offers considerable potential, including cross-border monitoring, structured exchange formats and joint strategy development. |

| Economic dimension | |
|---------------------------------------|---|
| <p>Key analytical findings</p> | <ul style="list-style-type: none"> • Economic development is the driver of the polycentric cross-border development with the Luxembourgish core driving the dynamics, displaying higher values in most economic indicators than the neighbouring regions; • The strong economic development path is of cross-border character in its very core. This demands an integrated cross-border development strategy of much more fundamental character than in most other European border regions; • Despite the extremely high numbers of cross-border commuters, the real estate market is tight and poses questions of affordable housing. |

| Economic dimension | |
|---------------------------|---|
| Policy options | <p>Competitiveness related aspects</p> <ul style="list-style-type: none"> • The availability of a qualified labour force represents a central challenge in the context of highly dynamic economic development. This challenge is further reinforced by demographic change, particularly ageing trends in regions neighbouring Luxembourg and the associated decline in the share of the active population; • Safeguarding the economic performance of the region requires the consideration of a wide range of instruments and strategies. This includes the reduction of barriers to cross-border labour mobility, ranging from the recognition of qualifications to adequate solutions for cross-border commuters; • In addition, the attraction and integration of in-migrating labour constitute a cross-border potential that benefits from coordinated approaches across the region. <p>Cross-cutting aspects</p> <ul style="list-style-type: none"> • Despite considerable economic differences within the region, all subregions can be regarded as relatively strong in a European context. Nevertheless, territorial cohesion remains a relevant concern; • With a strong economic core, the polycentric structure of the region requires coordinated and moderating approaches to infrastructure investment, which form a precondition for continued economic development; • Even where actions extend beyond the formal scope of Interreg, cross-border cooperation plays an important role in continuous information exchange, trust building and strategic orientation. |

| Green dimension | |
|--------------------------------|--|
| Key analytical findings | <ul style="list-style-type: none"> • Some of the indicators show that the cross-border integration is not very high on this field: Nature protection measures do not appear to have a very intense cross-border character, even if the national borders are not often linked to natural features (as mountain ranges); • With regard to renewable energy, there are clear border effects, both in terms of energy production and related infrastructure; • Natural risks are mainly to be found on the topic of landslides; • In the production sector, a series of sustainability challenges persist, as shown for the circular economy. |
| Policy options | <p>Cross-border cooperation potentials</p> <ul style="list-style-type: none"> • Several of the identified challenges are particularly well suited to cross-border cooperation, notably the alignment of green infrastructure and protection measures. In a context where ecological connectivity is gaining importance, border effects represent a relevant barrier that can be addressed through cooperation. Cooperation projects could address joint approaches to protected area identification and coordinated natural area management; • Risk management represents a traditional and highly relevant field of cross-border exchange, as aligned risk assessments, emergency planning and monitoring systems tend to be more robust when coordinated across borders; • Other topics, such as energy-related issues, are more difficult to address at the cross-border regional scale, as they are often embedded in European or multinational policy frameworks. <p>Cross-cutting aspects</p> <ul style="list-style-type: none"> • Many environmental challenges affect all parts of the programme area without having a predominantly border-related dimension, as is the case for climate change adaptation or the decarbonisation of the economy. Nevertheless, in indirect terms, cross-border cooperation can still provide added value, particularly through shared information bases and reliable communication channels; • A more specific issue concerns the integration of environmental considerations in the context of economic and demographic growth. A highly relevant policy option is the development of settlement and infrastructure systems that take into account environmental concerns and ecological connectivity, including across borders. |

| Socio-economic dimension | |
|---------------------------------|--|
| Key analytical findings | <ul style="list-style-type: none"> • Social integration – based on the social-media interaction – shows rather high value in this region that is economically highly integrated; • The accessibility to services of interest reflects differences in domestic policy approaches and also urban-rural gradients, with higher values in eastern parts than in the west; • The tourist sector is present in the whole region, with attractions both in urban centres as in natural areas; the values are not amongst the highest in Europe, but this segment plays a considerable role. |
| Policy options | <p>Sectoral aspects</p> <ul style="list-style-type: none"> • Given that a considerable share of public services is located close to the border, the potential for cross-border cooperation in this field is evident. While some services, such as healthcare, face significant legal constraints, others (e.g., retail) are more accessible for cooperation. Cross-border cooperation can play a particular role in piloting new service arrangements and reducing specific barriers; • Social integration remains a classical field of cross-border cooperation, particularly through small-scale projects. Even though formats such as school exchanges, sports events and cultural initiatives are well established, they continue to form an essential basis for addressing more complex cross-border challenges; • The tourism sector often reacts sensitively to competitive pressures. While cross-border cycling routes and the joint valorisation of points of interest near the border are well-established cooperation formats, destination management organisations tend to maintain a strong domestic focus. Cooperation on marketing, visitor management and overnight capacity remains challenging, yet joint approaches offer potential for unlocking new opportunities. <p>Cross-cutting aspect</p> <ul style="list-style-type: none"> • Cross-border spatial development needs to reflect socio-economic dynamics and territorial potentials. This is particularly relevant for cross-border public services. If efficiency is a core objective of polycentric settlement systems, the cross-border use of infrastructure can play a significant role. |

| Border security and safety dimension | |
|---|--|
| Key analytical findings | <ul style="list-style-type: none"> • The border region is amongst those cases where border controls have become more numerous in recent years, and they tend to be asymmetric (i.e. controls tend to be organised only in one direction); • Given the high relevance of cross-border integration to the region, the temporary reintroduction of controls is of high sensitivity. Border controls increase transaction cost in supply chains and they can complicate the daily lives of cross-border commuters and service providers. This is of particular importance, as the border region is amongst the most integrated ones in functional terms, and the number of borders – between 4 countries – is particularly high. In short, vulnerability and resilience is an issue here. |
| Policy options | <p>General relevance</p> <ul style="list-style-type: none"> • Border controls are predominantly a subject of European and multi-national mandates: this true for the mandates of the Schengen agreements, the European Single Market and questions of migration/asylum policies, that have been closely interlinked with border control measures. European territorial cooperation can only play a secondary role in this regard. <p>Cross-cutting aspect</p> <ul style="list-style-type: none"> • 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 | <p>In general, the programme area is amongst those regions with a particular rich governance setting:</p> <ul style="list-style-type: none"> • A comparably large number of institutionalised cooperation format is backed with a series of 'softer' cooperation processes, that accompany the high dynamics of cross-border integration. The cooperation involves all levels, from the municipal to the national levels, and covers a broad range of sectoral topics; • Some of the indicator patterns might be seen as rather asymmetric, as the use of the b-solutions programme, the presence of the cross-border advice centres in only some areas, the cross-border public services geography or the role of the bilateral agreements. However, these arguments have also to be seen against the background of specific administrative cultures on either side of the borders. |
| Policy options | <p>It is beyond the scope of this project to formulate specific governance recommendations, particularly given the advanced cooperation setting in this region. Nevertheless, the general potential of cross-border cooperation also applies in this context, notably through:</p> <ul style="list-style-type: none"> • The maintenance and strengthening of trust-based personal relations across governance levels and sectors, enabling engagement with more sensitive issues; • The support of pilot actions and innovative governance solutions, particularly in their early phases; • The transfer and scaling-up of governance solutions that have proven effective in one sector to other fields, for example through cross-border monitoring systems and exchange mechanisms for critical situations. |

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